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SHOULDER GIRDLE

Kinesio Taping

Int J Sports Med. 2013 Nov;34(11):950-5. doi: 10.1055/s-0033-1334911. Epub 2013 May 13.

Does the application of kinesiotape change scapular kinematics in healthy female handball players?

Van Herzeele M, van Cingel R, Maenhout A, De Mey K, Cools A.
Source

Rehabilitation Sciences an Physiotherapy, Ghent University, Ghent, Belgium.

Abstract
Elastic taping is widely used in sports medicine for correcting functional alignment and muscle recruitment.

However, evidence regarding its influence on scapular dynamic positioning is scarce. This study aimed to investigate the effect of a specific kinesiotaping method on scapular kinematics in female elite handball players without shoulder complaints. 25 athletes (18.0±1.5 years) active in the highest national division were recruited. All subjects received an elastic adhesive tape (K-active tape©) with the purpose to correct scapular position. 3-dimensional scapular motion measurements were performed (Fastrak®) during humeral elevation in the sagittal, frontal and scapular plane. The results showed that taping has a moderate to large effect (Cohen's d>0.7) towards scapular posterior tilting, in all 3 planes of humeral movement and for all angles of elevation (mean posteriorizing effect of 4.23°, 3.23° and 4.33° respectively for elevation in the sagittal, frontal and scapular plane, p<0.001). In addition, taping also moderately increased the scapular upward rotation at 30°, 60° and 90° of humeral abduction (mean increase of 2.90°, Cohen's d>0.7).

Together these results suggest that kinesiotape application causes positive changes in scapular motion. This could support its use in sports medicine for preventing shoulder problems in overhead athletes.

PMID: 23670362

Shoulder/AC joint/diagnostic accuracy

BMC Musculoskelet Disord. 2013 May 1;14(1):156. [Epub ahead of print]

Shoulder pain in primary care: diagnostic accuracy of clinical examination tests for non-traumatic acromioclavicular joint pain.

Cadogan A, McNair P, Laslett M, Hing W.

BACKGROUND:

Despite numerous methodological flaws in previous study designs and the lack of validation in primary care populations, clinical tests for identifying acromioclavicular joint (ACJ) pain are widely utilised without concern for such issues. The aim of this study was to estimate the diagnostic accuracy of traditional ACJ tests and to compare their accuracy with other clinical examination features for identifying a predominant ACJ pain source in a primary care cohort.

METHODS:

Consecutive patients with shoulder pain were recruited prospectively from primary health care clinics. Following a standardised clinical examination and diagnostic injection into the subacromial bursa, all participants received a fluoroscopically guided diagnostic block of 1% lidocaine hydrochloride (XylocaineTM) into the ACJ. Diagnostic accuracy statistics including sensitivity, specificity, predictive values, positive and negative likelihood ratios (LR+ and LR-) were calculated for traditional ACJ tests (Active Compression/O'Brien's test, cross-body adduction, localised ACJ tenderness and Hawkins-Kennedy test), and for individual and combinations of clinical examination variables that were associated with a positive anaesthetic response (PAR) (P<=0.05) defined as 80% or more reduction in post-injection pain intensity during provocative clinical tests.

RESULTS:

Twenty two of 153 participants (14%) reported an 80% PAR. None of the traditional ACJ tests were associated with an 80% PAR (P<0.05) and combinations of traditional tests were not able to discriminate between a PAR and a negative anaesthetic response (AUC 0.507; 95% CI: 0.366, 0.647; P>0.05). Five clinical examination variables (repetitive mechanism of pain onset, no referred pain below the elbow, thickened or swollen ACJ, no symptom provocation during passive glenohumeral abduction and external rotation) were associated with an 80% PAR (P<0.05) and demonstrated an ability to accurately discriminate between an PAR and NAR (AUC 0.791; 95% CI 0.702, 0.880; P<0.001). Less than two positive clinical features resulted in 96% sensitivity (95% CI 0.78, 0.99) and a LR- 0.09 (95% CI 0.02, 0.41) and four positive clinical features resulted in 95% specificity (95% CI 0.90, 0.98) and a LR+ of 4.98 (95% CI 1.69, 13.84).

CONCLUSIONS:

In this cohort of primary care patients with predominantly subacute or chronic ACJ pain of non-traumatic onset, traditional ACJ tests were of limited diagnostic value. Combinations of other history and physical examination findings were able to more accurately identify injection-confirmed ACJ pain in this cohort. PMID:23634871

Shoulder/Claviculectomy

Man Ther. 2013 Mar 18. pii: S1356-689X(13)00037-4. doi: 10.1016/j.math.2013.02.008. [Epub ahead of print]

Three-dimensional shoulder kinematics after total claviculectomy: A biomechanical investigation of a single case.

Camargo PR, Phadke V, Braman JP, Ludewig PM.

Source

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Abstract

Since total claviculectomy is an uncommon surgical procedure, few case reports exist in the literature. This report describes the three-dimensional scapulothoracic kinematics in a subject with unilateral total claviculectomy. Kinematic data were collected during shoulder protraction with arms at the side of the body, horizontal arm adduction at 90° of elevation, humeral internal/external rotation with the arm at 90° of elevation in the frontal plane, and elevation and lowering of the arm in the sagittal plane. Descriptive data were compared to the subject's contralateral shoulder. Scapulohumeral rhythm during arm elevation in the sagittal plane was calculated for both sides.

Overall the subject demonstrated excessive scapular mobility. However, kinematics during elevation were similar to the contralateral side during elevation. The subject demonstrates good muscle control despite the lack of normal sternoclavicular and acromioclavicular joint articulations. His relatively well-preserved shoulder biomechanics belied his ongoing symptoms, especially involving pain with activities that required use of the arm away from the side.

 PMID:23518038

Scapula/exercise/orientation

Conscious Correction of Scapular Orientation in Overhead Athletes Performing Selected Shoulder Rehabilitation Exercises: The Effect on Trapezius Muscle Activation Measured by Surface Electromyography

Kristof De Mey, Lieven A. Danneels, Barbara Cagnie, Lies Huyghe, Elien Seyns, Ann M. Cools
DOI: 10.2519/jospt.2013.4283

STUDY DESIGN: Controlled laboratory study.
OBJECTIVES: To assess the effect of conscious correction of scapular orientation on the activation of the 3 sections of the trapezius muscle during shoulder exercises in overhead athletes with scapular dyskinesis.
BACKGROUND: Previous research has led to the recommendation of 4 exercises for training of the trapezius muscle: prone extension, sidelying external rotation, sidelying forward flexion, and prone horizontal abduction with external rotation. However, the extent to which conscious correction of scapular orientation impacts trapezius muscle activation levels during these exercises is unknown.
METHODS: Absolute (upper trapezius [UT], middle trapezius [MT], lower trapezius [LT]) and relative (UT/MT and UT/LT) muscle activation levels were determined with surface electromyography in 30 asymptomatic overhead athletes with scapular dyskinesis, during 4 selected exercises performed with and without conscious correction of scapular orientation. Repeated-measures analyses of variance were used to determine if a voluntary scapular orientation correction strategy influenced the activation levels of the different sections of the trapezius during each exercise.
RESULTS: With conscious correction of scapular orientation, activation levels of the 3 sections of the trapezius muscle significantly increased during prone extension (mean ± SD difference: UT, 5.9% ± 8.6% maximal voluntary isometric contraction [MVIC]; MT, 13.8% ± 11.0% MVIC; LT, 9.8% ± 10.8% MVIC; $P<.05$) and sidelying external rotation (UT, 2.2% ± 4.4% MVIC; MT, 6.7% ± 10.6% MVIC; LT, 13.3% ± 24.4% MVIC; $P<.05$). There was no difference between conditions for sidelying forward flexion and prone horizontal abduction with external rotation. The UT/MT and UT/LT ratios were similar between conditions for all 4 exercises.
CONCLUSION: Conscious correction of scapular orientation during the prone extension and sidelying external rotation exercises can be used to increase the activation level in the 3 sections of the trapezius in overhead athletes with scapular dyskinesis. Although lack of kinematic data limits the interpretation of the results, this study suggests that conscious correction of scapular orientation can be performed without altering the favorable UT/MT and UT/LT ratios that have been previously reported for these exercises.

J Orthop Sports Phys Ther 2013;43(1):3-10. Epub 16 November 2012. doi:10.2519/jospt.2013.4283
KEY WORDS: muscle balance, overhead injury, scapular dyskinesis, shoulder pathology

The authors assess the effect of conscious correction of scapular orientation on the activation of the 3 sections of the trapezius muscle during shoulder exercises in overhead athletes with scapular dyskinesis.

C-spine/scapula

Manual Therapy Volume 16, Issue 6 , Pages 585-589, December 2011

Effects of passive correction of scapular position on pain, proprioception, and range of motion in neck-pain patients with bilateral scapular downward-rotation syndrome☆

Sung-min Ha, Oh-yun Kwon, Chung-hwi Yi, Hye-seon Jeon, Won-hwee Lee

The effects of passive correction of scapular position (PCSPT) on pain, proprioception, and range of motion (ROM) were investigated in neck-pain patients with bilateral scapular downward-rotation (SDR).

Fifteen neck-pain patients with bilateral SDR were recruited from a workplace based work-conditioning center. The intensity of pain felt was quantified using a visual analogue scale. Kinematic data for ROM and joint-position error (JPE) were analyzed using a 3-dimensional motion-analysis system. Differences in pain, JPE, and ROM with and without PCSPT were assessed using a paired *t*-test. PCSPT significantly decreased JPE and neck pain during active neck rotation and significantly increased neck-rotation ROM ($p < 0.05$).

These findings suggest that PCSPT results in decreased neck pain and improved neck-rotation ROM and proprioception during active neck rotation in neck-pain patients with bilateral SDR.

Scapula position

The effects of manual treatment on rounded-shoulder posture, and associated muscle strength.

Wong CK, Coleman D, Dipersia V, Song J, Wright D

Journal of bodywork and movement therapies Add to My Journals List

201010 14(4):326-33 Language: eng Country: United States Columbia University, 710 West 168th Street, NI8, New York, NY 10032, USA. ckw7@columbia.edu SUMMARY: A relationship between pectoralis minor muscle tightness and rounded shoulder posture (RSP) has been suggested, but evidence demonstrating that treatment aimed at the pectoralis minor affects posture or muscle function such as lower trapezius strength (LTS) remains lacking. In this randomized, blinded, controlled study of the 56 shoulders of 28 healthy participants, the experimental treatment consisting of pectoralis minor soft tissue mobilization (STM) and self-stretching significantly reduced RSP compared to the pre-treatment baseline (Friedman test, $p<.001$) and the control treatment of placebo touch and pectoralis major self-stretching (Mann-Whitney U-test, $p<.01$). RSP remained significantly reduced 2 weeks after the single treatment.

Both control and experimental treatments resulted in increased LTS (Friedman test, $p<.01$) with no significant difference in LTS noted between treatments ($p>.05$).

This study demonstrated that STM and self-stretching of the pectoralis minor can significantly reduce RSP. PMID: 20850039

Acromion shape

Do anatomic variants of the acromion shape in the frontal plane influence pain and function in calcifying tendinitis of the shoulder

Knee Surgery, Sports Traumatology, Arthroscopy, 06/15/2011

Purpose

To evaluate the relationship of a large acromion index and calcifying tendinitis of the supraspinatus tendon at the shoulder.

Materials and methods

Between 2002 and 2008, 109 consecutive patients with isolated calcifying tendinitis of the supraspinatus tendon were prospectively analysed by clinical investigation and standardized radiographs. Deposit size and appearance were measured and classified according to Bosworth and Gartner. The acromion index (AI) was calculated based on measurements on true anteroposterior radiographs. Pain record on VAS scale, active and passive range of motion and the constant score (CS) were recorded.

Results

The mean age of the patients was 48.2 ± 8.0 (n = 46 male 48.6 ± 7.3; n = 63 female 47.9 ± 8.6; P > 0.05). Pain and function were not significantly correlated with deposit size or classification. The acromion index (mean 0.64 ± 0.08) was not significantly correlated with the affected or dominant side, gender, deposit size or classification or any functional parameter like pain and the CS or its subgroups.

Conclusion

The theoretical concept of a high acromion index resulting in an increased resulting upward force against the subacromial space, which influences pain and function in calcifying tendinitis of the shoulder, was not supported.

Level of evidence Diagnostic clinical study, Level II.

Acromion

Do anatomic variants of the acromion shape in the frontal plane influence pain and function in calcifying tendinitis of the shoulder

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Level of evidence: Diagnostic clinical study, Level II.

Do anatomic variants of the acromion shape in the frontal plane influence pain and function in calcifying tendinitis of the shoulder. *Sports Traumatology*. Jun 2011. (*Entered July 2011)*

AC Joint

Manual Physical Therapy for Injection-Confirmed Nonacute Acromioclavicular Joint Pain

Kevin D. Harris, Gail D. Deyle, Norman W. Gill, Robert R. Howes
DOI: 10.2519/jospt.2012.3866

STUDY DESIGN: Prospective single-cohort study.

OBJECTIVES: To determine and document changes in pain and disability in patients with primary, nonacute acromioclavicular joint (ACJ) pain treated with a manual therapy approach.

BACKGROUND: To our knowledge, there are no published studies on the physical therapy management of nonacute ACJ pain. Manual physical therapy has been successful in the treatment of other shoulder conditions.

METHODS: The chief inclusion criterion was greater than 50% pain relief with an ACJ diagnostic injection. Patients were excluded if they had sustained an ACJ injury within the previous 12 months. Treatment was conducted utilizing a manual physical therapy approach that addressed all associated impairments in the shoulder girdle and cervicothoracic spine. The primary outcome measure was the Shoulder Pain and Disability Index. Secondary measures were the American Shoulder and Elbow Surgeon and global rating of change scales. Outcomes were collected at baseline, 4 weeks, and 6 months. The Shoulder Pain and Disability Index and American Shoulder and Elbow Surgeon scale values were analyzed with a repeated-measures analysis of variance.

RESULTS: Thirteen patients (11 male; mean ± SD age, 41.1 ± 9.6 years) completed treatment consisting of an average of 6.4 sessions. Compared to baseline, there was a statistically significant and clinically meaningful improvement for the Shoulder Pain and Disability Index at 4 weeks (P = .001; mean, 25.9 points; 95% confidence interval [CI]: 11.9, 39.8) and 6 months (P<.001; mean, 29.8 points; 95% CI: 16.5, 43.0), and the American Shoulder and Elbow Surgeon scale at 4 weeks (P<.001; mean, 27.9 points; 95% CI: 14.7, 41.1) and 6 months (P<.001; mean, 32.6 points; 95% CI: 21.2, 43.9).

CONCLUSION: Statistically significant and clinically meaningful improvements were observed in all outcome measures at 4 weeks and 6 months, following a short series of manual therapy interventions. These results, in a small cohort of patients, suggest the efficacy of this treatment approach but need to be verified by a randomized controlled trial.

LEVEL OF EVIDENCE: Therapy, level 4.
J Orthop Sports Phys Ther 2012:42(2):66-80, Epub 25 October 2011.
oi:10.2519/jospt.2012.3866

Shoulder/scapula/Kinematics

Dynamic In Vivo Glenohumeral Kinematics During Scapular Plane Abduction in Healthy Shoulders

Keisuke Matsuki, Kei O. Matsuki, Satoshi Yamaguchi, Nobuyasu Ochiai, Takahisa Sasho, Hiroyuki Sugaya, Tomoaki Toyone, Yuichi Wada, Kazuhisa Takahashi, Scott A. Banks
DOI: 10.2519/jospt.2012.3584

S**TUDY DESIGN:** Controlled laboratory study.
OBJECTIVES: To measure superior/inferior translation and external rotation of the humerus relative to the scapula during scapular plane abduction using 3-D/2-D model image registration techniques.

BACKGROUND: Kinematic changes in the glenohumeral joint, including excessive superior translation of the humeral head and inadequate external rotation of the humerus, are believed to be a possible cause of shoulder impingement. Although many researchers have analyzed glenohumeral kinematics with various methods, few articles have assessed dynamic in vivo glenohumeral motion.

METHODS: Twelve healthy males with a mean age of 32 years (range, 27-36 years) were enrolled in this study. Fluoroscopic images of the dominant shoulder during scapular plane elevation were taken, and computed tomography-derived 3-D bone models were matched with the silhouette of the bones in the fluoroscopic images using 3-D/2-D model image registration techniques. The kinematics of the humerus relative to the scapula were determined using Euler angles.

RESULTS: On average, there was 2.1 mm of initial humeral translation in the superior direction from the starting position to 105° of humeral elevation. Subsequently, an average of 0.9 mm of translation in the inferior direction occurred between 105° and maximum arm elevation. The average amount of external rotation of the humerus was 14° from the starting position to 60° of humeral elevation. The humerus then rotated internally an average 9° by the time the shoulder reached maximum elevation. These changes in superior/inferior translation and external/internal rotation were statistically significant ($P<.001$ and $P = .001$, respectively), based on 1-way repeated-measures analysis of variance.

CONCLUSION: The observed glenohumeral translations and rotations characterize healthy shoulder function and serve as a preliminary foundation for quantifying pathomechanics in the presence of glenohumeral joint disorders.

J Orthop Sports Phys Ther 2012;42(2):96-104, Epub 25 October 2011. doi:10.2519/jospt.2012.3584 **KEY WORDS:** 3-D/2-D registration, arthrokinematics, computed tomography, imaging, impingement

Subscapularis Lesion

Knee Surgery, Sports Traumatology, Arthroscopy December 2013

Internal rotation resistance test at abduction and external rotation: a new clinical test for diagnosing subscapularis lesions

Lin Lin, Hui Yan, Jian Xiao, Yingfang Ao, Guoqing Cui

Abstract

Purpose

A new clinical test for evaluating subscapularis (SSC) integrity was described, and its diagnostic value was compared with the present SSC tests (the lift-off, belly-press, IRLS and bear-hug tests). The new test is called internal rotation resistance test at abduction and external rotation (IRRT). The test is performed at maximal 90° of abduction and maximal external rotation.

Methods

Two hundred and thirty-five consecutive patients suffering from rotator cuff injury were evaluated preoperatively. Six tests were performed to assess the function of the SSC: the lift-off, belly-press, IRLS, the bear-hug, IRRT at 0° abduction and 0° external rotation (IRRT0°) and IRRT at maximal 90° abduction and maximal external rotation (IRRTM). Arthroscopic findings were the reference for diagnosing of SSC lesions.

Results

The IRRTM test showed the greatest sensitivity (76.5 %), and IRLS (31.6 %) test had the lowest sensitivity. The IRRTM had the highest accuracy (79.0 %), and lift-off had the lowest accuracy (65.3 %). Positive IRRTM, bear-hug, belly-press, IRRT0° tests indicate that about one-third of the SSC is torn, and a positive lift-off and IRLS tests predict a severe tear at least two-thirds of the SSC.

Conclusions

The IRRTM represents a sensitive diagnostic test for SSC lesions and improves the chance of finding the upper part of the SSC tears. When the IRRTM is positive, the surgeon should pay particular attention to detecting the SSC tendon during arthroscopy.

Level of evidence

Diagnostic study, Level I.

Scapula Kinematics

J Biomech. 2012 Aug 9;45(12):2176-9.

Identification of scapular kinematics using surface mapping: A validation study.

Mattson JM, Russo SA, Rose WC, Rowley KM, Richards JG.

Source

Human Performance Lab, Biomechanics and Movement Science Program, Department of Kinesiology and Applied Physiology, University of Delaware, Newark, DE 19716, USA.

Abstract

The immediate goal of this study was to develop and validate a noninvasive, computational surface mapping approach for measuring scapular kinematics by using available motion capture technology in an innovative manner.

The long-term goal is to facilitate clinical determination of the role of the scapula in children with brachial plexus birth palsy (BPBP). The population for this study consisted of fourteen healthy adults with prominent scapulae. Subject-specific scapular templates were created using the coordinates of five scapular landmarks obtained from palpation with subjects seated and arms relaxed in a neutral position. The scapular landmarks were re-palpated and their locations recorded in the six arm positions of the modified Mallet classification. The six Mallet positions were repeated with approximately 300 markers covering the scapula. The markers formed a surface map covering the tissue over the scapula. The scapular template created in the neutral position was iteratively fit to the surface map of each trial, providing an estimate of the orientation of the scapula. These estimates of scapular orientation were compared to the known scapular orientation determined from the scapular landmarks palpated in each Mallet position. The magnitude of the largest mean difference about an anatomical axis between the two measures of scapular orientation was 3.8° with an RMS error of 5.9°.

This technique is practical for populations with visibly prominent scapulae (e.g., BPBP patients), for which it is a viable alternative to existing clinical methods with comparable accuracy.

Identification of scapular kinematics using surface mapping: A validation study. Mattson JM, Russo SA, Rose WC, Rowley KM, Richards JG. *J Biomech. 2012 Aug 9*

Scapula Assessment/Impingement

Br J Sports Med. 2012 Jul 21.

Clinical assessment of the scapula: a review of the literature.

Struyf F, Nijs J, Mottram S, Roussel NA, Cools AM, Meeusen R.
Source

Department of Healthcare, Division of Musculoskeletal Physiotherapy, Artesis University College Antwerp, Merksem, Antwerp, Belgium.

Abstract
Scientific evidence supporting a role for faulty scapular positioning in patients with various shoulder disorders is cumulating.

Clinicians who manage patients with shoulder pain and athletes at risk of developing shoulder pain need to have the skills to assess static and dynamic scapular positioning and dynamic control. Several methods for the assessment of scapular positioning are described in scientific literature. However, the majority uses expensive and specialised equipment (laboratory methods), making their use in clinical practice nearly impossible. On the basis of biometric and kinematic studies, guidelines for interpreting the observation of static and dynamic scapular positioning pattern in patients with shoulder pain are provided. At this point, clinicians can use reliable clinical tests for the assessment of both static and dynamic scapular positioning in patients with shoulder pain. However, this review also provides clinicians several possible pitfalls when performing clinical scapular evaluation. On the basis of its clinical relevance, its proven reliability, its relation to body length and its applicability in a clinical setting, this review recommends to assess the scapula both static (visual observation and acromial distance or Baylor/double square method for shoulder protraction) and semidynamic (visual observation and inclinometry for scapular upward rotation).

In addition, when the patient demonstrates with shoulder impingement symptoms, the scapular repositioning test and scapular assistant test are recommended for relating the patients' symptoms to the position or movement of the scapula.

PMID: 22821720 [PubMed - as supplied by publisher

Scapula Dyskinesis

J Am Acad Orthop Surg. 2012 Jun;20(6):364-72.

Scapular dyskinesis and its relation to shoulder injury.

Kibler WB, Sciascia A, Wilkes T.
Source

The Shoulder Center of Kentucky, Lexington, KY, USA.

Abstract
The scapula plays a key role in nearly every aspect of normal shoulder function. Scapular dyskinesis-altered scapular positioning and motion-is found in association with most shoulder injuries.

Basic science and clinical research findings have led to the identification of normal three-dimensional scapular kinematics in scapulohumeral rhythm and to abnormal kinematics in shoulder injury, the development of clinical methods of evaluating the scapula (eg, scapular assistance test, scapular retraction test), and the formulation of rehabilitation guidelines.

Primary scapular presentations such as scapular winging and snapping should be managed with a protocol that is focused on the scapula. Persons with associated conditions such as shoulder impingement, rotator cuff disease, labral injury, clavicle fracture, acromioclavicular joint injury, and multidirectional instability should be evaluated for scapular dyskinesis and treated accordingly.

Scapula/exercise

Am J Sports Med. 2012 Aug;40(8):1906-15. Epub 2012 Jul 11.

Scapular muscle rehabilitation exercises in overhead athletes with impingement symptoms: effect of a 6-week training program on muscle recruitment and functional outcome.

De Mey K, Danneels L, Cagnie B, Cools AM.

Source

Kristof De Mey,Ghent University Hospital, Department of Rehabilitation Sciences and Physiotherapy, De Pintelaan 185, 2B3, B9000 Ghent, Belgium. Kristof.demey@ugent.be.

Abstract

BACKGROUND:
Previous research has identified some specific exercises to correct scapular muscle balance and onset timing in healthy subjects. However, evidence for their effectiveness in overhead athletes with impingement symptoms has been lacking until now.

HYPOTHESIS:
A 6-week exercise program consisting of previously selected exercises is able to improve muscle activation and onset timing during shoulder elevation. This program may also change pain and functionality levels in overhead athletes with mild impingement symptoms.

STUDY DESIGN:
Case series; Level of evidence, 4.

METHODS:
Forty-seven overhead athletes with mild impingement symptoms (25 men and 22 women) were enrolled in this study. Before and after the 6-week training program, the Shoulder Pain and Disability Index (SPADI) score was individually obtained and maximum voluntary isometric contraction (MVIC) values were determined by surface electromyography. Mean muscle activation levels, muscle ratio data, and muscle onset timing were assessed for the upper (UT), middle (MT), and lower (LT) trapezius and serratus anterior (SA) muscle during arm elevation in the scapular plane.

RESULTS:
Forty participants completed the exercise program. The SPADI scores significantly decreased from 29.86 ± 17.03 during initial assessment to 11.7 ± 13.78 during postmeasurements ($P < .001$). The 3 trapezius muscle parts showed increased MVIC values and decreased activation levels during arm elevation, whereas this was not the case for the SA muscle. After the training program, UT/SA significantly decreased, whereas UT/MT and UT/LT did not change ($P < .05$). No differences in muscle timing between pre- and postmeasurements could be identified. The LT showed significant earlier activation compared with UT (-0.47; $P < .001$) and MT (-0.49; $P < .001$). The serratus anterior showed significant earlier activation compared with the UT (-0.74; $P < .001$), MT (-0.76; $P < .001$), and LT muscles ($F = 0.27$; $P = .046$).

CONCLUSION:
This is the first longitudinal study to demonstrate that previously selected exercises (1) improve pain and function based on SPADI scores, (2) reduce relative trapezius muscle activation, and (3) alter UT/SA ratios. However, they were unable to change the timing of the scapular muscles during arm elevation when compared before and after a 6-week training program in overhead athletes with mild impingement symptoms. PMID: 22785606

Acromion Shape

Do anatomic variants of the acromion shape in the frontal plane influence pain and function in calcifying tendinitis of the shoulder

Knee Surgery, Sports Traumatology, Arthroscopy, 06/15/2011

Purpose To evaluate the relationship of a large acromion index and calcifying tendinitis of the supraspinatus tendon at the shoulder.

Materials and methods Between 2002 and 2008, 109 consecutive patients with isolated calcifying tendinitis of the supraspinatus tendon were prospectively analysed by clinical investigation and standardized radiographs. Deposit size and appearance were measured and classified according to Bosworth and Gartner. The acromion index (AI) was calculated based on measurements on true anteroposterior radiographs. Pain record on VAS scale, active and passive range of motion and the constant score (CS) were recorded.

Results The mean age of the patients was 48.2 ± 8.0 (n = 46 male 48.6 ± 7.3; n = 63 female 47.9 ± 8.6; $P > 0.05$). Pain and function were not significantly correlated with deposit size or classification. The acromion index (mean 0.64 ± 0.08) was not significantly correlated with the affected or dominant side, gender, deposit size or classification or any functional parameter like pain and the CS or its subgroups.

Conclusion

The theoretical concept of a high acromion index resulting in an increased resulting upward force against the subacromial space, which influences pain and function in calcifying tendinitis of the shoulder, was not supported.

Level of evidence Diagnostic clinical study, Level II.

Scapula/Impingement

The Scapular Assistance Test Results in Changes in Scapular Position and Subacromial Space but Not Rotator Cuff Strength in Subacromial Impingement

Amee L. Seitz, Philip W. McClure, Sheryl Finucane, Jessica M. Ketchum, Matthew K. Walsworth, N. Douglas Boardman, Lori A. Michener
DOI: 10.2519/jospt.2012.3579

J Orthop Sports Phys Ther 2012;42(5):400-412, Epub 27 January 2012.
doi:10.2519/jospt.2012.3579

STUDY DESIGN: Controlled laboratory study.

OBJECTIVES: To determine the effect of the modified scapular assistance test (SAT) on 3-dimensional shoulder kinematics, strength, and linear measures of subacromial space in patients with subacromial impingement syndrome (SAIS).

BACKGROUND: Abnormal scapular kinematics have been identified in patients with SAIS. Increased scapular upward rotation and posterior tilt, as induced with manual assistance using the SAT, have been theorized to increase subacromial space and may alter shoulder strength.

METHODS: Forty-two subjects (21 with SAIS and 21 controls) participated in this study. The anterior outlet of the subacromial space, measured via the acromiohumeral distance on ultrasound images, and 3-dimensional scapular kinematics, measured using motion analysis, were determined with the arm at rest, and at 45° and 90° of active elevation with and without the SAT. A dynamometer was used to measure isometric shoulder strength. Full factorial mixed-model analyses of variance evaluated the effects of the SAT on variables between groups.

RESULTS: There was an increase in scapular posterior tilt at all angles, upward rotation at rest and 45° of elevation, and acromiohumeral distance at 45° and at 90° with the SAT. The SAT did not alter normalized isometric strength. There were no differences in response to the SAT between the SAIS and control groups.

CONCLUSIONS: Manual scapular assistance using the SAT influences factors associated with SAIS, such as subacromial space and potentially scapular orientation during static arm elevation, but not more so in individuals with SAIS than in healthy individuals. The SAT performed statically may be a way to identify potential subgroups of individuals with SAIS for whom subacromial space narrowing may be a contributing factor.

KEY WORDS: acromiohumeral distance, examination, rotator cuff disease, shoulder, ultrasound imaging

Scapula Position

Man Ther. 2012 Jul 23.

Scapular positioning assessment: Is side-to-side comparison clinically acceptable?

Morais NV, Pascoal AG.

Source

Rua Eng. Duarte Pacheco 19C, Fração AC, 3850-040 Albergaria-a-Velha, Aveiro, Portugal.

Abstract

Clinicians routinely assess scapular position and motion of the symptomatic shoulder taking as reference for the contralateral asymptomatic side. A different positioning between sides (scapular asymmetry) is often assumed as pathological, however, the symmetry of scapular kinematics in healthy individuals is yet to be demonstrated.

This study tested the hypothesis of scapular symmetry during arm elevation. The 3-dimensional scapular positioning of the dominant and non-dominant shoulders of fourteen healthy young adults was simultaneously measured by a 6 degrees of freedom electromagnetic tracking device at three positions of arm elevation: rest, hands on hips, and 90° of shoulder abduction with internal rotation. The scapula on the dominant shoulder showed greater retraction ($P < 0.001$; $\eta(2)(p) = 0.68$) and upward rotation ($P < 0.001$; $\eta(2)(p) = 0.70$) at all positions of arm elevation. From rest to 90° of shoulder abduction, the mean (±SD) amount of scapular angular displacement was, respectively for dominant and non-dominant shoulders, 7.2° (±7.8°) and 7.2° (±4.4°) for retraction, 17.4° (±5.1°) and 17.8° (±6.4°) for upward rotation, and 3.8° (±3.6°) and 0.9° (±3.6°) for posterior tilting.

These findings suggest that scapular positioning on the thorax are not the same despite the observation of an identical kinematic pattern during arm elevation. This should be taken into consideration when comparing scapular position and motion of symptomatic and contralateral shoulders.

Scapular positioning assessment: Is side-to-side comparison clinically acceptable?Nuno Valente Morais, Augusto Gil Pascoal. *Manual Therapy July25, 2012*

C Spine/Scapula

Effects of passive correction of scapular position on pain, proprioception, and range of motion in neck-pain patients with bilateral scapular downward-rotation syndrome☆

Sung-min Haa, Oh-yun Kwonb, Chung-hwi Yia, Hye-seon Jeona, Won-hwee Leea

Manual Therapy **Volume 16**, **Issue 6**, Pages 585-589 (December 2011

Abstract

The effects of passive correction of scapular position (PCSPT) on pain, proprioception, and range of motion (ROM) were investigated in neck-pain patients with bilateral scapular downward-rotation (SDR).

Fifteen neck-pain patients with bilateral SDR were recruited from a workplace based work-conditioning center. The intensity of pain felt was quantified using a visual analogue scale. Kinematic data for ROM and joint-position error (JPE) were analyzed using a 3-dimensional motion-analysis system. Differences in pain, JPE, and ROM with and without PCSPT were assessed using a paired *t*-test. PCSPT significantly decreased JPE and neck pain during active neck rotation and significantly increased neck-rotation ROM ($p < 0.05$).

These findings suggest that PCSPT results in decreased neck pain and improved neck-rotation ROM and proprioception during active neck rotation in neck-pain patients with bilateral SDR.

Serrates Anterior/scapula winging/exercise

J Electromyogr Kinesiol. 2013 Apr;23(2):462-8. doi: 10.1016/j.jelekin.2012.11.013. Epub 2013 Jan 16.

Effect of isometric horizontal abduction on pectoralis major and serratus anterior EMG activity during three exercises in subjects with scapular winging.

Park KM, Cynn HS, Yi CH, Kwon OY.

Source

Department of Physical Therapy, The Graduate School, Yonsei University, 1 Yonseidae-gil, Wonju, Gangwon-do, South Korea. kyungmi87@hanmail.net

Abstract

The aim of this study was to determine the effect of isometric horizontal abduction using Thera-Band during three exercises (forward flexion, scaption, and wall push-up plus) in subjects with scapular winging by investigating the electromyographic (EMG) amplitude of the pectoralis major, serratus anterior and the pectoralis major/serratus anterior activity ratio.

Twenty-four males with scapular winging participated in this study. The subjects performed the forward flexion, scaption, and wall push-up plus with and without isometric horizontal abduction using Thera-Band. Surface EMG was used to collect the EMG data of the pectoralis major and serratus anterior during the three exercises. Two-way repeated analyses of variance with two within-subject factors (isometric horizontal abduction condition and exercise type) were used to determine the statistical significance of pectoralis major and serratus anterior EMG activity and the pectoralis major/serratus anterior EMG activity ratio. Pectoralis major EMG activity was significantly lower during forward flexion and wall push-up plus with isometric horizontal abduction, and serratus anterior EMG activity was significantly greater with isometric horizontal abduction. Additionally, the pectoralis major/serratus anterior activity ratio was significantly lower during the forward flexion and wall push-up plus with isometric horizontal abduction.

The results of this study suggest that isometric horizontal abduction using Thera-Band can be used as an effective method to facilitate the serratus anterior activity and to reduce excessive pectoralis major activity during exercises for activating serratus anterior.

PMID: 23332682

Scapula/Rotation/impingement

Clinical Measurement of Scapular Upward Rotation in Response to Acute Subacromial Pain

Craig A. Wassinger, Gisela Sole, Hamish Osborne

DOI: 10.2519/jospt.2013.4276

STUDY DESIGN: Block-counterbalanced, repeated-measures crossover study.

OBJECTIVES: To assess scapular upward rotation positional adaptations to experimentally induced subacromial pain.

BACKGROUND: Existing subacromial pathology is often related to altered scapular kinematics during humeral elevation, such as decreased upward rotation and posterior tilting. These changes have the potential to limit subacromial space and mechanically impinge subacromial structures. Yet, it is unknown whether these changes are the cause or result of injury and what the acute effects of subacromial pain on scapular upward rotation may be.

METHODS: Subacromial pain was induced via hypertonic saline injection in 20 participants, aged 18 to 31 years. Scapular upward rotation was measured with a digital inclinometer at rest and at 30°, 60°, 90°, and 120° of humeral elevation during a painful condition and a pain-free condition. Repeated-measures analyses of variance were conducted for scapular upward rotation position, based on condition (pain or control) and humeral position. Post hoc testing was conducted with paired t tests as appropriate.

RESULTS: Scapular upward rotation during the pain condition was significantly increased (range of average increase, 3.5°-7.7°) compared to the control condition at all angles of humeral elevation tested.

CONCLUSION: Acute subacromial pain elicited an increase in scapular upward rotation at all angles of humeral elevation tested. This adaptation to acute experimental pain may provide protective compensation to subacromial structures during humeral elevation.

J Orthop Sports Phys Ther 2013;43(4):199-203. Epub 14 January 2013. doi:10.2519/jospt.2013.4276

Scapula/shoulder

J Am Acad Orthop Surg. 2012 Jun;20(6):364-72.

Scapular dyskinesis and its relation to shoulder injury.

Kibler WB, Sciascia A, Wilkes T.

Source

The Shoulder Center of Kentucky, Lexington, KY, USA.

Abstract

The scapula plays a key role in nearly every aspect of normal shoulder function. Scapular dyskinesis-altered scapular positioning and motion-is found in association with most shoulder injuries.

Basic science and clinical research findings have led to the identification of normal three-dimensional scapular kinematics in scapulohumeral rhythm and to abnormal kinematics in shoulder injury, the development of clinical methods of evaluating the scapula (eg, scapular assistance test, scapular retraction test), and the formulation of rehabilitation guidelines.

Primary scapular presentations such as scapular winging and snapping should be managed with a protocol that is focused on the scapula. Persons with associated conditions such as shoulder impingement, rotator cuff disease, labral injury, clavicle fracture, acromioclavicular joint injury, and multidirectional instability should be evaluated for scapular dyskinesis and treated accordingly.

PMID: 22661566 [PubMed - indexed for MEDLINE

Scapular dyskinesis

J Shoulder Elbow Surg. 2012 Mar 21.

Does scapular dyskinesis affect top rugby players during a game season?

Kawasaki T, Yamakawa J, Kaketa T, Kobayashi H, Kaneko K.
Source

Department of Orthopaedic Surgery, Juntendo University Faculty of Medicine, Bunkyo, Tokyo, Japan.

Abstract
BACKGROUND:
Scapular dyskinesis represents a considerable risk of shoulder injury to overhead athletes; however, there is a shortage of detailed epidemiologic information about scapular dyskinesis among the participants in collision sports.

PURPOSE:
To describe the incidence and relationship of scapular dyskinesis to shoulder discomfort and variables related to the shoulder in top rugby players.

METHODS:
One hundred twenty top rugby football players in Japan were evaluated by means of questionnaires, physical examinations, and a video analysis during their preseason. Data were assessed by a logistic regression analysis calculating odds ratios. The primary outcome was processed to assess the relationship between scapular dyskinesis and other variables at the preseason. The secondary outcome was processed to assess an influence of scapular dyskinesis to shoulder discomfort during their regular season that were reassigned by second questionnaires.

RESULTS:
Scapular dyskinesis was identified in 33 (32%) shoulders, and type III was prominent. Scapular dyskinesis was significantly associated with shoulder discomfort (OR [odds ratio] = 4.4), and was also associated with variables of the affected shoulder. In addition, the players with asymptomatic scapular dyskinesis at the preseason would have high incident with shoulder discomfort during their regular season (OR = 3.6).

CONCLUSIONS:
Scapular dyskinesis was associated significantly with both subjective and objective symptoms of the affected shoulder. These appearances may be of particular relevance in the early screening of chronic shoulder disorders in the rugby population. Further study to investigate and evaluate its reliability is needed to characterize its impact on the participants in collision sports.

Motion analysis

Interrater reliability of clinical tests to evaluate scapulothoracic motion

Evelyn Baertschi, **Jaap Swanenburg**, **Florian Brunner** and **Jan Kool**

BMC Musculoskeletal Disorders 2013, **14**:315 doi:10.1186/1471-2474-14-315

Published: 5 November 2013

Abstract (provisional)

Background
Decreased scapulothoracic motion has been associated with various pathologies of the shoulder. Reliable and simple assessment methods of scapular mobility are, however lacking. The aim of this study was to evaluate the interrater reliability of four clinical tests to assess scapulothoracic motion in patients with a slightly restricted shoulder flexion.

Methods
A total of nineteen patients with a symptomatic slight restriction of shoulder flexion and twenty asymptomatic subjects were evaluated. The investigation consisted of four palpatory tests to assess scapulothoracic motion. A two-level rating scale (positive, negative) was utilised. Interrater reliability was evaluated using kappa coefficients.

Results
We found substantial to almost perfect (Kappa = 0.63-0.4) interrater reliability for the four tests.

Conclusion
Our study demonstrates that the four mobility tests of the shoulder are a reliable and simple instrument to assess patients with a slightly restricted shoulder flexion. Future studies should be conducted to evaluate the validity of these tests and to establish their clinical usefulness.

Scapular Kinematics/flexion

RESEARCH REPORT

Scapular Kinematics During Shoulder Elevation Performed With and Without Elastic Resistance in Men Without Shoulder Pathologies

Authors: Elif Camci, PT, MSc1, Irem Duzgun, PT, PhD1, Mutlu Hayran, MD, PhD2, Gul Baltaci, PT, PhD, FACSM3, Ayse Karaduman, PT, PhD3

Journal of Orthopaedic & Sports Physical Therapy, 2013, **Volume:** 43 **Issue:** 10 **Pages:** 735-743
doi:10.2519/jospt.2013.4466

AFFILIATIONS: 1Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Gazi University, Ankara, Turkey. 2Cancer Institute, Hacettepe University, Ankara, Turkey. 3Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Hacettepe University, Ankara, Turkey. Address correspondence to Elif Camci, Gazi University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, 06500 Besevler, Ankara, Turkey. E-mail: elifcamci@gmail.com

Study Design Controlled laboratory study using within-group comparisons.
Objectives To compare scapular kinematics between active and resisted shoulder elevation performed in the sagittal (flexion), frontal (abduction), and scapular (scapular abduction) planes.
Background Several studies have documented scapular kinematics during arm elevation against an external load; however, there is little information on how scapular kinematics change with loading provided by elastic bands, an exercise approach often used in the clinic.
Methods Thirty-two men without shoulder pathology participated in the study. The level of resistance to be used for each individual was determined prior to data collection and standardized by perceived effort on a Borg scale. Three-dimensional scapular kinematics were recorded with an electromagnetic tracking device in all 3 planes of shoulder elevation for both the unloaded (active) and loaded (resisted) conditions. Data for scapular kinematics were analyzed at 30°, 60°, 90°, and 120° of humerothoracic elevation and lowering. Comparisons between loading conditions were made using analysis-of-variance models.
Results In general, for all 3 planes of movement, the scapula was more downwardly rotated and anteriorly tilted during the elevation phase and more so during the lowering phase of shoulder elevation when performed against elastic resistance. While some of the statistically significant differences might not have been large enough to be considered clinically meaningful, some values were of a magnitude similar to previously reported differences between healthy and symptomatic individuals.
Conclusions
The changes in scapular motion during the loaded condition were relatively small in this population with normal scapular motion, but they were in a direction that would be considered to have potential to lead to injuries, suggesting caution when using these exercises in individuals with poor scapular control.

J Orthop Sports Phys Ther 2013;43(10):735–743. Epub 13 September 2013. doi:10.2519/jospt.2013.4466

Keyword: biomechanics, motion analysis, scapula, scapulothoracic Read More: http://www.jospt.org/doi/abs/10.2519/jospt.2013.4466#.Uk4LTRZ50Vs

Scapula position overhead athletes

Int J Sports Med. 2014 Jan;35(1):75-82. doi: 10.1055/s-0033-1343409. Epub 2013 Jul 3.

Does scapular positioning predict shoulder pain in recreational overhead athletes?

Struyf F1, Nijs J2, Meeus M3, Roussel NA4, Mottram S5, Truijen S6, Meeusen R7.
Author information

Abstract

The objective of this prospective study is to investigate possible scapular related risk factors for developing shoulder pain.

Therefore, a 2-year follow-up study in a general community sports centre setting was conducted. A sample of convenience of 113 recreational overhead athletes (59 women and 54 men) with a mean age of 34 (17-64; SD 12) years were recruited. At baseline, visual observation for scapular dyskinesis, measured scapular protraction, upward scapular rotation and dynamic scapular control were evaluated. 22% (n=25) of all athletes developed shoulder pain during the 24 months following baseline assessment.

The Mean Shoulder Disability Questionnaire (SDQ) score for the painful shoulders was 34.8 (6.3-62.5; SD 17.4). None of the scapular characteristics predicted the development of shoulder pain. However, the athletes that developed shoulder pain demonstrated significantly less upward scapular rotation at 45° (p=0.010) and 90° (p=0.016) of shoulder abduction in the frontal plane at baseline in comparison to the athletes that remained pain-free.

In conclusion, although these scapular characteristics are not of predictive value for the development of shoulder pain, this study increases our understanding of the importance of a scapular upward rotation assessment among recreational overhead athletes.

PMID: 23825003

Shoulder/AC joint/diagnostic accuracy

BMC Musculoskelet Disord. 2013 May 1;14(1):156.

Shoulder pain in primary care: diagnostic accuracy of clinical examination tests for non-traumatic acromioclavicular joint pain.

Cadogan A, McNair P, Laslett M, Hing W.

BACKGROUND:

Despite numerous methodological flaws in previous study designs and the lack of validation in primary care populations, clinical tests for identifying acromioclavicular joint (ACJ) pain are widely utilised without concern for such issues. The aim of this study was to estimate the diagnostic accuracy of traditional ACJ tests and to compare their accuracy with other clinical examination features for identifying a predominant ACJ pain source in a primary care cohort.

METHODS:

Consecutive patients with shoulder pain were recruited prospectively from primary health care clinics. Following a standardised clinical examination and diagnostic injection into the subacromial bursa, all participants received a fluoroscopically guided diagnostic block of 1% lidocaine hydrochloride (XylocaineTM) into the ACJ. Diagnostic accuracy statistics including sensitivity, specificity, predictive values, positive and negative likelihood ratios (LR+ and LR-) were calculated for traditional ACJ tests (Active Compression/O'Brien's test, cross-body adduction, localised ACJ tenderness and Hawkins-Kennedy test), and for individual and combinations of clinical examination variables that were associated with a positive anaesthetic response (PAR) ($P<=0.05$) defined as 80% or more reduction in post-injection pain intensity during provocative clinical tests.

RESULTS:

Twenty two of 153 participants (14%) reported an 80% PAR. None of the traditional ACJ tests were associated with an 80% PAR ($P<0.05$) and combinations of traditional tests were not able to discriminate between a PAR and a negative anaesthetic response (AUC 0.507; 95% CI: 0.366, 0.647; $P>0.05$). Five clinical examination variables (repetitive mechanism of pain onset, no referred pain below the elbow, thickened or swollen ACJ, no symptom provocation during passive glenohumeral abduction and external rotation) were associated with an 80% PAR ($P<0.05$) and demonstrated an ability to accurately discriminate between an PAR and NAR (AUC 0.791; 95% CI 0.702, 0.880; $P<0.001$). Less than two positive clinical features resulted in 96% sensitivity (95% CI 0.78, 0.99) and a LR- 0.09 (95% CI 0.02, 0.41) and four positive clinical features resulted in 95% specificity (95% CI 0.90, 0.98) and a LR+ of 4.98 (95% CI 1.69, 13.84).

CONCLUSIONS:

In this cohort of primary care patients with predominantly subacute or chronic ACJ pain of non-traumatic onset, traditional ACJ tests were of limited diagnostic value. Combinations of other history and physical examination findings were able to more accurately identify injection-confirmed ACJ pain in this cohort. PMID:23634871

Scapula/position

Manual Therapy Volume 18, Issue 1 , Pages 46-53, February 2013

Scapular positioning assessment: Is side-to-side comparison clinically acceptable?

Nuno Valente Morais, Augusto Gil Pascoal

Clinicians routinely assess scapular position and motion of the symptomatic shoulder taking as reference for the contralateral asymptomatic side. A different positioning between sides (scapular asymmetry) is often assumed as pathological, however, the symmetry of scapular kinematics in healthy individuals is yet to be demonstrated.

This study tested the hypothesis of scapular symmetry during arm elevation. The 3-dimensional scapular positioning of the dominant and non-dominant shoulders of fourteen healthy young adults was simultaneously measured by a 6 degrees of freedom electromagnetic tracking device at three positions of arm elevation: rest, hands on hips, and 90° of shoulder abduction with internal rotation. The scapula on the dominant shoulder showed greater retraction ($P < 0.001$; $\eta 2p = 0.68$) and upward rotation ($P < 0.001$; $\eta 2p = 0.70$) at all positions of arm elevation. From rest to 90° of shoulder abduction, the mean (±SD) amount of scapular angular displacement was, respectively for dominant and non-dominant shoulders, 7.2° (±7.8°) and 7.2° (±4.4°) for retraction, 17.4° (±5.1°) and 17.8° (±6.4°) for upward rotation, and 3.8° (±3.6°) and 0.9° (±3.6°) for posterior tilting.

These findings suggest that scapular positioning on the thorax are not the same despite the observation of an identical kinematic pattern during arm elevation. This should be taken into consideration when comparing scapular position and motion of symptomatic and contralateral shoulders.

Keywords: 3D scapular kinematics, Arm elevation, Asymmetry, Hand dominance

Serrates Anterior/scapula winging/exercise

J Electromyogr Kinesiol. 2013 Apr;23(2):462-8. doi: 10.1016/j.jelekin.2012.11.013. Epub 2013 Jan 16.

Effect of isometric horizontal abduction on pectoralis major and serratus anterior EMG activity during three exercises in subjects with scapular winging.

Park KM, Cynn HS, Yi CH, Kwon OY.

Source

Department of Physical Therapy, The Graduate School, Yonsei University, 1 Yonseidae-gil, Wonju, Gangwon-do, South Korea. kyungmi87@hanmail.net

Abstract

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PMID: 23332682

Scapula/Rotation/impingement

Clinical Measurement of Scapular Upward Rotation in Response to Acute Subacromial Pain

Craig A. Wassinger, Gisela Sole, Hamish Osborne
DOI: 10.2519/jospt.2013.4276

STUDY DESIGN: Block-counterbalanced, repeated-measures crossover study.
OBJECTIVES: To assess scapular upward rotation positional adaptations to experimentally induced subacromial pain.
BACKGROUND: Existing subacromial pathology is often related to altered scapular kinematics during humeral elevation, such as decreased upward rotation and posterior tilting. These changes have the potential to limit subacromial space and mechanically impinge subacromial structures. Yet, it is unknown whether these changes are the cause or result of injury and what the acute effects of subacromial pain on scapular upward rotation may be.

METHODS: Subacromial pain was induced via hypertonic saline injection in 20 participants, aged 18 to 31 years. Scapular upward rotation was measured with a digital inclinometer at rest and at 30°, 60°, 90°, and 120° of humeral elevation during a painful condition and a pain-free condition. Repeated-measures analyses of variance were conducted for scapular upward rotation position, based on condition (pain or control) and humeral position. Post hoc testing was conducted with paired t tests as appropriate.

RESULTS: Scapular upward rotation during the pain condition was significantly increased (range of average increase, 3.5°-7.7°) compared to the control condition at all angles of humeral elevation tested.

CONCLUSION: Acute subacromial pain elicited an increase in scapular upward rotation at all angles of humeral elevation tested. This adaptation to acute experimental pain may provide protective compensation to subacromial structures during humeral elevation.

J Orthop Sports Phys Ther 2013;43(4):199-203. Epub 14 January 2013. doi:10.2519/jospt.2013.4276

Testing external rotation

Clin Orthop Relat Res. 2013 Dec 10.

Effects of External Rotation on Anteroposterior Translations in the Shoulder: A Pilot Study.

Brown AJ, Debski RE, Voycheck CA, McMahon PJ.

Source

Department of Bioengineering, Swanson School of Engineering, University of Pittsburgh, Pittsburgh, PA, USA.

Abstract

BACKGROUND:
Using physical examination to make the diagnosis of shoulder instability can be difficult, because typical examination maneuvers are qualitative, difficult to standardize, and not reproducible. Measuring shoulder translation is especially difficult, which is a particular problem, because measuring it inaccurately may result in improper treatment of instability.

QUESTIONS/PURPOSES:
The objective of this study was to use a magnetic motion tracking system to quantify the effects of external rotation of the abducted shoulder on a simulated simple translation test in healthy subjects. Specifically, we hypothesized that (1) increasing external rotation of the abducted shoulder would result in decreasing translation; (2) intraobserver repeatability would be less than 2 mm at all external rotation positions; and (3) mean side-to-side differences would be less than 2 mm at all external rotation positions.

METHODS:
The intraobserver repeatability and side-to-side differences of AP translation were quantified with a noninvasive magnetic motion tracking system and automated data analysis routine in nine healthy subjects at four positions of external rotation with the arm abducted. A shoulder positioning apparatus was used to maintain the desired arm position.

RESULTS:
No differences in translations between the positions of external rotation were found ($p = 0.48$). Intraobserver repeatability was 1.1 mm (SD, 0.8 mm) and mean side-to-side differences were small: 2.7 mm (SD, 2.8 mm), 2.8 mm (SD, 1.8 mm), 2.5 mm (SD, 1.8 mm), and 4.0 mm (SD, 2.6 mm) at 0°, 20°, 40°, and 60° of external rotation, respectively.

CONCLUSIONS:
The intraobserver repeatability was strong and the side-to-side differences in translation were small with the magnetic motion tracking system, which is encouraging for development of an improved quantitative test to assess shoulder translation for fast and low-cost diagnosis of shoulder instability.

CLINICAL RELEVANCE:
Clinicians may not have to position the contralateral, normal, abducted shoulder in precisely the same position of external rotation as the injured shoulder while performing side-to-side comparisons.

PMID: 24323688

Shoulder Impingement/Scapula

Clin Rheumatol. 2012 Oct 2.

Scapular-focused treatment in patients with shoulder impingement syndrome: a randomized clinical trial.

Struyf F, Nijs J, Mollekens S, Jeurissen I, Truijen S, Mottram S, Meeusen R.
Source

Division of Musculoskeletal Physiotherapy, Department of Health Sciences, Artesis University College Antwerp, Antwerp, Belgium, filip.struyf@vub.ac.be.

Abstract

The purpose of this clinical trial is to compare the effectiveness of a scapular-focused treatment with a control therapy in patients with shoulder impingement syndrome.

Therefore, a randomized clinical trial with a blinded assessor was used in 22 patients with shoulder impingement syndrome. The primary outcome measures included self-reported shoulder disability and pain. Next, patients were evaluated regarding scapular positioning and shoulder muscle strength.

The scapular-focused treatment included stretching and scapular motor control training. The control therapy included stretching, muscle friction, and eccentric rotator cuff training.

Main outcome measures were the shoulder disability questionnaire, diagnostic tests for shoulder impingement syndrome, clinical tests for scapular positioning, shoulder pain (visual analog scale; VAS), and muscle strength. A large clinically important treatment effect in favor of scapular motor control training was found in self-reported disability (Cohen's $d = 0.93$, $p = 0.025$), and a moderate to large clinically important improvement in pain during the Neer test, Hawkins test, and empty can test (Cohen's d 0.76, 1.04, and 0.92, respectively). In addition, the experimental group demonstrated a moderate (Cohen's $d = 0.67$) improvement in self-experienced pain at rest (VAS), whereas the control group did not change. The effects were maintained at three months follow-up.

PMID: 23053685 [PubMed - as supplied by publisher

GLENOHUMERAL/SHOULDER

Biopsychosocial/Shoulder Pain

J Pain. 2014 Jan;15(1):68-80. doi: 10.1016/j.jpain.2013.09.012. Epub 2013 Oct 5.

Biopsychosocial influence on exercise-induced injury: genetic and psychological combinations are predictive of shoulder pain phenotypes.

George SZ1, Parr JJ2, Wallace MR3, Wu SS4, Borsa PA5, Dai Y4, Fillingim RB6.
Author information

Abstract

Chronic pain is influenced by biological, psychological, social, and cultural factors. The current study investigated potential roles for combinations of genetic and psychological factors in the development and/or maintenance of chronic musculoskeletal pain. An exercise-induced shoulder injury model was used, and a priori selected genetic (ADRB2, COMT, OPRM1, AVPR1 A, GCH1, and KCNS1) and psychological (anxiety, depressive symptoms, pain catastrophizing, fear of pain, and kinesiophobia) factors were included as predictors. Pain phenotypes were shoulder pain intensity (5-day average and peak reported on numerical rating scale), upper extremity disability (5-day average and peak reported on the QuickDASH), and shoulder pain duration (in days). After controlling for age, sex, and race, the genetic and psychological predictors were entered as main effects and interaction terms in separate regression models for the different pain phenotypes. Results from the recruited cohort (N = 190) indicated strong statistical evidence for interactions between the COMT diplotype and 1) pain catastrophizing for 5-day average upper extremity disability and 2) depressive symptoms for pain duration. There was moderate statistical evidence for interactions for other shoulder pain phenotypes between additional genes (ADRB2, AVPR1 A, and KCNS1) and depressive symptoms, pain catastrophizing, or kinesiophobia. These findings confirm the importance of the combined predictive ability of COMT with psychological distress and reveal other novel combinations of genetic and psychological factors that may merit additional investigation in other pain cohorts.

PERSPECTIVE:

Interactions between genetic and psychological factors were investigated as predictors of different exercise-induced shoulder pain phenotypes. The strongest statistical evidence was for interactions between the COMT diplotype and pain catastrophizing (for upper extremity disability) or depressive symptoms (for pain duration). Other novel genetic and psychological combinations were identified that may merit further investigation.

KEYWORDS: COMT, Chronic pain, muscle pain, pain candidate genes, psychological predictors, single nucleotide polymorphism PMID: 24373571

Shoulder/muscle activation

J Shoulder Elbow Surg. 2013 Jul 5. pii: S1058-2746(13)00200-0. doi: 10.1016/j.jse.2013.04.010.

Analysis of arm elevation muscle activity through different movement planes and speeds during in-water and dry-land exercise.

Castillo-Lozano R, Cuesta-Vargas A, Gabel CP.
Source

Department of Psychiatry and Physiotherapy, Faculty of Medicine, Málaga University, Málaga, Spain.

Abstract
OBJECTIVE:
The objectives of this cross-sectional, analytical inference analysis were to compare shoulder muscle activation at arm elevations of 0° to 90° through different movement planes and speeds during in-water and dry-land exercise and to extrapolate this information to a clinical rehabilitation model.

METHODS:
Six muscles of right-handed adult subjects (n = 16; males/females: 50%; age: 26.1 ± 4.5 years) were examined with surface electromyography during arm elevation in water and on dry land. Participants randomly performed 3 elevation movements (flexion, abduction, and scaption) through 0° to 90°. Three movement speeds were used for each movement as determined by a metronome (30°/sec, 45°/sec, and 90°/sec). Dry-land maximal voluntary contraction tests were used to determine movement normalization.

RESULTS:
Muscle activity levels were significantly lower in water compared with dry land at 30°/sec and 45°/sec but significantly higher at 90°/sec. This sequential progressive activation with increased movement speed was proportionally higher on transition from gravity-based on-land activity to water-based isokinetic resistance. The pectoralis major and latissimus dorsi muscles showed higher activity during abduction and scaption.

CONCLUSIONS:
These findings on muscle activation suggest protocols in which active flexion is introduced first at low speeds (30°/sec) in water, then at medium speeds (45°/sec) in water or on dry land, and finally at high speeds (90°/sec) on dry land before in water. Abduction requires higher stabilization, necessitating its introduction after flexion, with scaption introduced last. This model of progressive sequential movement ensures that early active motion and then stabilization are appropriately introduced. This should reduce rehabilitation time and improve therapeutic goals without compromising patient safety or introducing inappropriate muscle recruitment or movement speed.

KEYWORDS: Aquatic therapy, Basic Science Study, Electromyography, movement, muscle, physical therapy, shoulder, surface electromyography PMID: 23834994

Muscle function/Chest press

An electromyography analysis of 3 muscles surrounding the shoulder joint during the performance of a chest press exercise at several angles.

Trebs AA, Brandenburg JP, Pitney WA

Journal of strength and conditioning research / National Strength & Conditioning Association
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201007 24(7):1925-30 Language: eng Country: United States Department of Kinesiology and Physical Education, Northern Illinois University, DeKalb, Illinois, USA. This study compared the activation of the clavicular head and the sternocostal head of the pectoralis major and the anterior deltoid when performing the bench press at several different angles. Fifteen healthy male subjects participated in this study. Subjects performed the chest press exercise at 0 (flat bench), 28, 44, and 56 degrees above horizontal using 70% of their respective 1 repetition maximum for each angle. Electromyographic activity was recorded during each repetition. Activation of the clavicular head of the pectoralis major was significantly greater at 44 degrees compared to 0 degrees ($p = 0.010$), at 56 degrees compared to 0 degrees ($p = 0.013$), and at 44 degrees compared to 28 degrees ($p = 0.003$). Activation of the sternocostal head of the pectoralis major was significantly greater at 0 degrees compared to 28 degrees ($p = 0.013$), at 0 degrees compared to 44 degrees ($p = 0.018$), at 0 degrees compared to 56 degrees ($p = 0.001$), at 28 degrees compared to 56 degrees ($p = 0.003$), and at 44 degrees compared to 56 degrees ($p = 0.001$).

Activation of the anterior deltoid was significantly greater at 28 degrees compared to 0 degrees ($p = 0.002$), at 44 degrees compared to 0 degrees ($p = 0.012$), and at 56 degrees compared to 0 degrees ($p = 0.014$). To optimize recruiting the involved musculature, it would seem that performing both the flat and incline chest press exercises is necessary.

Submaximal isometric effort

Activation of Selected Shoulder Muscles During Unilateral Wall and Bench Press Tasks Under Submaximal Isometric Effort

Helga T. Tucci, Marcia A. Ciol, Rodrigo Cappato de Araújo, Rodrigo de Andrade, Jaqueline Martins, Kevin J. McQuade, Anamaria S. Oliveira

DOI: 10.2519/jospt.2011.3418

STUDY DESIGN: Controlled laboratory study.

OBJECTIVE: To assess the activation of 7 shoulder muscles under 2 closed kinetic chain (CKC) tasks for the upper extremity using submaximal isometric effort, thus providing relative quantification of muscular isometric effort for these muscles across the CKC exercises, which may be applied to rehabilitation protocols for individuals with shoulder weakness.

BACKGROUND: CKC exercises favor joint congruence, reduce shear load, and promote joint dynamic stability. Additionally, knowledge about glenohumeral and periscapular muscle activity elicited during CKC exercises may help clinicians to design protocols for shoulder rehabilitation.

METHODS: Using surface electromyography, activation level was measured across 7 shoulder muscles in 20 healthy males, during the performance of a submaximal isometric wall press and bench press. Signals were normalized to the maximal voluntary isometric contraction, and, using paired *t* tests, data were analyzed between the exercises for each muscle.

RESULTS: Compared to the wall press, the bench press elicited higher activity for most muscles, except for the upper trapezius. Levels of activity were usually low but were above 20% maximal voluntary isometric contraction for the serratus anterior on both tasks, and for the long head triceps brachii on the bench press.

CONCLUSIONS: Both the bench press and wall press, as performed in this study, led to relatively low EMG activation levels for the muscles measured and may be considered for use in the early phases of rehabilitation.

J Orthop Sports Phys Ther 2011;41(7):520-525, Epub 2 February 2011.
doi:10.2519/jospt.2011.3418

Shoulder/T spine extension

Clinical and Radiological Investigation of Thoracic Spine Extension Motion During Bilateral Arm Elevation

Stephen J. Edmondston, Andrij Ferguson, Patrick Ippersiel, Lars Ronningen, Stig Sodeland, Luke Barclay
DOI: 10.2519/jospt.2012.4164

S**TUDY DESIGN:** Single-cohort laboratory-based study.
OBJECTIVES: To measure thoracic spine extension motion during bilateral arm elevation using functional radiography and photographic image analysis.
BACKGROUND: Impairment of thoracic spine extension motion may impact shoulder girdle function. Motion of the thoracic spine during arm movement has not been directly measured using functional radiographic analysis.
METHODS: In 21 asymptomatic men, thoracic kyphosis was measured in neutral standing and in end-range bilateral arm elevation, using lateral radiographs and photographic image analysis. Using both measurement techniques, the difference in thoracic kyphosis between the 2 body positions was used to quantify the range of extension motion of the thoracic spine. Bland-Altman plots were used to examine the agreement between measurement techniques. The relationship between the amount of thoracic kyphosis in neutral standing and kyphosis in full bilateral arm elevation was also examined.
RESULTS: The mean ± SD increase in thoracic extension with bilateral arm elevation was 12.8° ± 7.6° and 10.5° ± 4.4°, when measured from the radiographs and photographs, respectively. There was a significant correlation between the radiographic and photographic measurements of the amount of thoracic kyphosis measured in neutral posture (r = 0.71, P<.01) and for the kyphosis measured in full bilateral arm elevation (r = 0.79, P<.001). The mean difference between the 2 measurement techniques was 2.1° for kyphosis measured in neutral posture and 0.5° when measured in full bilateral arm elevation. The thoracic kyphosis angle measured in neutral posture was strongly correlated with the thoracic kyphosis angle measured in full bilateral arm elevation when measured with both radiographic (r = 0.80, P<.001) and photographic (r = 0.84, P<.001) techniques.

CONCLUSION: In asymptomatic men, bilateral arm elevation is associated with movement of the thoracic spine toward extension, but the amount of movement is variable among individuals.

J Orthop Sports Phys Ther 2012;42(10):861-869, Epub 20 April 2012.
doi:10.2519/jospt.2012.4164
KEY WORDS: biomechanics, kyphosis, movement analysis, range of motion, shoulder elevation

The authors measure thoracic spine extension motion during bilateral arm elevation using functional radiography and photographic image analysis.

Shoulder/ex/irradiation

Scand J Med Sci Sports. 2013 Jan 7. doi: 10.1111/sms.12037.

At-home resistance tubing strength training increases shoulder strength in the trained and untrained limb.

Magnus CR, Boychuk K, Kim SY, Farthing JP.

Source

College of Kinesiology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.

Abstract

The purpose was to determine if an at-home resistance tubing strength training program on one shoulder (that is commonly used in rehabilitation settings) would produce increases in strength in the trained and untrained shoulders via cross-education. Twenty-three participants were randomized to TRAIN (strength-trained one shoulder; n = 13) or CONTROL (no intervention; n = 10). Strength training was completed at home using resistance tubing and consisted of maximal shoulder external rotation, internal rotation, scaption, retraction, and flexion 3 days/week for 4 weeks. Strength was measured via handheld dynamometry and muscle size measured via ultrasound. For external rotation strength, the trained (10.9 ± 10.9%) and untrained (12.7 ± 9.6%) arm of TRAIN was significantly different than CONTROL (1.6 ± 13.2%; -2.7 ± 12.3%; pooled across arm; $P < 0.05$). For internal rotation strength, the trained (14.8 ± 11.3%) and untrained (14.6 ± 10.1%) arm of TRAIN was significantly different than CONTROL (6.4 ± 11.2%; 5.1 ± 8.8%; pooled across arm; $P < 0.05$). There were no significant differences for scaption strength ($P = 0.056$). TRAIN significantly increased muscle size in the training arm of the supraspinatus (1.90 ± 0.32 to 1.99 ± 0.31 cm), and the anterior deltoid (1.08 ± 0.37 to 1.21 ± 0.39 cm; $P < 0.05$).

This study suggests that an at-home resistance tubing training program on one limb can produce increases in strength in both limbs, and has implications for rehabilitation after unilateral shoulder injuries.

PMID: 23293845 [PubMed - as supplied by publisher]

Shoulder/exercise

The effectiveness of therapeutic exercise for painful shoulder conditions: a meta-analysis

Journal of Shoulder and Elbow Surgery, 09/06/2011 Evidence Based Medicine Clinical Article

Marinko LN et al. –

Therapeutic exercise is an effective intervention for the treatment of painful shoulder conditions; however, subsequent research is necessary for translation into clinical practice.

Methods

- Medline via Ovid, CINAHL (Cumulative Index to Nursing and Allied Health Literature), and the Cochrane Central Register of Controlled Trials were searched from 1997 through March 2011.
- Randomized controlled trials comparing physical therapist–prescribed exercises against any other type of intervention were included.
- Articles were qualitatively evaluated by use of the Physiotherapy Evidence Database scale by 5 separate reviewers.
- Data from included studies were extracted and synthesized with respect to the primary outcomes of ROM, pain, and function.
- Individual effect sizes were calculated with a standard formula, and overall effect was calculated by use of random- and fixed-effects models.

Results

- The authors qualitatively reviewed 19 articles; 17 achieved the criterion of 6 or better on the Physiotherapy Evidence Database scale.
- Significant heterogeneity in reporting among included studies limited quantitative assessment.
- Overall, therapeutic exercise has a positive effect on pain and function above all other interventions.
- The findings for ROM were inconclusive

Conclusion

Therapeutic exercise is an effective intervention for the treatment of painful shoulder conditions; however, subsequent research is necessary for translation into clinical practice.

http://www.jshoulderelbow.org/article/PIIS1058274611002448/abstract?rss=yes

Shoulder/MWM

Man Ther. 2013 Feb 4. pii: S1356-689X(13)00002-7. doi: 10.1016/j.math.2013.01.001.

One-week time course of the effects of Mulligan's Mobilisation with Movement and taping in painful shoulders.

Teys P, Bisset L, Collins N, Coombes B, Vicenzino B.

Source

Griffith Health Institute, Griffith University, Gold Coast Campus, Queensland, Australia; Australian Catholic University, Brisbane, Queensland, Australia.

Abstract

Previous research suggests that Mulligan's Mobilisation-with-Movement (MWM) technique for the shoulder produces an immediate improvement in movement and pain.

The aims of this study were to investigate the time course of the effects of a single MWM technique and to ascertain the effects of adding tape following MWM in people with shoulder pain.

Twenty-five participants (15 males, 10 females), who responded positively to an initial application of MWM, were randomly assigned to MWM or MWM-with-Tape. Range of movement (ROM), pressure pain threshold (PPT) and current pain severity (PVAS) were measured pre- and post-intervention, 30-min, 24-h and one week follow-up. Following a one-week washout period, participants were crossed over to receive a single session of the opposite intervention with follow-up measures repeated. ROM significantly improved with MWM-with-Tape and was sustained over one week follow-up ($p < 0.001$; 18.8°, 95% confidence intervals (CI) 7.3-30.4), and in PVAS up to 30-min follow-up (38.4 mm, 95% CI 20.6-56.1 mm). MWM demonstrated an improvement in ROM (11.8°, 95% CI 1.9-21.7) and PVAS (40.4 mm, 95% CI 27.8-53.0 mm), but only up to 30-min follow-up.

There was no significant improvement in PPT for either intervention at any time point. MWM-with-Tape significantly improved ROM over the one-week follow-up compared to MWM alone (15.9°, 95% CI 7.4-24.4). Both MWM and MWM-with-Tape provide a short-lasting improvement in pain and ROM, and MWM-with-Tape also provides a sustained improvement in ROM to one-week follow-up, which is superior to MWM alone.

PMID: 23391760 [PubMed - as supplied by publisher

Shoulder/MWM/Taping

J Manipulative Physiol Ther. 2012 Jul;35(6):454-63. Epub 2012 Aug 24.

Mobilization with movement and kinesiotaping compared with a supervised exercise program for painful shoulder: results of a clinical trial.

Djordjevic OC, Vukicevic D, Katunac L, Jovic S.

Source

Medical Doctor, Specialist in Physical Medicine and Rehabilitation, Specialist in Plastic and Reconstructive Surgery, Clinic for Rehabilitation "Dr Miroslav Zotovic," Belgrade, Serbia.

Abstract

OBJECTIVE:

The purpose of this study was to compare the efficacy of Mobilization with Movement (MWM) and kinesiotaping (KT) techniques with a supervised exercise program in participants with patients with shoulder pain.

METHODS:

Twenty subjects with shoulder pain were included if subjects were diagnosed by the referring physician with either rotator cuff lesion with impingement syndrome or impingement shoulder syndrome. Participants were randomly assigned to 1 of 2 groups after clinical and radiologic assessment: group 1 was treated with MWM and KT techniques, whereas group 2 was treated with a supervised exercise program. The main outcome measures were active pain-free shoulder abduction and flexion tested on days 0, 5, and 10.

RESULTS:

Improvement in active pain-free shoulder range of motion was significantly higher in the group treated with MWM and KT. Repeated-measures analysis of variance indicated significant effects of treatment, time, and treatment × time interaction.

CONCLUSION:

This study suggests that MWM and KT may be an effective and useful treatment in range of motion augmentation of subjects with rotator cuff lesion and impingement syndrome or impingement shoulder syndrome.

Shoulder pain/function

Pain. 2012 Aug 30.

Predictors of chronic shoulder pain after 5years in a working population.

Herin F, Vézina M, Thaon I, Soulat JM, Paris C; ESTEV group.

Source

UMR 1027, Toulouse, France; CHU Toulouse, Service des Maladies Professionnelles et Environnementales, Toulouse, France.

Abstract

The role of psychosocial and physical factors in the development of shoulder pain has now been clearly demonstrated. However, only a few studies have analyzed these associations over time. The main goal of this study was to evaluate the predictive value of work-related psychological and mechanical factors on chronic shoulder pain.

A total of 12,714 subjects (65% men) born in 1938, 1943, 1948, and 1953 participating in a French prospective longitudinal epidemiological investigation in 1990 to 1995 Enquête Santé Travail Et Vieillissement (ESTEV) were included. Clinical examination was performed by 400 trained occupational physicians. Personal factors and work exposure were assessed by self-administered questionnaires. Statistical associations between chronic shoulder pain and personal and occupational factors were analyzed using logistic regression modeling. A total of 1706 subjects experienced chronic shoulder pain in 1990, and 2089 experienced chronic shoulder pain in 1995. The incidence of chronic shoulder pain in 1995 was 11% (n=1355). Forceful effort (odds ratio [OR]=1.24 95% CI [1.05-1.44], awkward posture (OR=1.34 95% CI [1.19-1.52]), decision latitude (OR=1.19 [1.04 to 1.35]), and psychological demand (OR=1.19 95% CI [1.06-1.32]) in 1990 were significantly associated with chronic shoulder pain in 1995, even after adjustment for personal factors and previous shoulder pain status. Awkward posture (OR=1.43 [1.25 to 1.63]), psychological demand (OR=1.24 [1.09 to 1.40]), and decision latitude (OR=1.21 [1.04 to 1.41] work-related factors in 1990 were associated with the development of chronic shoulder pain between 1990 and 1995.

These results suggest that awkward posture, forceful effort, job demand, and decision control are predictors of chronic shoulder pain at work. Interventions designed to reduce the incidence of chronic shoulder pain must include both mechanical and psychological factors.

PMID: 22940463 [PubMed - as supplied by publisher]

Shoulder/MRI

Abnormal findings on magnetic resonance images of asymptomatic shoulders.

The Journal of bone and joint surgery. American volume. Jan 1995;77(1):10-15.

Magnetic resonance images of the shoulders of ninety-six asymptomatic individuals were evaluated to determine the prevalence of findings consistent with a tear of the rotator cuff. The scans were reviewed independently by two diagnostic radiologists who are experienced in the interpretation of magnetic resonance images of the shoulder. The over-all prevalence of tears of the rotator cuff in all age-groups was 34 per cent (thirty-three). There were four- teen full-thickness tears (15 per cent) and nineteen partial-thickness tears (20 per cent). The frequency of full-thickness and partial-thickness tears increased significantly with age ($p < 0.001$ and 0.05, respectively). Twenty-five (54 per cent) of the forty-six individuals who were more than sixty years old had a tear of the rotator cuff: thirteen (28 per cent) had a full- thickness tear and twelve (26 per cent) had a partial-thickness tear. Of the twenty-five individuals who were forty to sixty years old, one (4 per cent) had a full-thickness tear and six (24 per cent) had a partial-thickness tear.

Of the twenty-five individuals who were nineteen to thirty-nine years old, none had a full-thickness tear and one (4 per cent) had a partial-thickness tear. Magnetic resonance imaging identified a high prevalence of tears of the rotator cuff in asymptomatic individuals. These tears were increasingly frequent with advancing age and were compatible with normal, painless, functional activity.

The results of the present study emphasize the potential hazards of the use of magnetic resonance imaging scans alone as a basis for the determination of operative intervention in the absence of associated clinical findings.

GH dislocation

Arch Orthop Trauma Surg. 2013 May 14.

A simple, safe and painless method for acute anterior glenohumeral joint dislocations: "the forward elevation maneuver"

Guner S, Guner SI, Gormeli G, Turkozu T, Gormeli CA, Bora A.

Source

Department of Trauma and Orthopedic Surgery, Yuzuncu Yil Universitesi Tip Fakultesi, Medical School of Yuzuncu Yil University, Ortopedi ve Travmatoloji AD, Van, Turkey, gunersavas@gmail.com.

Abstract

PURPOSE:

The glenohumeral joint is the most frequently dislocated joint in the body. Numerous techniques for reducing an acute anterior dislocation of the glenohumeral joint have been described. The goal of this study was to assess the efficacy of Janecki's forward elevation maneuver for reducing a traumatic acute anterior glenohumeral joint dislocation.

METHODS:

Between May 2010 and November 2011, the forward elevation maneuver was applied to 27 patients who presented to the emergency department of Yuzuncu Yil University Medical School with a traumatic anterior glenohumeral joint dislocation. For each patient, the forward elevation maneuver was used to reduce the anterior glenohumeral joint dislocation. The type of dislocation, the effectiveness of the procedure in achieving reduction, the need for premedication, the ease of performing the reduction and complications (if present) were noted.

RESULTS:

Janecki's forward elevation maneuver was successful for 25 patients (92.6 %) on the first attempt. Premedication was not used for 22 patients, and reduction was successful for 20 of them. The method was not successful in two cases. Twenty-three of the patients (85.2 %) experienced no pain or mild pain. Complications referred to the reduction technique were not found in any patient.

CONCLUSIONS:

This paper concludes that Janecki's forward elevation maneuver is a simple, safe, painless, and effective reduction method. Consequently, the forward elevation maneuver seems to be a good method for reducing anterior glenohumeral joint dislocation.

PMID: 23670119

Shoulder/Sleep

Association between the side of unilateral shoulder pain and preferred sleeping position: a cross-sectional study of 83 danish patients Journal of Manipulative and Physiological Therapeutics, 07/09/2012

Kempf B et al. –

Patients with unilateral shoulder pain were more likely to sleep on the side of the painful shoulder than on the pain–free side and reported to turn away from their partners in bed. It is unknown whether the observed associations are causal, but it is worth investigating whether a change in sleeping position has a positive effect on patients with shoulder pain and if this can be achieved simply by changing side of sleeping in bed.

Methods

In a cross–sectional study.

Adult patients seeking chiropractic care with unilateral shoulder pain were asked about sleeping position and, if sleeping with a partner, which side of the bed they slept in.

A total of 83 participants were included from 10 chiropractic clinics.

Associations were cross–tabulated and tested by Fisher exact test

Results

. The pain was in the right shoulder in 55% (95 % confidence interval, 46–66) of the participants with unilateral pain.

. The side of shoulder pain was associated to the side patients slept on, with 67% of those sleeping on one side lying on the painful shoulder (P = .02).

Moreover, patients were more likely to turn away from their partner at night, and 76% slept on the side opposite their partner (P < .001).

Shoulder/Depression

J Shoulder Elbow Surg. 2012 Jun 25.

Is shoulder pain for three months or longer correlated with depression, anxiety, and sleep disturbance?

Cho CH, Jung SW, Park JY, Song KS, Yu KI.

Source

Pain Research Center, Department of Orthopedic Surgery, Dongsan Medical Center, School of Medicine, Keimyung University, Daegu, South Korea.

Abstract

BACKGROUND:
Recent studies have found a high prevalence of depression, anxiety, and sleep disturbance in patients with chronic musculoskeletal pain. We conducted a study to determine whether shoulder pain for 3 months or longer is correlated with depression, anxiety, and sleep disturbance.

MATERIALS AND METHODS:
We prospectively evaluated 130 patients who had had shoulder pain for 3 months or longer (group I) and 60 healthy controls (group II). We obtained visual analog scale (VAS) pain score, and scores for the American Shoulder and Elbow Surgeons (ASES), Korean Shoulder Scale (KSS), Hospital Anxiety and Depression Scale (HADS), and Pittsburgh Sleep Quality Index (PSQI).

RESULTS:
The mean VAS pain score, ASES score, and KSS score in group I were 6.2, 46.6, and 51.5, respectively. In that group, 22.3% had depression, 19.2% had anxiety, and 81.5% had sleep disturbance. The prevalences were higher in group I than in group II. There were no differences in depression, anxiety, or sleep disturbance by age, sex, type of disease, or duration of symptoms in group I. VAS pain scores positively correlated with PSQI scores ($P = .01$). ASES and KSS scores negatively correlated with HADS depression and anxiety subscale and PSQI scores ($P < .001$). Shoulder pain for 3 months or longer was the strongest predictor of sleep disturbance ($P < .001$).

CONCLUSIONS:
Our study demonstrated high prevalence and close relationships of depression, anxiety, and sleep disturbance in patients with shoulder pain for 3 months or longer. These results may indicate importance of the psychologic approach as well as adequate pain control.

ULNT

The Validity of Upper-Limb Neurodynamic Tests for Detecting Peripheral Neuropathic Pain

Robert J. Nee, Gwendolen A. Jull, Bill Vicenzino, Michel W. Coppieters
DOI: 10.2519/jospt.2012.3988

SYNOPSIS: The validity of upper-limb neurodynamic tests (ULNTs) for detecting peripheral neuropathic pain (PNP) was assessed by reviewing the evidence on plausibility, the definition of a positive test, reliability, and concurrent validity.

Evidence was identified by a structured search for peer-reviewed articles published in English before May 2011. The quality of concurrent validity studies was assessed with the Quality Assessment of Diagnostic Accuracy Studies tool, where appropriate. Biomechanical and experimental pain data support the plausibility of ULNTs. Evidence suggests that a positive ULNT should at least partially reproduce the patient's symptoms and that structural differentiation should change these symptoms. Data indicate that this definition of a positive ULNT is reliable when used clinically. Limited evidence suggests that the median nerve test, but not the radial nerve test, helps determine whether a patient has cervical radiculopathy. The median nerve test does not help diagnose carpal tunnel syndrome. These findings should be interpreted cautiously, because diagnostic accuracy might have been distorted by the investigators' definitions of a positive ULNT.

Furthermore, patients with PNP who presented with increased nerve mechanosensitivity rather than conduction loss might have been incorrectly classified by electrophysiological reference standards as not having PNP. The only evidence for concurrent validity of the ulnar nerve test was a case study on cubital tunnel syndrome. We recommend that researchers develop more comprehensive reference standards for PNP to accurately assess the concurrent validity of ULNTs and continue investigating the predictive validity of ULNTs for prognosis or treatment response.
J Orthop Sports Phys Ther 2012;42(5):413-424, Epub 8 March 2012.
doi:10.2519/jospt.2012.3988

Shoulder/depression

Effect of depressive symptoms on perceived disability in patients with chronic shoulder pain

Archives of Orthopaedic and Trauma Surgery, 05/25/2012

Roh YH et al. –

Degrees of depressive symptoms were found to be significantly associated with higher symptom scores and greater disability in patients with chronic shoulder pain. Although a large proportion of perceived disability remains unexplained, perceived disability in patients with chronic shoulder pain was found to be strongly influenced by depressive symptoms.

Background
Psychological distress may be an important determinant of perceived disability in patients with chronic musculoskeletal disorders. We evaluated the relationship between depressive symptoms and perceived disability in patients with chronic shoulder pain and quantified the contribution made by depression to perceived disability.
Methods
In this prospective study, 109 patients with chronic shoulder pain caused by degenerative or inflammatory disorders were evaluated using the Disability of Arm, Shoulder and Hand (DASH) questionnaire and the Center for Epidemiologic Studies-Depression (CES-D) Scale to determine relationships between depressive symptoms and perceived disability in patients with chronic shoulder pain. In addition, pain scores were evaluated using a visual analog scale (VAS) during activity, and range of motion (ROM) and abduction strength (strength) measurements were measured. Multivariate analyses of variance and regression modeling were used to assess the relative contributions made by depressive symptoms (CES-D) and other clinical parameters to patient-perceived disability (DASH).
Results
DASH scores were found to be moderately correlated ($0.3 < r < 0.6$) with ROM, strength, pain VAS and CES-D; DASH scores were more strongly correlated with CES-D scores than with pain VAS scores or range of motion ($r = 0.58$; $p < 0.001$, 0.37; $p < 0.001$, 0.32; $p = 0.04$ respectively). Multiple stepwise regression analyses revealed that gender, ROM, pain VAS and CES-D scores independently predicted DASH score and accounted for 43 % of the variance. CES-D score was found to be the strongest predictor of DASH score and accounted for 23 % of the variance.
Conclusions
Degrees of depressive symptoms were found to be significantly associated with higher symptom scores and greater disability in patients with chronic shoulder pain. Although a large proportion of perceived disability remains unexplained, perceived disability in patients with chronic shoulder pain was found to be strongly influenced by depressive symptoms.
Type of study/level of evidence

Measuring internal rotation mobility

Reliability of Shoulder Internal Rotation Passive Range of Motion Measurements in the Supine Versus Sidelying Position

Jason B. Lunden, Mike Muffenbier, M. Russell Giveans, Cort J. Cieminski

DOI: 10.2519/jospt.2010.3197

STUDY DESIGN: Clinical measurement, reliability.

OBJECTIVE: To compare intrarater and interrater reliability of shoulder internal rotation (IR) passive range of motion measurements utilizing a standard supine position and a sidelying position.

BACKGROUND: Glenohumeral IR range of motion deficits are often noted in patients with shoulder pathology. Excellent intrarater reliability has been found when measuring this motion. However, interrater reliability has been reported as poor to fair. Some clinicians currently use a sidelying position for IR stretching with patients who have shoulder pathology. However, no objective data exist for IR passive range of motion measured in this sidelying position, either in terms of reliability or normative values.

METHODS: Seventy subjects (mean age, 36.8 years), with (n = 19) and without (n = 51) shoulder pathology, were included in this study. Shoulder IR passive range of motion of the dominant shoulder or involved shoulder was measured by 2 investigators in 2 positions: (1) a standard supine position, with the shoulder at 90°of abduction, and (2) in sidelying on the tested side, with the shoulder flexed to 90°.

RESULTS: Intrarater reliability for supine measurements was good to excellent ($ICC_{3,1}$ = 0.70-0.93) and for sidelying measurements was excellent ($ICC_{3,1}$ = 0.94-0.98). Interrater reliability was fair to good for the supine measurement ($ICC_{2,2}$ = 0.74-0.81) and good to excellent for the sidelying measurement ($ICC_{2,2}$ = 0.88-0.96). The mean (range) value of the dominant shoulder sidelying IR passive range of motion was 40° (11° to 69°) for healthy subjects and 25° (–16° to 49°) for subjects with shoulder pathology.

CONCLUSIONS: For subjects with shoulder pathology, measurements of shoulder IR made in the sidelying position had superior intrarater and interrater reliability compared to those in the standard supine position.

J Orthop Sports Phys Ther 2010;40(9):589-594, Epub 22 April 2010.
doi:10.2519/jospt.2010.3197

KEY WORDS: glenohumeral joint, goniometry, motion, rehabilitation

The authors aim to compare intrarater and interrater reliability of shoulder internal rotation (IR) passive range of motion measurements

Jerk Test

PAINFUL JERK TEST: A PREDICTOR OF SUCCESS IN NON-OPERATIVE TREATMENT OF POSTEROINFERIOR INSTABILITY OF THE SHOULDER

Kim SH, Park JC, Oh I. Am J Sports Med. 2004;32(8):1849-1855.

The jerk test has been used as a diagnostic test for posterior-inferior instability of the shoulder. Pain may or may not be associated with posterior clunking during the jerk test. The purpose of this study was to evaluate the presence or absence of pain with the jerk test as a predictor of the success of non-operative treatment for posterior-inferior instability of the shoulder, and to identify the pathological lesion responsible for the pain in the jerk test.
The study was a retrospective review of prospectively collected data. Eighty-one patients (89 shoulders) who had posterior-inferior instability with a positive posterior clunk during the jerk test were treated nonoperatively.
All patients had a clunk with the test, but not all necessarily had pain. The patients were divided into 2 groups according to whether or not they had pain with the jerk test: the painless jerk group (54 shoulders) and the painful jerk group (35 shoulders). Response to the non-operative treatment was evaluated after at least a 6 month rehabilitation program.
Patients who did not respond to the rehabilitation underwent arthroscopic examination to identify any pathologic lesions. All of these unresponsive shoulders were found to have variable degrees of posteroinferior labral lesions.

The jerk test is described as follows: The patient is seated and the examiner stabilizes the scapula with one hand; with the other hand, the examiner grasps the elbow of the affected side and abducts to 90° with internal rotation; an axial load is applied through the humerus while the arm is horizontally adducted.
In a positive test, there is a sudden "clunk" or jerk as the head of the humerus slides off the back of the glenoid. A second clunk or jerk may be experienced if the arm is then returned to the starting position and the humerus repositions into the glenoid. The painful jerk group had a higher failure rate with nonoperative treatment ($P < .001$) compared to the group that had a painless clunk during the jerk test.
In the painless jerk group 50 shoulders (93%) responded to the rehabilitation program after a mean of 4 months. Four shoulders (7%) were unresponsive to the rehabilitation. In the painful jerk group, 5 shoulders (16%) were successful with the rehabilitation, whereas the other 30 shoulders (84%) failed. All 34 shoulders that were unresponsive to the rehabilitation had a variable degree of posterior-inferior labral lesions. The authors concluded that the jerk test is a hallmark for predicting the prognosis of non-operative treatment for posterior-inferior instability.

IAOM-US Comment*In our 2nd quarter newsletter this year, we discussed another article by Dr. Kim. In that article, he was able to document that those subjects who had pain with the jerk test, or an alternative test he proposed, had posterior labral lesions when the shoulders were examined arthroscopically.1 So, the authors' contention is that a painful clunk with the jerk test, or the Kim test as it was called, are indicative of a posterior labral lesion and a poorer prognosis for conservative care. We would still recommend a trial of conservative care including rotator cuff strengthening, serratus anterior and lower trapezius training, joint specific treatment to hypomobilities in other parts of the elevation chain including the sternoclavicular and acromioclavicular joint and the thoracic spine. For a detailed description of some recommendations for rehabilitating the unstable shoulder, see the IAOM quarterly newsletter: 1995, volume 11, which can be accessed through the archived Quarterly Newsletters section on the IAOM website (www.iaom-us.com). This topic is also covered in more detail in the IAOM shoulder course. Still, the results of this study provide useful information in patient education and in clinical expectations about prognosis. When a posterior labral lesion is suspected in a patient with a painful clunk test, we should not be surprised if our patient ends up requiring surgery.***Reference***1. Kim SO, Park JS, Jeong WK, Shin SK. The Kim test: A novel test for posterior inferior labral lesions of the shoulder- A comparison to the Jerk Test. Am J Sports Medicine. 2005;33(8):1188-1192.

Shoulder/pain

Effect of depressive symptoms on perceived disability in patients with chronic shoulder pain

Archives of Orthopaedic and Trauma Surgery, 05/25/2012

Roh YH et al. –

Degrees of depressive symptoms were found to be significantly associated with higher symptom scores and greater disability in patients with chronic shoulder pain. Although a large proportion of perceived disability remains unexplained, perceived disability in patients with chronic shoulder pain was found to be strongly influenced by depressive symptoms.

Background
Psychological distress may be an important determinant of perceived disability in patients with chronic musculoskeletal disorders. We evaluated the relationship between depressive symptoms and perceived disability in patients with chronic shoulder pain and quantified the contribution made by depression to perceived disability.

Methods
In this prospective study, 109 patients with chronic shoulder pain caused by degenerative or inflammatory disorders were evaluated using the Disability of Arm, Shoulder and Hand (DASH) questionnaire and the Center for Epidemiologic Studies-Depression (CES-D) Scale to determine relationships between depressive symptoms and perceived disability in patients with chronic shoulder pain. In addition, pain scores were evaluated using a visual analog scale (VAS) during activity, and range of motion (ROM) and abduction strength (strength) measurements were measured. Multivariate analyses of variance and regression modeling were used to assess the relative contributions made by depressive symptoms (CES-D) and other clinical parameters to patient-perceived disability (DASH).

Results
DASH scores were found to be moderately correlated ($0.3 < r < 0.6$) with ROM, strength, pain VAS and CES-D; DASH scores were more strongly correlated with CES-D scores than with pain VAS scores or range of motion ($r = 0.58$; $p < 0.001$, 0.37; $p < 0.001$, 0.32; $p = 0.04$ respectively). Multiple stepwise regression analyses revealed that gender, ROM, pain VAS and CES-D scores independently predicted DASH score and accounted for 43 % of the variance. CES-D score was found to be the strongest predictor of DASH score and accounted for 23 % of the variance.

Conclusions
Degrees of depressive symptoms were found to be significantly associated with higher symptom scores and greater disability in patients with chronic shoulder pain. Although a large proportion of perceived disability remains unexplained, perceived disability in patients with chronic shoulder pain was found to be strongly influenced by depressive symptoms.

Type of study/level of evidence
Level 2, prospective cohort study, prognostic study.

Posterior Capsule

The Effect of Cyclic Loading Simulating Oscillatory Joint Mobilization on the Posterior Capsule of the Glenohumeral Joint: A Cadaveric Study

Takayuki Muraki, Nobuyuki Yamamoto, Lawrence J. Berglund, John W. Sperling, Scott P. Steinmann, Robert H. Cofield, Kai-Nan An

DOI: 10.2519/jospt.2011.3448

STUDY DESIGN: Experimental laboratory design.

OBJECTIVES: To examine the effect of force and repetition during oscillatory joint mobilizations on the posterior capsule of the glenohumeral joint.

BACKGROUND: The optimal external force and frequency to be used during joint mobilization to elongate the posterior capsule of the glenohumeral joint has yet to be identified.

METHODS: Twenty-one posterior capsules were harvested from fresh-frozen shoulders. A cyclic loading test simulating oscillatory posterior joint mobilization on the shoulder specimens was performed with a material testing machine. The specimens were assigned to 3 different loading groups simulating joint mobilization in the toe (5 N), transition (20 N), and beginning of the linear regions (40 N) of the load displacement curve. Displacement of the humeral head at an applied load of 5 N was recorded at the 1st, 100th, 200th, 300th, 400th, 500th, and 600th cycles and at 1 hour after completion of the cyclic loading. Furthermore, stiffness was calculated after the 1st and 600th cycles and 1 hour after testing. **RESULTS:** Humeral head displacement was significantly greater for the 100th to 600th cycle, compared to the 1st cycle, for all 3 loading groups. Significant increases in displacement and stiffness were observed between the 1st cycle and 1 hour after completion of the cyclic tests for both the 20-N and 40-N loading groups.

CONCLUSION: While oscillatory joint mobilization to a force of 5 N resulted in temporary elongation of the posterior capsule, mobilization to loads of 20 and 40 N resulted in sustained elongation of the capsule for up to 1 hour. Our findings also suggest that mobilization up to loads that represent the beginning of the linear region of the load displacement curve could be performed without serious damage to the posterior capsule.

J Orthop Sports Phys Ther 2011;41(5):311-318, Epub 18 February 2011. doi:10.2519/jospt.2011.3448

KEY WORDS: biomechanics, manual therapy, shoulder flexibility, shoulder stretching, upper extremity

Shoulder pain impact

Costs of shoulder pain and resource use in primary health care: a cost-of-illness study in Sweden *Full Text*

BMC Musculoskeletal Disorders, 02/16/2012

Virta L et al. –

The model applied in this study provides valuable information that can be used in cost evaluations. Costs for secondary care and particularly for sick leave have a major influence on total costs and interventions that can reduce long periods of sick leave are warranted.

Methods

The study was performed in western Sweden, in a region with 24 000 inhabitants.

Data were collected during six months from electronic patient records at three primary healthcare centres in two municipalities.

All patients between 20 and 64 years of age who presented with shoulder pain to a general practitioner or a physiotherapist were included.

Diagnostic codes were used for selection, and the cases were manually controlled.

The cost for sick leave was calculated according to the human capital approach.

Sensitivity analysis was used to explore uncertainty in various factors used in the model.

Results

. 204 (103 women) patients, mean age 48 (SD 11) years, were registered.

. Half of the cases were closed within six weeks, whereas 32 patients (16%) remained in the system for more than six months.

. A fifth of the patients were responsible for 91% of the total costs, and for 44% of the healthcare costs.

. The mean healthcare cost per patient was E326 (SD 389) during six months.

. Physiotherapy treatments accounted for 60%.

. The costs for sick leave contributed to 84% of the total costs.

. The mean annual total cost was E4139 per patient.

Estimated costs for secondary care increased the total costs by one third.

Shoulder/C spine

Elite swimmers with unilateral shoulder pain demonstrate altered pattern of cervical muscles activation during a functional upper limb task

Journal of Orthopaedic & Sports Physical Therapy, 02/06/2012

Hidalgo–Lozano A et al. –

The elite swimmers with shoulder pain demonstrated greater activation of the SCL muscles during a functional task and a lower ability to relax the SCL muscles after completion of the task than elite swimmers without shoulder pain. The present findings suggest altered pattern of cervical muscle activation on elite swimmers with shoulder pain during performance of a functional task.

STUDY DESIGN: Cross sectional cohort study.

OBJECTIVE: To investigate the differences in the level of activation of neck-shoulder muscles between elite swimmers with and without shoulder pain during a functional upper limb task.
BACKGROUND: Previous studies have reported altered motor control of the neck-shoulder muscles in patients with chronic neck-shoulder pain. Whether the activation of neck-shoulder muscles is altered among elite swimmers suffering from shoulder pain is unknown.

METHODS: Surface electromyography (SEMG) from the sternocleidomastoid (SCM), upper trapezius (UT), and anterior scalene (SCL) muscles was recorded bilaterally in 17 elite swimmers (9 men, 8 women; mean ± SD age: 21±3 years) with unilateral shoulder pain, and 17 age- and sex matched elite swimmers without pain. Root mean square (RMS) values were calculated and normalized to assess the level of muscular activation 5 seconds before, 120 seconds and 150 seconds into, and 10 seconds after a functional upper limb task.

RESULTS: The repeated measures revealed significant differences between both groups for RMS of both SCL ($F=3.733$; $P=0.016$), but not for the SCM and UT muscles. Swimmers with shoulder pain had higher normalised RMS in both SCL muscles at 120s (78% on average) and 150s (86% on average) into and 10s post-task (40% on average) as compared with swimmers without shoulder pain ($P<0.05$).

CONCLUSIONS: The elite swimmers with shoulder pain demonstrated greater activation of the SCL muscles during a functional task and a lower ability to relax the SCL muscles after completion of the task than elite swimmers without shoulder pain. The present findings suggest altered pattern of cervical muscle activation on elite swimmers with shoulder pain during performance of a functional task.

J Orthop Sports Phys Ther, Epub 25 January 2012. doi:10.2519/jospt.2012.3875

Deep fascia of upper limb

it. j. anat. embryol. Vol. 111, n. 2: 000-000, 2006

A histological study of the deep fascia of the upper limb

Carla Stecco1,2 M.D., Andrea Porzionato1 M.D., Veronica Macchi1 M.D., Cesare Tiengo1 M.D., Anna Parenti3 M.D., Roberto Aldegheri2 M.D., Vincent Delmas4 M.D. and Raffaele De Caro1 M.D.

Post-mortem specimens taken from the antebrachial and brachial fasciae of 20 upper limbs were studied by histological and immune histochemical staining in order to evaluate collagen fibre bundle arrangement, the presence of elastic fibres, and the density of innervation in deep muscular fascia. The study demonstrated that the fasciae are formed of numerous layers of undulating collagen fibre bundles. In each layer, the bundles are parallel to each other, whereas adjacent layers show different orientations. Each layer is separated from the adjacent one by a thin layer of adipose tissue, like plywood. Many elastic fibres and a variety of both free and encapsulated nerve endings, especially Ruffini and Pacini corpuscles, are also present, suggesting a proprioceptive capacity of the deep fascia.

Thanks to the undulating collagen fibre bundles and elastic fibres, the fasciae can adapt to stretching, but this is only possible within certain limits, beyond which nerve terminations are activated by stretching. This mechanism allows a sort of “gate control” on the normal activation of intrafascial receptors. The capacity of the various collagen layers to slide over each other may be altered in cases of over-use syndrome, trauma or surgery. In such cases, the amortising mechanism of the fascia on the nervous terminations is lost, causing incorrect paradoxical activation of nerve receptors within the fascia, resulting in the propagation of a nociceptive signal even in situations of normal physiological stretch. At the same time, the layered collagen fibres allow transmission of tension according to the various lines of force. This structure of the muscular fascia guarantees perceptive and directional continuity along a particular myokinetic chain, acting like a transmission belt between two adjacent joints and also between synergic muscle groups.

Deep fascia of upper limb

it. j. anat. embryol. Vol. 111, n. 2: 105-110, 2006

Histological characteristics of the deep fascia of the upper limb

Carla Stecco1,2 M.D., Andrea Porzionato1 M.D., Veronica Macchi1 M.D., Cesare Tiengo1 M.D., Anna Parenti3 M.D., Roberto Aldegheri2 M.D., Vincent Delmas4 M.D. and Raffaele De Caro1 M.D.

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Myofascial continuity

Journal of Bodywork and Movement Therapies(2009) 13, 53–62

Anatomical study Of myofascial continuity in the anterior region of The Upper limb

Antonio Steccoa, Veronica Macchib, Carla Steccoc, Andrea Porzionatob, Julie Ann Dayd, Vincent Delmase, Raffaele DeCarob, _

Summary
Fifteen unembalmed cadavers were dissected in order to study ‘anatomical continuity’’ between the various muscles involved in the movement of flexion of the upper limb. This study demonstrated the existence of specific myofascial expansions, with an early constant pattern, which originate from the flexor muscles and extend to the overlying fascia. The clavicular part of the pectoralis majorsendsamyofascialexpansion,withameanlengthof3.6cm,to the anterior region of the brachial fascia, and the costal parts ends one to the medial region of the brachia l fascia(meanlength:6.8cm).The biceps brachii presents two expansions: the lacertus fibrosus, oriented medially, with a mean height
of4.7cmandabaseof1.9cm,andasecond,lessevident,longitudinal expansion (meanlength:4.5cm,meanwidth:0.7cm).Lastly, the Palmaris longus sends an expansion to the fascia overlying the then arm muscles (meanlength:1.6cm, mean width:0.5cm). During flexion ,as these muscles contract, the anterior portion of the brachial and antebrachial fascia is subject to tension. As the fascia is rich in Proprioceptive nerve endings, it is hypothesized that this tension activates a specific pattern of receptors, contributing to perception of motor direction. If the muscular fascia is in anon- physiological state, these mechanisms are altered , and the proprioceptors in the fascia may be incorrectly activated, thus giving rise to many types of extra-articular pain.

Shoulder pain/Assessment/Volleyball

Med Sci Sports Exerc. 2013 Apr 10. [Epub ahead of print]

Shoulder Pain among High-Level Volleyball Players and Preseason Features.

Forthomme B, Wieczorek V, Frisch A, Crielaard JM, Croisier JL.

Source

1Department of Sport and Rehabilitation Sciences, University and University Hospital Centre of Liege, Belgium 2Regional Hospital Centre of Lille, France 3 Sports Medicine Research Laboratory, Public Research Centre for Health and Sports Clinic of the Hospital Centre of Luxembourg, Luxembourg.

Abstract

Purpose: The main goal of this prospective study was to identify the most significant intrinsic risk factors for shoulder pain by measuring strength developed by shoulder rotators and by carrying out various morphostatic assessments.

Methods: Sixty-six players (24 ± 5 years) were recruited from 9 volleyball teams from the first and second divisions (34 men and 32 women) to participate in the study. Before the start of the volleyball season, all the participants completed a preseason questionnaire and underwent both a bilateral isokinetic evaluation of the shoulders and morphostatic measurements. During the subsequent 6 months of the competition period, the players reported through a weekly questionnaire any shoulder pain experienced.

Results: During the on-going season, 23% (15 players out of 66) of the volleyball players suffered from dominant shoulder pain. Interestingly, participants who reported a history of dominant shoulder pain were found to have a 9 times higher risk of suffering further pain in their dominant shoulder. The eccentric maximal strength developed by the internal and external rotators was found to represent a protective factor in the volleyball players (respective odds ratios = 0.946 - p = 0.01 and 0.94 - p = 0.05). No risk factors were found among the shoulder morphostatic measurements.

Conclusion: In our study, the evaluation of shoulder rotator muscle strength through isokinetic assessment, especially eccentric mode, appeared to be the most contributing parameter to identify risk factors for shoulder pain. This evaluation should allow to better identify players at risk.

PMID:23575514

Shoulder/acupuncture/Pain

Randomized Trial of Trigger Point Acupuncture Treatment for Chronic Shoulder Pain: A Preliminary Study *Full Text*

Journal of Acupuncture and Meridian Studies, 03/19/2013 Clinical Article

Itoh K et al. –

The authors compared the effect of trigger point acupuncture (TrP), with that of sham (SH) acupuncture treatments, on pain and shoulder function in patients with chronic shoulder pain. Compared with SH acupuncture therapy, TrP therapy appears more effective for chronic shoulder pain.

Methods

- The participants were 18 patients (15 women, 3 men; aged 42–65years) with nonradiating shoulder pain for at least 6months and normal neurological findings.
- The participants were randomized into two groups, each receiving five treatment sessions.
- The TrP group received treatment at trigger points for the muscle, while the other group received SH acupuncture treatment on the same muscle.
- Outcome measures were pain intensity (visual analogue scale, VAS) and shoulder function (Constant–Murley Score: CMS).

Results

- After treatment, pain intensity between pretreatment and 5weeks after TrP decreased significantly ($p<0.001$).
- Shoulder function also increased significantly between pretreatment and 5weeks after TrP ($p<0.001$).
- A comparison using the area under the outcome curves demonstrated a significant difference between groups ($p=0.024$).

Hemi/shoulder pain

Hemiplegic shoulder pain: Evidence of a neuropathic origin

Pain; 154 (2); Pages 263-271; February 2013

Hemiplegic shoulder pain (HSP) is common after stroke. Whereas most studies have concentrated on the possible musculoskeletal factors underlying HSP, neuropathic aspects have hardly been studied.

Our aim was to explore the possible neuropathic components in HSP, and if identified, whether they are specific to the shoulder or characteristic of the entire affected side. Participants included 30 post- stroke patients, 16 with and 14 without HSP, and 15 healthy controls. The thresholds of warmth, cold, heat-pain, touch, and graphesthesia were measured in the intact and affected shoulder and in the affected lower leg. They were also assessed for the presence of allodynia and hyperpathia, and computed tomography/magnetic resonance imaging scans of the brain were reviewed. In addition, chronic pain was characterized.

Participants with HSP exhibited higher rates of parietal lobe damage ($P < 0.05$) compared to those without HSP. Both post-stroke groups exhibited higher sensory thresholds than healthy controls. Those with HSP had higher heat-pain thresholds in both the affected shoulder ($P < 0.001$) and leg ($P < 0.01$), exhibited higher rates of hyperpathia in both these regions (each $P < 0.001$), and more often reported chronic pain throughout the affected side ($P < 0.001$) than those with- out HSP. The more prominent sensory alterations in the shoulder region suggest that neuropathic factors play a role in HSP.

The clinical evidence of damage to the spinothalamic-thalamocortical system in the affected shoulder and leg, the presence of chronic pain throughout the affected side, and the more frequent involvement of the parietal cortex all suggest that the neuropathic component is of central origin.

Superior capsule stability

J Shoulder Elbow Surg. 2013 Dec 31. pii: S1058-2746(13)00509-0. doi: 10.1016/j.jse.2013.09.025.

Role of the superior shoulder capsule in passive stability of the glenohumeral joint.

Ishihara Y1, Mihata T2, Tamboli M3, Nguyen L3, Park KJ3, McGarry MH3, Takai S4, Lee TQ3.

Abstract

BACKGROUND:
The shoulder capsule is the main static stabilizer of the glenohumeral joint. However, few studies specifically address the function of the superior shoulder capsule, which is usually damaged in patients with complete rotator cuff tears. Therefore, the purpose of this study was to determine the biomechanical contribution of the superior shoulder capsule to passive stability of the glenohumeral joint.

METHODS:
Seven cadaveric shoulders were tested with a custom testing system. Glenohumeral translations, subacromial contact pressure, and glenohumeral external and internal rotations were quantified at 5°, 30°, and 60° of glenohumeral abduction. Data were compared among 3 conditions: (1) intact superior capsule, (2) after detaching the superior capsule from the greater tuberosity (tear model), and (3) after complete removal of the superior capsule from the greater tuberosity to the superior glenoid (defect model).

RESULTS:
A tear of the superior capsule significantly ($P < .05$) increased anterior and inferior translations compared with those in the intact capsule. Creation of a superior capsular defect significantly ($P < .05$) increased glenohumeral translation in all directions, subacromial contact pressure at 30° of glenohumeral abduction, and external and internal rotations compared with those of the intact capsule.

CONCLUSION:
The superior shoulder capsule plays an important role in passive stability of the glenohumeral joint. A tear in the superior capsule at the greater tuberosity, which may be seen with partial rotator cuff tears, increased anterior and inferior translations. A defect in the superior capsule, seen in massive cuff tears, increased glenohumeral translations in all directions.

KEYWORDS: Basic Science Study, Biomechanics, Capsule, defect, shoulder, stability, superior, tear PMID: 24388150

HAGL lesions

Skeletal Radiol. 2014 Mar;43(3):307-13. doi: 10.1007/s00256-013-1778-1. Epub 2013 Dec 15.

Prevalence of HAGL lesions and associated abnormalities on shoulder MR examination.

Magee T.

OBJECTIVE:
Humeral avulsion of the glenohumeral ligament (HAGL) is an uncommon shoulder injury. We report the prevalence of HAGL lesions and other associated shoulder injuries in a large series of shoulder MR examinations. All results were correlated with surgery.

MATERIALS AND METHODS:
MR reports of 1,000 consecutive conventional shoulder MR exams performed on patients with shoulder pain were reviewed in our information system for the word HAGL. A total of 743 patients went on to surgery. There were 23 HAGL lesions reported at surgery. Those 23 examinations were reviewed retrospectively in consensus by two musculoskeletal radiologists. Scans were assessed for HAGL lesions, full or partial thickness supraspinatus, infraspinatus or subscapularis tendon tears, superior labral anterior posterior (SLAP) tears, anterior or posterior labral tears, and Hill-Sachs lesions.

RESULTS:
All 23 patients had HAGL lesions at surgery. Sixteen HAGL lesions were seen on prospective MR reading and 17 HAGL lesions were seen on retrospective MR consensus reading. Six HAGL lesions were not seen on retrospective consensus reading. Sixteen patients had Hill-Sachs deformities, ten had subscapularis tendon tears, five had supraspinatus tendon tears, six had superior labral tearing, and six had anterior labral tears. The above findings were confirmed on arthroscopy.

CONCLUSIONS:
In this series, there was a 1.6 % prevalence on all MR examinations, and prevalence of 2.1 % seen on MR examination for those who went to surgery. Common injuries associated with HAGL lesions are Hill-Sachs deformities and subscapularis tendon tears. Anterior labral tears were seen in only six cases despite Hill-Sachs deformities in 16 patients. In patients with Hill-Sachs deformities without anterior labral tears, one must carefully assess for the presence of a HAGL lesion.

PMID: 24337489

Conservative care of pain

Cochrane Database Syst Rev. 2013 Dec 12;12:CD008742. doi: 10.1002/14651858.CD008742.pub2.

Conservative interventions for treating work-related complaints of the arm, neck or shoulder in adults. Verhagen AP, Bierma-Zeinstra SM, Burdorf A, Stynes SM, de Vet HC, Koes BW. **BACKGROUND:** Work-related upper limb disorder (WRULD), repetitive strain injury (RSI), occupational overuse syndrome (OOS) and work-related complaints of the arm, neck or shoulder (CANS) are the most frequently used umbrella terms for disorders that develop as a result of repetitive movements, awkward postures and impact of external forces such as those associated with operating vibrating tools. Work-related CANS, which is the term we use in this review, severely hampers the working population.

OBJECTIVES: To assess the effects of conservative interventions for work-related complaints of the arm, neck or shoulder (CANS) in adults on pain, function and work-related outcomes.
DATA COLLECTION AND ANALYSIS: Two review authors independently selected trials for inclusion, extracted data and assessed risk of bias of the included studies. When studies were sufficiently similar, we performed statistical pooling of reported results.
MAIN RESULTS: We included 44 studies (62 publications) with 6,580 participants that evaluated 25 different interventions. We categorised these interventions according to their working mechanisms into exercises, ergonomics, behavioural and other interventions. Overall, we judged 35 studies as having a high risk of bias mainly because of an unknown randomisation procedure, lack of a concealed allocation procedure, unblinded trial participants or lack of an intention-to-treat analysis. We found very low-quality evidence showing that exercises did not improve pain in comparison with no treatment (five studies, standardised mean difference (SMD) -0.52, 95% confidence interval (CI) -1.08 to 0.03), or minor intervention controls (three studies, SMD -0.25, 95% CI -0.87 to 0.37) or when provided as additional treatment (two studies, inconsistent results) at short-term follow-up or at long-term follow-up. Results were similar for recovery, disability and sick leave. Specific exercises led to increased pain at short-term follow-up when compared with general exercises (four studies, SMD 0.45, 95% CI 0.14 to 0.75)We found very low-quality evidence indicating that ergonomic interventions did not lead to a decrease in pain when compared with no intervention at short-term follow-up (three studies, SMD -0.07, 95% CI -0.36 to 0.22) but did decrease pain at long-term follow-up (four studies, SMD -0.76, 95% CI -1.35 to -0.16). There was no effect on disability but sick leave decreased in two studies (risk ratio (RR) 0.48, 95% CI 0.32 to 0.76). None of the ergonomic interventions was more beneficial for any outcome measures when compared with another treatment or with no treatment or with placebo. Behavioural interventions had inconsistent effects on pain and disability, with some subgroups showing benefit and others showing no significant improvement when compared with no treatment, minor intervention controls or other behavioural interventions.In the eight studies that evaluated various other interventions, there was no evidence of a clear beneficial effect of any of the interventions provided.

AUTHORS' CONCLUSIONS: We found very low-quality evidence indicating that pain, recovery, disability and sick leave are similar after exercises when compared with no treatment, with minor intervention controls or with exercises provided as additional treatment to people with work-related complaints of the arm, neck or shoulder. Low-quality evidence also showed that ergonomic interventions did not decrease pain at short-term follow-up but did decrease pain at long-term follow-up. There was no evidence of an effect on other outcomes. For behavioural and other interventions, there was no evidence of a consistent effect on any of the outcomes. Studies are needed that include more participants, that are clear about the diagnosis of work-relatedness and that report findings according to current guidelines. PMID: 24338903

Functional Tests/Impingement

BMC Musculoskelet Disord. 2014 Jan 3;15(1):1.

Closed Kinetic Chain Upper Extremity Stability Test (CKCUES Test): a reliability study in persons with and without shoulder impingement syndrome.

Tucci H, Martins J, Sposito GD, de Oliveira AS.

Abstract

BACKGROUND::

The Close Kinetic Chain Upper Extremity Stability Test (CKCUES test) is a low cost shoulder functional test that could be considered as a complementary and objective clinical outcome for shoulder performance evaluation. However, its reliability was tested only in recreational athletes' males and there are no studies comparing scores between sedentary and active samples. The purpose was to examine inter and intrasession reliability of CKCUES Test for samples of sedentary male and female with (SIS), for samples of sedentary healthy male and female, and for male and female samples of healthy upper extremity sport specific recreational athletes. Other purpose was to compare scores within sedentary and within recreational athletes samples of same gender.

METHOD: S:

A sample of 108 subjects with and without SIS was recruited. Subjects were tested twice, seven days apart. Each subject performed four test repetitions, with 45seconds of rest between them. The last three repetitions were averaged and used to statistical analysis. Intraclass Correlation Coefficient ICC2,1 was used to assess intrasession reliability of number of touches score and ICC2,3 was used to assess intersession reliability of number of touches, normalized score, and power score. Test scores within groups of same gender also were compared. Measurement error was determined by calculating the Standard Error of the Measurement (SEM) and Minimum detectable change (MDC) for all scores.

RESULTS::

The CKCUES Test showed excellent intersession reliability for scores in all samples. Results also showed excellent intrasession reliability of number of touches for all samples. Scores were greater in active compared to sedentary, with exception of power score. All scores were greater in active compared to sedentary and SIS males and females. SEM ranged from 1.45 to 2.76 touches (based on a 95% CI) and MDC ranged from 2.05 to 3.91(based on a 95% CI) in subjects with and without SIS. At least 3 touches are needed to be considered a real improvement on CKCUES Test scores.

CONCLUSION:

Results suggest CKCUES Test is a reliable tool to evaluate upper extremity functional performance for sedentary, for upper extremity sport specific recreational, and for sedentary males and females with SIS.

PMID: 2438719

Central sensitization

Clin J Pain. 2014 Feb;30(2):143-51. doi: 10.1097/AJP.0b013e318287a2a4.

Experimental pain responses support peripheral and central sensitization in patients with unilateral shoulder pain.

Coronado RA, Simon CB, Valencia C, George SZ.
Author information

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Abstract

OBJECTIVE:
The aims of this study were to (1) examine the pattern of experimental pain responses in the affected and nonaffected extremities in patients with shoulder pain and (2) explore the intraindividual association between sensitization states derived from experimental pain testing.

METHODS:
Experimental pain responses from 58 patients with shoulder pain (17 women, aged 18 to 52 y) were compared with those from 56 age-matched and sex-matched pain-free volunteers (16 women, aged 21 to 58 y). Experimental pain responses included pressure pain threshold (PPT), thermal pain threshold and tolerance, and suprathreshold heat pain response. Comparisons were made between the affected and nonaffected extremities of clinical participants and the average response of extremities in control participants. Peripheral and central sensitization indexes were computed for clinical participants using standardized scores and percentile cutoffs on the basis of the data from the control sample. Experimental pain responses in clinical participants observed beyond the 25th and 75th percentile of control sample responses were used for investigation of intraindividual association of sensitization states.

RESULTS:
PPT at the acromion and masseter on the affected side of clinical participants were diminished compared with that on their nonaffected side ($P<0.015$). Bilateral sensitivity in clinical participants was noted for PPT at the acromion and suprathreshold heat pain response ($P<0.015$). Peripheral and central sensitization indexes demonstrated that individuals with shoulder pain present with variable patterns of peripheral and central sensitization.

CONCLUSIONS:
Collectively, experimental pain responses supported peripheral and central sensitization in response to pressure and thermal stimuli. No clear association was made between individuals exhibiting peripheral or central sensitization, thus suggesting heterogeneity in pain processing in this clinical population.

PMID: 23619203

Rotation in the elevated position

Surg Radiol Anat. 2014 Jan 24.

Glenohumeral relationship in maximum elevation.

Inui H, Nobuhara K.

Abstract

PURPOSE:
The purpose of this study was to clarify rotational relationships between the anatomical landmarks of the glenohumeral joint in maximum elevation.

METHODS:
Twenty-five healthy volunteers (20 men, 5 women; mean age, 31 years) held the arm in maximum elevation in an open MRI system. In each three-dimensionally computer-generated image, elevation angle of the humerus in the plane of elevation was measured, based on the glenoid and the scapular planes. Using the equator set on the head surface by the plane parallel to the humeral axis, involving the head center and the bicipital groove, glenoid location and rotational relationships were investigated.

RESULTS:
The elevation angle was 102° ± 9° in the plane 7° ± 8° anterior to the scapular plane, and axial rotation was fixed with the glenoidal long axis parallel to the equator (within 2°). Each glenoid center located on antero-superior portion of the humeral head, and the direction from the top of the head to its location was the same as that of the shaft tilting, indicating the glenoid only translated without rotation after reaching the top of the head on the equator.

CONCLUSIONS:
Before reaching maximum elevation, the glenohumeral joint would be locked in axial rotation. The position when the glenoid is on the top of the humeral head with the humeral shaft perpendicular to the glenoid is considered to be essentially the final position of elevation, above which the glenohumeral joint only translates without axial rotation even if the humerus is more elevated.

PMID: 24458714

Shoulder pain and sensitization

Clin J Pain. 2014 Feb;30(2):143-51. doi: 10.1097/AJP.0b013e318287a2a4.

Experimental pain responses support peripheral and central sensitization in patients with unilateral shoulder pain.

Coronado RA1, Simon CB, Valencia C, George SZ.

Abstract
OBJECTIVE:

The aims of this study were to (1) examine the pattern of experimental pain responses in the affected and nonaffected extremities in patients with shoulder pain and (2) explore the intraindividual association between sensitization states derived from experimental pain testing.

METHODS:

Experimental pain responses from 58 patients with shoulder pain (17 women, aged 18 to 52 y) were compared with those from 56 age-matched and sex-matched pain-free volunteers (16 women, aged 21 to 58 y). Experimental pain responses included pressure pain threshold (PPT), thermal pain threshold and tolerance, and suprathreshold heat pain response. Comparisons were made between the affected and nonaffected extremities of clinical participants and the average response of extremities in control participants. Peripheral and central sensitization indexes were computed for clinical participants using standardized scores and percentile cutoffs on the basis of the data from the control sample. Experimental pain responses in clinical participants observed beyond the 25th and 75th percentile of control sample responses were used for investigation of intraindividual association of sensitization states.

RESULTS:

PPT at the acromion and masseter on the affected side of clinical participants were diminished compared with that on their nonaffected side ($P<0.015$). Bilateral sensitivity in clinical participants was noted for PPT at the acromion and suprathreshold heat pain response ($P<0.015$). Peripheral and central sensitization indexes demonstrated that individuals with shoulder pain present with variable patterns of peripheral and central sensitization.

CONCLUSIONS:

Collectively, experimental pain responses supported peripheral and central sensitization in response to pressure and thermal stimuli. No clear association was made between individuals exhibiting peripheral or central sensitization, thus suggesting heterogeneity in pain processing in this clinical population.

ROTATOR CUFF

Symptoms and cuff tear

J Shoulder Elbow Surg. 2013 Dec 27. pii: S1058-2746(13)00480-1. doi: 10.1016/j.jse.2013.09.011.

Intensity and distribution of shoulder pain in patients with different sized postero-superior rotator cuff tears.

Gumina S1, Candela V2, Passaretti D2, Venditto T3, Carbone S2, Arceri V2, Giannicola G2.
Author information

Abstract

BACKGROUND:
The vast majority of studies regarding rotator cuff tears (RCTs) are focused on etiopathogenesis and treatments, but information on shoulder pain characteristics needs further investigation. We analyzed the intensity and distribution of shoulder pain in patients with different sizes of RCTs.

METHODS:
Two hundred eighty-five consecutive patients with postero-superior RCTs were enrolled for this study. Tear size was intraoperatively classified. Before surgery, all patients completed an upper limb pain map (dermatome map made by Keegan). Shoulder pain intensity was assessed with a visual analogue scale (VAS). Data were submitted to statistical analysis.

RESULTS:
Shoulder pain intensity caused by a RCT was greater in females ($P = .024$); it did not vary with the side nor with age. Pain intensity was less in massive tears ($P < .05$) and in patients whose pain was distributed only to the shoulder ($P = .035$). Furthermore, patients whose pain persisted for more than 6 months maintained the same pain intensity. Pain was localized predominantly on dermatomes C5-C6, was more diffuse in massive tears ($P < .05$), and rarely extended beyond the elbow. In the presence of intense shoulder pain, its precise distribution was not well-delimited.

CONCLUSION:
Shoulder pain characteristics in patients with RCTs may be influenced by gender and size of tear. Cuff tear pain distribution principally involves the antero-lateral aspect of the shoulder with extension down the lateral surface of the arm to the elbow. Information about pain intensity and distribution in patients with RCTs may contribute to a more accurate diagnosis.

KEYWORDS: Cross Sectional Study, Level III, Rotator cuff tear, pain distribution, pain intensity, shoulder pain PMID: 24378179

Impingement/RC

Knee Surgery, Sports Traumatology, Arthroscopy February 2014

Quantitative and qualitative analyses of subacromial impingement by kinematic open MRI

Atsushi Tasaki, Akimoto Nimura, Taiki Nozaki, Akira Yamakawa, Mamoru Niitsu, Wataru Morita, Yoshimitsu Hoshikawa, Keiichi Akita

Abstract

Purpose

Quantitative and qualitative kinematic analyses of subacromial impingement by 1.2T open MRI were performed to determine the location of impingement and the involvement of the acromioclavicular joint.

Methods

In 20 healthy shoulders, 10 sequential images in the scapular plane were taken in a 10-s pause at equal intervals from 30° to maximum abduction in neutral and internal rotation. The distances between the rotator cuff (RC) and the acromion and the acromioclavicular joint were measured. To comprehend the positional relationships, cadaveric specimens were also observed.

Results

Although asymptomatic, the RC came into contact with the acromion and the acromioclavicular joint in six and five cases, respectively. The superior RC acted as a depressor for the humeral head against the acromion as the shoulder elevated. The mean elevation angle and distance at the closest position between the RC and the acromion in neutral rotation were 93.5° and 1.6 mm, respectively, while those between the RC and the acromioclavicular joint were 86.7° and 2.0 mm. When comparing this distance and angle, there was no significant difference between the RC to the acromion and to the acromioclavicular joint. The minimum distance between the RC and the acromion was significantly shorter than that between the greater tuberosity and the acromion. The location of RC closest to the acromion and the acromioclavicular joint differed significantly.

Conclusion

Although asymptomatic, contact was found between the RC and the acromion and the acromioclavicular joint. The important role of the RC to prevent impingement was observed, and hence, dysfunction of the RC could lead to impingement that could result in a RC lesion. The RC lesions may differ when they are caused by impingement from either the acromion or the acromioclavicular joint.

RC/Shoulder pain/Assessment/Volleyball

Med Sci Sports Exerc. 2013 Apr 10.

Shoulder Pain among High-Level Volleyball Players and Preseason Features.

Forthomme B, Wieczorek V, Frisch A, Crielaard JM, Croisier JL.

Source

1Department of Sport and Rehabilitation Sciences, University and University Hospital Centre of Liege, Belgium 2Regional Hospital Centre of Lille, France 3 Sports Medicine Research Laboratory, Public Research Centre for Health and Sports Clinic of the Hospital Centre of Luxembourg, Luxembourg.

Abstract

Purpose: The main goal of this prospective study was to identify the most significant intrinsic risk factors for shoulder pain by measuring strength developed by shoulder rotators and by carrying out various morphostatic assessments.

Methods: Sixty-six players (24 ± 5 years) were recruited from 9 volleyball teams from the first and second divisions (34 men and 32 women) to participate in the study. Before the start of the volleyball season, all the participants completed a preseason questionnaire and underwent both a bilateral isokinetic evaluation of the shoulders and morphostatic measurements. During the subsequent 6 months of the competition period, the players reported through a weekly questionnaire any shoulder pain experienced.

Results: During the on-going season, 23% (15 players out of 66) of the volleyball players suffered from dominant shoulder pain. Interestingly, participants who reported a history of dominant shoulder pain were found to have a 9 times higher risk of suffering further pain in their dominant shoulder. The eccentric maximal strength developed by the internal and external rotators was found to represent a protective factor in the volleyball players (respective odds ratios = 0.946 - p = 0.01 and 0.94 - p = 0.05). No risk factors were found among the shoulder morphostatic measurements.

Conclusion: In our study, the evaluation of shoulder rotator muscle strength through isokinetic assessment, especially eccentric mode, appeared to be the most contributing parameter to identify risk factors for shoulder pain. This evaluation should allow to better identify players at risk.

PMID:23575514

Shoulder/MRI finding

Shoulder after rotator cuff repair: MR imaging findings in asymptomatic individuals--initial experience.

Radiology. Dec 1999;213 (3):705-708.

PURPOSE: To assess the magnetic resonance (MR) imaging appearance of the successfully repaired rotator cuff in an asymptomatic population.

MATERIALS AND METHODS: Fifteen subjects who had undergone clinically successful rotator cuff repair were included in the study. All underwent functional testing of the affected shoulder and had good to excellent scores on the Constant scale. Standard MR imaging sequences were performed at 1.5 T, including oblique coronal fast spin-echo T2-weighted MR imaging with fat saturation.

RESULTS: Three (10%) of 30 supraspinatus and infraspinatus tendons had normal signal intensity, and 16 (53%) had mildly increased signal intensity on fast spin-echo T2- weighted fat-saturated images, compatible with tendonitis or tendinosis. Three partial and four complete tears of the supraspinatus tendon and two partial and two complete tears of the infraspinatus tendon were seen. Other findings included subacromial-subdeltoid effusion (10 subjects), joint effusions (five subjects), and bone marrow edema (six subjects).

CONCLUSION: Postoperative signal intensity changes consistent with tendonitis or tendinosis were common, and clinically "silent" partial and complete rotator cuff tears were seen. Such postoperative MR imaging findings should be interpreted with caution, and meticulous correlation with symptoms and clinical results is recommended.

Cuff/Evolution

Int Orthop. 2013 Dec 10.

Human evolution and tears of the rotator cuff.

Craik JD, Mallina R, Ramasamy V, Little NJ.

Source

Department of Orthopaedics, Epsom General Hospital, Dorking Road, Epsom, Surrey, KT18 7EG, UK, jcraik82@gmail.com.

Abstract

PURPOSE:

Humans differ from other great ape species in their propensity to develop tears of the rotator cuff. The aim of this study was to compare the anatomical risk factors for subacromial impingement and rotator cuff tears amongst the great apes and to determine which features may be accentuated in humans and therefore play a more significant role in disease aetiology.

METHODS:

Orthogonal digital photographs of 22 human, 17 gorilla, 13 chimpanzee and 12 orangutan dry bone scapula specimens oriented in the glenoid plane were taken. Anatomical measurements were preformed using a calibrated digital image technique and the results scaled according to scapula vertebral border length.

RESULTS:

Of the ten anatomical features associated with subacromial impingement and rotator cuff tears in humans, none were shown to be accentuated and significantly different to the other species studied. However the human supraspinatus fossa was shown to be significantly smaller.

CONCLUSIONS:

These results indicate that an alternative primary aetiological factor for rotator cuff tears must exist. A reduction in the size of the supraspinatus fossa in human scapulae suggests that structural insufficiency of the supraspinatus or a change in rotator cuff force vectors could play a role.

PMID: 24323350

Shoulder/T spine Manip

The Effects of Thoracic Spine Manipulation in Subjects With Signs of Rotator Cuff Tendinopathy

Stephanie Muth, Mary F. Barbe, Richard Lauer, Philip W. McClure
DOI: 10.2519/jospt.2012.4142

STUDY DESIGN: Controlled laboratory study.
OBJECTIVES: To assess scapular kinematics and electromyographic signal amplitude of the shoulder musculature, before and after thoracic spine manipulation (TSM) in subjects with rotator cuff tendinopathy (RCT). Changes in range of motion, pain, and function were also assessed.
BACKGROUND: There are various treatment techniques for RCT. Recent studies suggest that TSM may be a useful component in the management of pain and dysfunction associated with RCT. **METHODS:** Thirty subjects between 18 and 45 years of age, who showed signs of RCT, participated in this study. Changes in scapular kinematics and muscle activity, as well as changes in shoulder pain and function, were assessed pre-TSM and post-TSM using paired t tests and repeated-measures analyses of variance.
RESULTS: TSM did not lead to changes in range of motion or scapular kinematics, with the exception of a small decrease in scapular upward rotation (P = .05). The only change in muscle activity was a small but significant increase in middle trapezius activity (P = .03). After TSM, subjects demonstrated decreased pain during performance of the Jobe empty-can (mean ± SD change, 2.6 ± 1.1), Neer (2.6 ± 1.3), and Hawkins-Kennedy (2.8 ± 1.3) tests (all, P<.001). Subjects also reported decreased pain with shoulder flexion (mean ± SD change, 2.0 ± 1.5; P<.001) and improved shoulder function (force production, 2.5 ± 1.4 kg; Penn Shoulder Score, 7.7 ± 9.4; sports/performing arts module of the Disabilities of the Arm, Shoulder and Hand questionnaire, 16.4 ± 13.2) (all, P<.001).
CONCLUSION: Immediate improvements in shoulder pain and function post-TSM are not likely explained by alterations in scapular kinematics or shoulder muscle activity. For people with pain associated with RCT, TSM may be an effective component of their treatment plan to improve pain and function. However, further randomized controlled studies are necessary to better validate this treatment approach.

The authors assess scapular kinematics and electromyographic signal amplitude of the shoulder musculature, before and after thoracic spine manipulation (TSM) in subjects with rotator cuff tendinopathy (RCT). Changes in range of motion, pain, and function were also assessed.

LEVEL OF EVIDENCE: Therapy, level 4. *J Orthop Sports Phys Ther 2012;42(12):1005-1016, Epub 17 August 2012. doi:10.2519/jospt.2012.4142* **KEY WORDS:** joint mobilization, manual therapy, scapula, shoulder impingement

Shoulder/MRI

Rotator-cuff changes in asymptomatic adults. The effect of age, hand dominance and gender.

J Bone Joint Surg Br. Mar 1995;77(2):296-298.

We studied the integrity of the rotator cuff in both dominant and non-dominant shoulders of 90 asymptomatic adults between the ages of 30 and 99 years using ultrasound. The criteria for diagnosis had been validated on un-embalmed cadaver specimens.

We found no statistically significant difference in the incidence of impingement findings between dominant and non-dominant arms or between genders. The prevalence of partial- or full-thickness tears increased markedly after 50 years of age: these were present in over 50% of dominant shoulders in the seventh decade and in 80% of subjects over 80 years of age.

Our results indicate that rotator-cuff lesions are a natural correlate of ageing, and are often present with no clinical symptoms. Treatment should be based on clinical findings and not on the results of imaging.

Shoulder/MRI

Dead men and radiologists don't lie: a review of cadaveric and radiological studies of rotator cuff tear prevalence.

Ann R Coll Surg Engl. Mar 2006;88(2):116-121.

Rotator cuff tears are a common pathology, with a varied prevalence reported.

PATIENTS AND METHODS: A literature review was undertaken to determine the cadaveric and radiological (ultrasonography and magnetic resonance imaging [MRI]) prevalence of rotator cuff tear. The radiological studies were subdivided into symptomatic and asymptomatic subjects.

RESULTS: Cadaveric rotator cuff tears were found in 4629 shoulders of which only 2553 met the inclusion criteria. The prevalence of full-thickness tears was 11.75% and partial thickness 18.49% (total tears 30.24%). The total tear rate in ultrasound asymptomatic was 38.9% and ultrasound symptomatic 41.4%. The total rate in MRI asymptomatic was 26.2% whilst MRI symptomatic was 49.4%.

DISCUSSION: The unselected cadaveric population should contain both symptomatic and asymptomatic subjects. A prevalence of tears between the symptomatic and asymptomatic radiological groups would be expected. However, apart from the MRI asymptomatic group, the radiological prevalence of rotator cuff tears exceeds the cadaveric.

CONCLUSIONS: Rotator cuff tears are frequently asymptomatic. Tears demonstrated during radiological investigation of the shoulder may be asymptomatic. It is important to correlate radiological and clinical findings in the shoulder.

Shoulder/rotator cuff/exercise

J Shoulder Elbow Surg. 2013 Mar 26. pii: S1058-2746(13)00083-9. doi: 10.1016/j.jse.2013.01.026.

Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study.

Kuhn JE, Dunn WR, Sanders R, An Q, Baumgarten KM, Bishop JY, Brophy RH, Carey JL, Holloway BG, Jones GL, Ma CB, Marx RG, McCarty EC, Poddar SK, Smith MV, Spencer EE, Vidal AF, Wolf BR, Wright RW; MOON Shoulder Group.

Source

MOON Shoulder Group, Nashville, TN, USA. Electronic address: j.kuhn@vanderbilt.edu.

Abstract

PURPOSE:

To assess the effectiveness of a specific nonoperative physical therapy program in treating atraumatic full-thickness rotator cuff tears using a multicenter prospective cohort study design.

MATERIALS AND METHODS:

Patients with atraumatic full-thickness rotator cuff tears who consented to enroll provided data via questionnaire on demographics, symptom characteristics, comorbidities, willingness to undergo surgery, and patient-related outcome assessments (Short Form 12 score, American Shoulder and Elbow Surgeons score, Western Ontario Rotator Cuff score, Single Assessment Numeric Evaluation score, and Shoulder Activity Scale). Physicians recorded physical examination and imaging data. Patients began a physical therapy program developed from a systematic review of the literature and returned for evaluation at 6 and 12 weeks. At those visits, patients could choose 1 of 3 courses: (1) cured (no formal follow-up scheduled), (2) improved (continue therapy with scheduled reassessment in 6 weeks), or (3) no better (surgery offered). Patients were contacted by telephone at 1 and 2 years to determine whether they had undergone surgery since their last visit. A Wilcoxon signed rank test with continuity correction was used to compare initial, 6-week, and 12-week outcome scores.

RESULTS:

The cohort consists of 452 patients. Patient-reported outcomes improved significantly at 6 and 12 weeks. Patients elected to undergo surgery less than 25% of the time. Patients who decided to have surgery generally did so between 6 and 12 weeks, and few had surgery between 3 and 24 months.

CONCLUSION:

Nonoperative treatment using this physical therapy protocol is effective for treating atraumatic full-thickness rotator cuff tears in approximately 75% of patients followed up for 2 years.

PMID: 23540577

Rotator cuff/Fat

J Am Acad Orthop Surg. 2013 Oct;21(10):613-623.

Fatty Infiltration and Rotator Cuff Atrophy.

Kuzel BR, Grindel S, Papandrea R, Ziegler D.

Abstract

Moderate to severe fatty infiltration and rotator cuff atrophy are commonly associated with poor clinical outcomes and failed rotator cuff repair. Numerous animal and human studies have attempted to elucidate the etiology of fatty infiltration and rotator cuff atrophy. Mechanical detachment of the tendon in rotator cuff tears is primarily responsible. Suprascapular nerve injury may also play a role. CT, MRI, and ultrasonography are used to evaluate severity. The Goutallier staging system is most commonly used to evaluate fatty infiltration, and rotator cuff atrophy is measured using multiple techniques.

The presence and severity of fatty infiltration have been associated with increasing age, tear size, degree of tendon retraction, number of tendons involved (ie, massive tears), suprascapular neuropathy, and traumatic tears. Fatty infiltration is irreversible and progressive if left untreated. Slight reversal of muscle atrophy has been noted after repair in some studies. Novel therapies are currently being evaluated that may eventually allow clinicians to alter the natural history and improve patient outcomes.

PMID: 24084435

Fat/Rotator Cuff

J Shoulder Elbow Surg. 2013 Jun 19. pii: S1058-2746(13)00201-2. doi: 10.1016/j.jse.2013.04.011.

Aging-associated exacerbation in fatty degeneration and infiltration after rotator cuff tear.

Gumucio JP, Korn MA, Saripalli AL, Flood MD, Phan AC, Roche SM, Lynch EB, Claflin DR, Bedi A, Mendias CL.

Source

Department Orthopaedic Surgery, University of Michigan Medical School, Ann Arbor, MI, USA; Department of Molecular & Integrative Physiology, University of Michigan Medical School, Ann Arbor, MI, USA.

Abstract

BACKGROUND:
Rotator cuff tears are one of the most common musculoskeletal complaints and a substantial source of morbidity in elderly patients. Chronic cuff tears are associated with muscle atrophy and an infiltration of fat to the area, a condition known as "fatty degeneration." To improve the treatment of cuff tears in elderly patients, a greater understanding of the changes in the contractile properties of muscle fibers and the molecular regulation of fatty degeneration is essential.

METHODS:
Using a full-thickness, massive supraspinatus and infraspinatus tear model in elderly rats, we measured fiber contractility and determined changes in fiber type distribution that develop 30 days after tear. We also measured the expression of messenger RNA and micro-RNA transcripts involved in muscle atrophy, lipid accumulation, and matrix synthesis. We hypothesized that a decrease in specific force of muscle fibers, an accumulation of type IIb fibers, and an upregulation in atrophic, fibrogenic, and inflammatory gene expression would occur in torn cuff muscles.

RESULTS:
Thirty days after the tear, we observed a reduction in muscle fiber force and an induction of RNA molecules that regulate atrophy, fibrosis, lipid accumulation, inflammation, and macrophage recruitment. A marked accumulation of advanced glycation end products and a significant accretion of macrophages in areas of fat accumulation were observed.

CONCLUSIONS:
The extent of degenerative changes in old rats was greater than that observed in adults. In addition, we identified that the ectopic fat accumulation that occurs in chronic cuff tears does not occur by activation of canonical intramyocellular lipid storage and synthesis pathways.

 PMID: 23790676

Fat infiltrates

J Shoulder Elbow Surg. 2013 Nov;22(11):1537-46. doi: 10.1016/j.jse.2013.01.028. Epub 2013 May 2.

A comparative analysis of fatty infiltration and muscle atrophy in patients with chronic rotator cuff tears and suprascapular neuropathy.

Beeler S, Ek ET, Gerber C.

Source Department of Orthopaedics, University of Zürich, Balgrist University Hospital, Zürich, Switzerland.

Abstract

BACKGROUND:

Little is known of the mechanisms that lead to the muscle changes associated with rotator cuff disorders. We have observed that the magnetic resonance imaging (MRI) appearance of fatty infiltration (FI) and muscle atrophy (MA) differ between chronic cuff tears and suprascapular neuropathy, suggesting different pathophysiology. This study compares the different MRI changes that occur in chronic cuff tears and suprascapular neuropathy.

METHODS:

Two groups were retrospectively identified: (1) RCT group (20 shoulders): patients with chronic tears of the supraspinatus and/or infraspinatus without electromyographic (EMG) evidence of suprascapular neuropathy; (2) neuro group (17 shoulders): patients with EMG documented suprascapular nerve dysfunction and absence of a rotator cuff tear. Magnetic resonance arthrograms were analyzed for the degree of FI and MA, and the morphology of the muscle was assessed, in particular the muscle border, pattern of FI, and extent of involvement.

RESULTS:

The muscle changes that occur following chronic cuff tears differ from that following denervation secondary to suprascapular neuropathy, especially with respect to the muscle border, degree of perineural fat, and overall distribution of FI. Highly specific and characteristic morphological patterns of FI exist for both chronic cuff tears and suprascapular neuropathy.

CONCLUSION:

Chronic rotator cuff tendon tears and suprascapular neuropathy are both associated with FI and MA of the rotator cuff muscles. The pattern of FI is markedly different in the 2 situations. These findings have diagnostic potential and may serve as a basis for further research concerning type, severity, and evolution of FI under different conditions and after treatment. KEYWORDS: Anatomic Study, Fatty infiltration, Imaging, muscle atrophy, rotator cuff tear, suprascapular neuropathyn 23642348

ID rotator cuff

Cochrane Database Syst Rev. 2013 Sep 24;9:CD009020. doi: 10.1002/14651858.CD009020.pub2.

Magnetic resonance imaging, magnetic resonance arthrography and ultrasonography for assessing rotator cuff tears in people with shoulder pain for whom surgery is being considered.

Lenza M, Buchbinder R, Takwoingi Y, Johnston RV, Hanchard NC, Faloppa F.

Source

Department of Orthopaedics and Traumatology, Universidade Federal de São Paulo, Rua Borges Lagoa, 783 - 5th Floor, São Paulo, São Paulo, Brazil, 04038-032.

Abstract

BACKGROUND:

Shoulder pain is a very common symptom. Disorders of the rotator cuff tendons due to wear or tear are among the most common causes of shoulder pain and disability. Magnetic resonance imaging (MRI), magnetic resonance arthrography (MRA) and ultrasound (US) are increasingly being used to assess the presence and size of rotator cuff tears to assist in planning surgical treatment. It is not known whether one imaging method is superior to any of the others.

OBJECTIVES:

To compare the diagnostic test accuracy of MRI, MRA and US for detecting any rotator cuff tears (i.e. partial or full thickness) in people with suspected rotator cuff tears for whom surgery is being considered.

SEARCH METHODS:

We searched the Cochrane Register of Diagnostic Test Accuracy Studies, MEDLINE, EMBASE, and LILACS from inception to February 2011. We also searched trial registers, conference proceedings and reference lists of articles to identify additional studies. No language or publication restrictions were applied.

SELECTION CRITERIA:

We included all prospective diagnostic accuracy studies that assessed MRI, MRA or US against arthroscopy or open surgery as the reference standard, in people suspected of having a partial or full thickness rotator cuff tear. We excluded studies that selected a healthy control group, or participants who had been previously diagnosed with other specific causes of shoulder pain such as osteoarthritis or rheumatoid arthritis. Studies with an excessively long period (a year or longer) between the index and reference tests were also excluded.

DATA COLLECTION AND ANALYSIS:

Two review authors independently extracted data on study characteristics and results of included studies, and performed quality assessment according to QUADAS criteria. Our unit of analysis was the shoulder. For each test, estimates of sensitivity and specificity from each study were plotted in ROC space and forest plots were constructed for visual examination of variation in test accuracy. Meta-analyses were performed using the bivariate model to produce summary estimates of sensitivity and specificity. We were unable to formally investigate potential sources of heterogeneity because of the small number of studies.

MAIN RESULTS:

We included 20 studies of people with suspected rotator cuff tears (1147 shoulders), of which six evaluated MRI and US (252 shoulders), or MRA and US (127 shoulders) in the same people. Many studies had design flaws, with the potential for bias, thus limiting the reliability of their

findings. Overall, the methodological quality of the studies was judged to be low or unclear. For each test, we observed considerable heterogeneity in study results, especially between studies that evaluated US for the detection of full thickness tears and studies that evaluated MRA for the detection of partial thickness tears. The criteria for a positive diagnostic test (index tests and reference standard) varied between studies.Meta-analyses were not possible for studies that assessed MRA for detection of any rotator cuff tears or partial thickness tears. We found no statistically significant differences in sensitivity or specificity between MRI and US for detecting any rotator cuff tears (P = 0.13), or for detecting partial thickness tears (P = 1.0). Similarly, for the comparison between MRI, MRA and US for detecting full thickness tears, there was no statistically significant difference in diagnostic performance (P = 0.7). For any rotator cuff tears, the summary sensitivity and specificity were 98% (95% CI 92% to 99%) and 79% (95% CI 68% to 87%) respectively for MRI (6 studies, 347 shoulders), and 91% (95% CI 83% to 95%) and 85% (95% CI 74% to 92%) respectively for US (13 studies, 854 shoulders). For full thickness tears, the summary sensitivity and specificity were 94% (95% CI 85% to 98%) and 93% (95% CI 83% to 97%) respectively for MRI (7 studies, 368 shoulders); 94% (95% CI 80% to 98%) and 92% (95% CI 83% to 97%) respectively for MRA (3 studies, 183 shoulders); and 92% (95% CI 82% to 96%) and 93% (95% CI 81% to 97%) respectively for US (10 studies, 729 shoulders).Because few studies were direct head-to-head comparisons, we could not perform meta-analyses restricted to these studies. The test comparisons for each of the three classifications of the target condition were therefore based on indirect comparisons which may be prone to bias due to confounding.

AUTHORS' CONCLUSIONS:

MRI, MRA and US have good diagnostic accuracy and any of these tests could equally be used for detection of full thickness tears in people with shoulder pain for whom surgery is being considered. The diagnostic performance of MRI and US may be similar for detection of any rotator cuff tears. However, both MRI and US may have poor sensitivity for detecting partial thickness tears, and the sensitivity of US may be much lower than that of MRI. The strength of evidence for all test comparisons is limited because most studies were small, heterogeneous and methodologically flawed, and there were few comparative studies. Well designed studies that directly compare MRI, MRA and US for detection of rotator cuff tears are needed.

PMID: 24065456

Repair failures

Am J Sports Med. 2013 Aug 13.

Effect of Postoperative Repair Integrity on Health-Related Quality of Life After Rotator Cuff Repair: Healed Versus Retear Group.

Yoo JH, Cho NS, Rhee YG.

Source

Shoulder & Elbow Clinic, Department of Orthopaedic Surgery, College of Medicine, Kyung Hee University, Seoul, Korea.

Abstract

BACKGROUND: Although rotator cuff repair is performed to improve health-related quality of life (HRQL) by reducing pain and improving shoulder function, it has not been clearly demonstrated that HRQL is improved in retear cases.

PURPOSE: To compare HRQL outcomes after rotator cuff repair between patients with healed cuffs and those with retears using the Short Form-36 Health Survey (SF-36). STUDY

DESIGN: Cohort study; Level of evidence, 3. METHODS:A total of 81 patients who underwent rotator cuff repair were enrolled in this study. There were 56 patients in the healed group and 25 patients in the retear group. The mean age at the time of surgery was 56 years (range, 35-73 years) in the healed group and 59.7 years (range, 45-74 years) in the retear group. The mean follow-up period was 29.7 months (range, 14-95 months) and 26.4 months (range, 13-101 months) in the healed and retear groups, respectively.

RESULTS: At final follow-up, the SF-36 scores for physical and mental component summaries (PCS and MCS, respectively) revealed significant improvement, from 36.6 to 51.2 (PCS) and 34.4 to 51.6 (MCS) in the healed group ($P < .0001$ in both cases) and from 34.2 to 49.4 (PCS) and 33.4 to 53.2 (MCS) in the retear group ($P < .0001$ in both cases). Mean scores on the SF-36 subscale for role limitations because of physical health problems (RP) were 52.3 in the healed group and 50.6 in the retear group. The RP and PCS scores were significantly higher in the healed group ($P = .007$ and $P = .025$, respectively). All domains and component summaries also had a fair to moderate correlation (range, 0.296-0.496) with the SF-36 score.

CONCLUSION: Although clinical shoulder outcome measures (University of California, Los Angeles [UCLA] and American Shoulder and Elbow Surgeons [ASES] scores) and all dimensions of the SF-36 showed significant improvement in both groups after rotator cuff repair, scores were significantly higher in the healed group on RP and PCS of the SF-36 as well as on the UCLA and ASES. There was no significant difference in MCS scores between the 2 groups. Despite similar improvements in the MCS scores, there were apparent objective differences between the groups. The values were statistically significant but clinically not significant for some of these measures.

KEYWORDS: SF-36, healed, quality of life, repair, retear, rotator cuff tear, shoulder PMID: 23942286

Shoulder/rotator cuff/exercise

Eur J Phys Rehabil Med. 2013 Mar 13.

Exercise therapy is evidence-based treatment of shoulder impingement syndrome - Current practice or recommendation only.

Ylinen J, Vuorenmaa M, Paloneva J, Kiviranta I, Kautiainen H, Oikari M, Häkkinen A.

Source

Department of Physical and Rehabilitation Medicine Jyväskylä Central Hospital, Jyväskylä, Finland - jari.ylinen@ksshp.fi.

Abstract

Background: Subacromial impingement syndrome is the most common indication for shoulder operation. However, exercise therapy for the conservative treatment is recommended in the first instance.

Aim: To evaluate the implementation of exercise therapy in impingement syndrome.

Design: Retrospective study using structured postal questionnaire and data collected from hospital archive. Methods: A total of 104 consecutive patients who had undergone shoulder surgery due to impingement syndrome. Patients were asked about therapy modalities that they had received before and after the operation as well as pain (VAS) and functional impairment (ASES) at one-year follow-up.

Results: Before surgery 49% of patients had not received advice for shoulder muscle exercises. After operation all patients had received mobility exercises, but one quarter of patients still reported that they had not received instructions about shoulder strength exercises. At the follow-up the means of the ASES index was 85 and use of NSAID had decreased by 75%. However, 15% of patients had moderate functional impairment (ASES under 60).

Conclusion: About half of patients reported that they had not received advice for rotator cuff exercise therapy before surgery even though with it surgery would probably have been avoided in many cases. Although symptoms in most patients had decreased after operation, several patients still suffered from pain and decreased function. Still several patients had not received advice for shoulder strengthening exercises that are important to recovery.

Clinical Rehabilitation Impact: The adherence to the current recommendations about exercise therapy is insufficient in clinical practice. Thus we recommend that it should be monitored in all institutions in which shoulder pain is treated.

PMID: 23480979

Shoulder/rotator cuff tears

PM R. 2013 Jan;5(1):45-56. doi: 10.1016/j.pmrj.2012.08.019.

Clinical examination of the rotator cuff.

Jain NB, Wilcox RB 3rd, Katz JN, Higgins LD.

Source

Department of Physical Medicine and Rehabilitation, Spaulding Rehabilitation Hospital and Harvard Medical School, Boston, MA; Department of Orthopaedic Surgery, Brigham and Women's Hospital and Harvard Medical School, Boston, MA; Harvard Shoulder Service, Harvard Medical School, Boston, MA; Orthopedic and Arthritis Center for Outcomes Research, Brigham and Women's Hospital, 75 Francis St, BC-4-016, Boston, MA 02115(□). Electronic address: njain1@partners.org.

Abstract

Rotator cuff tears are the leading cause of shoulder pain and shoulder-related disability and account for 4.5 million physician visits in the United States annually.

A careful history and structured physical examination are often sufficient for diagnosing rotator cuff disorders. We are not aware of a clinical review article that presents a structured physical examination protocol of the rotator cuff for the interested clinician. To fill this void, we present a physical examination protocol developed on the basis of review of prior literature and our clinical experience from dedicated shoulder practices. Our protocol includes range of motion testing by using a goniometer, strength testing by using a dynamometer, and select special tests. Among the many tests for rotator cuff disorders that have been described, we chose ones that have been more thoroughly assessed for sensitivity and specificity.

This protocol can be used to isolate the specific rotator cuff tendon involved. The protocol can typically be completed in 15 minutes. We also discuss the clinical implications and limitations of the physical examination maneuvers described in our protocol. This protocol is thorough yet time efficient for a busy clinical practice. It is useful in the diagnosis of rotator cuff tears, impingement syndrome, and biceps pathology.

PMID: 23332909 [PubMed - in process]

RC/Acromiohumeral distance

Effect of Posture on Acromiohumeral Distance With Arm Elevation in Subjects With and Without Rotator Cuff Disease Using Ultrasonography

Nitin Kalra, Amee L. Seitz, N. Douglas Boardman III, Lori A. Michener

DOI: 10.2519/jospt.2010.3155

STUDY DESIGN: Controlled laboratory study.

OBJECTIVES: To examine the effects of altering posture on the subacromial space (SAS) in subjects with rotator cuff disease and subjects without shoulder pain.

BACKGROUND: Poor upper quadrant posture has been linked to altered scapular mechanics, which has been theorized to excessively reduce SAS. However, no study has examined the direct effects of altering upper quadrant posture on SAS. We hypothesized that upright posture would increase and slouched posture would decrease the SAS, as compared to a normal posture, when measured both with the shoulder at rest along the side of the trunk and when maintained in 45° of active shoulder abduction.

METHODS: Participants included 2 groups: the subjects with shoulder pain and rotator cuff disease, as diagnosed via magnetic resonance imaging (n = 31), and control subjects without shoulder pain (n = 29). The SAS was imaged with ultrasound using a 7.5-MHz linear transducer placed in the coronal plane over the posterior to midportion of the acromion. The SAS was measured on ultrasound images using the acromiohumeral distance (AHD), defined as the shortest distance between the acromion and the humerus. The AHD was measured in 2 trials at 2 arm angles (at rest along the trunk and at 45° of active abduction) and across 3 postures (normal, slouched, and upright), and averaged for data analysis.

RESULTS: Two mixed-model analyses of variance, 1 for each arm angle, were used to compare AHD across postures and between groups. There was no interaction between group and posture, and no significant main effect of group for either arm position. There was no significant main effect of posture for the arm at rest (P = .26); however, there was a significant main effect of posture on AHD at the 45° abduction arm angle (P = .0002), with a significantly greater AHD in upright posture (mean AHD, 9.8 mm), ascompared to normal posture (mean AHD, 8.6 mm).

CONCLUSION: The effect of posture on SAS, as measured by the 2-dimensional AHD using ultrasound of the posterior to middle aspect of the SAS, is small. The AHD increased with upright posture by 1.2 mm compared to normal posture, when the arm was in 45° active abduction.

J Orthop Sports Phys Ther 2010;40(10):633-640, Epub 6 August 2010.
doi:10.2519/jospt.2010.3155 **KEY WORDS:** impingement, posture, rotator cuff, shoulder, subacromial space

The authors examine the effects of altering posture on the subacromial space (SAS) in subjects with rotator cuff disease and subjects without shoulder pain.

Shoulder/Rotator Cuff/Ultrasound

Rotator cuff tears in asymptomatic individuals: a clinical and ultrasonographic screening study.

Eur J Radiol. Sep 2004;51(3):263-268.

OBJECTIVE: To determine the prevalence and clinical impact of rotator cuff tears in asymptomatic volunteers.

MATERIALS AND METHODS: Sonographic examinations of the shoulder of 212 asymptomatic individuals between 18 and 85 years old were performed by a single experienced operator. The prevalence and location of complete rotator cuff tears were evaluated. The clinical assessment was based on the Constant Score. Magnetic resonance imaging (MRI) of the shoulder was obtained in those patients where US showed rotator cuff pathology.

RESULTS: Ultrasound showed a complete rupture of the supraspinatus tendon in 6% of 212 patients from 56 to 83 years of age (mean: 67 years). MRI confirmed a complete rupture of the supraspinatus tendon in 90%. All patients reported no functional deficits, although strength was significantly lower in the patient group with complete supraspinatus tendon tear ($P < 0.01$).

CONCLUSION: There is a higher prevalence in older individuals of rotator cuff tendon tears that cause no pain or decrease in activities of daily living.

Cuff tears/Supraspinatus

Acta Orthop. 2013 Dec;84(6):565-70. doi: 10.3109/17453674.2013.858289. Epub 2013 Oct 31.

Lower muscle regenerative potential in full-thickness supraspinatus tears compared to partial-thickness tears.

Lundgreen K, Lian OB, Engebretsen L, Scott A.

Source

Department of Orthopaedic Surgery , Lovisenberg Diaconal Hospital, Oslo , Norway .

Abstract

Background and purpose Rotator cuff tears are associated with secondary rotator cuff muscle pathology, which is definitive for the prognosis of rotator cuff repair. There is little information regarding the early histological and immunohistochemical nature of these muscle changes in humans. We analyzed muscle biopsies from patients with supraspinatus tendon tears. Methods Supraspinatus muscle biopsies were obtained from 24 patients undergoing arthroscopic repair of partial- or full-thickness supraspinatus tendon tears. Tissue was formalin-fixed and processed for histology (for assessment of fatty infiltration and other degenerative changes) or immunohistochemistry (to identify satellite cells (CD56+), proliferating cells (Ki67+), and myofibers containing predominantly type 1 or 2 myosin heavy chain (MHC)). Myofiber diameters and the relative content of MHC1 and MHC2 were determined morphometrically. Results Degenerative changes were present in both patient groups (partial and full-thickness tears). Patients with full-thickness tears had a reduced density of satellite cells, fewer proliferating cells, atrophy of MHC1+ and MHC2+ myofibers, and reduced MHC1 content. Interpretation Full-thickness tears show significantly reduced muscle proliferative capacity, myofiber atrophy, and loss of MHC1 content compared to partial-thickness supraspinatus tendon tears.

PMID: 24171689

CPM/Cuff repair

Effects of one-month continuous passive motion after arthroscopic rotator cuff repair: results at 1-year follow-up of a prospective randomized study.

Garofalo R, Conti M, Notarnicola A, Maradei L, Giardella A, Castagna A

Musculoskeletal surgery Add to My Journals List
201005 94 Suppl 1:S79-83 Language: eng Country: Italy Orthopaedic and Traumatologic Unit, Regional Hospital F. Miulli, Bari, Italy. raffaelegarofalo@gmail.com

The study included 100 patients who underwent an arthroscopic rotator cuff repair. All patients suffered about a rotator cuff tear that was repaired arthroscopically with a suture anchor technique. Immediately postoperatively, patients were randomly allocated to one of two different postoperative physiotherapy regimens: passive self-assisted range of motion exercise (controls: 46 patients) versus passive self-assisted range of motion exercise associated with use of continuous passive motion (CPM) for a total of 2 h per day (experimental group: 54 patients), for 4 weeks. After this time, all the patients of both groups underwent the same physical therapy protocol. An independent examiner assessed the patients at 2.5, 6 and 12 months particularly about pain with the VAS scale (0-10) and the range of motion (ROM).

Our findings show that postoperative treatment of an arthroscopic rotator cuff repair with passive self-assisted exercises associated with 2-h CPM a day provides a significant advantage in terms of ROM improvement and pain relief when compared to passive self-assisted exercise alone, at the short-term follow-up. No significant differences between the two groups were observed at 1 year postoperatively. PMID: 20383685

Impact of massive tear

Relationship between massive chronic rotator cuff tear pattern and loss of active shoulder range of motion

Journal of Shoulder and Elbow Surgery, 01/17/2014 **Evidence Based Medicine**
Collin P, et a

Background

Management of massive chronic rotator cuff tears remains controversial, with no clearly defined clinical presentation as yet. The purpose of the study was to evaluate the effect of tear size and location on active motion in patients with chronic and massive rotator cuff tears with severe muscle degeneration.

Methods

One hundred patients with massive rotator cuff tears accompanied by muscle fatty infiltration beyond Goutallier stage 3 were prospectively included in this study. All patients were divided into 5 groups on the basis of tear pattern (supraspinatus, superior subscapularis, inferior subscapularis, infraspinatus, and teres minor). Active range of shoulder motion was assessed in each group and differences were analyzed.

Results

Active elevation was significantly decreased in patients with 3 tear patterns involved. Pseudoparalysis was found in 80% of the cases with supraspinatus and complete subscapularis tears and in 45% of the cases with tears involving the supraspinatus, infraspinatus, and superior subscapularis. Loss of active external rotation was related to tears involving the infraspinatus and teres minor; loss of active internal rotation was related to tears of the subscapularis.

Conclusions

This study revealed that dysfunction of the entire subscapularis and supraspinatus or 3 rotator cuff muscles is a risk factor for pseudoparalysis. For function to be preserved in patients with massive chronic rotator cuff tears, it may be important to avoid fatty infiltration with anterior extension into the lower subscapularis or involvement of more than 2 rotator cuff muscles.

Shoulder/Rotator Cuff Tear

Long-term follow-up of cases of rotator cuff tear treated conservatively

Journal of Shoulder and Elbow Surgery, 01/27/2012
Kijima H et al. –

In cases of rotator cuff tears treated conservatively, at 13 years after diagnosis, about 90% of patients had no or only slight pain and about 70% had no disturbance in activities of daily life. However, the younger patients tended to have more significant pain or disorder in daily life more than 10 years after diagnosis.

Background

This study clarified the long-term results of conservative treatment of rotator cuff tears.

Materials and methods

This study focused on 103 shoulders diagnosed with rotator cuff tears by magnetic resonance imaging or arthrography at our institution from 1996 to 1999. Sixty-five shoulders were followed up by telephone survey and 43 of these shoulders were evaluated; 11 shoulders were excluded because the patient had died, 10 shoulders because of severe dementia, and 1 shoulder that had undergone trauma. The mean patient age for these 43 shoulders at the time of diagnosis was 62 years, and the mean follow-up period was 13 years. The pain score (30 points) and the activities-of-daily-life score (10 points) of the Japanese Orthopaedic Association shoulder scoring system were determined.

Results

The mean pain score was 25.4 points, and the proportion of patients with no pain or with only slight pain was 88%. The mean score for activities of daily life was 9.4 points, and the proportion of patients with no disturbance in daily life was 72%. The patients with fewer than 20 points out of the possible 40 points (30 points for pain score plus 10 points for activities-of-daily-life score) were significantly younger than the other patients.

Conclusions

In cases of rotator cuff tears treated conservatively, at 13 years after diagnosis, about 90% of patients had no or only slight pain and about 70% had no disturbance in activities of daily life. However, the younger patients tended to have more significant pain or disorder in daily life more than 10 years after diagnosis.

RC Interventions

Current evidence for effectiveness of interventions to treat rotator cuff tears

Manual Therapy; Volume 16 (3); Pages 217-230 June 2011

In this systematic review we assessed effectiveness of non-surgical and (post)surgical interventions for symptomatic rotator cuff tears (RotCuffTear). The Cochrane Library, PubMed, Embase, Cinahl, and Pedro were searched for relevant systematic reviews and randomized controlled trials (RCTs). Two reviewers independently selected relevant studies, extracted data and as-sessed the methodological quality.

Three Cochrane reviews (7 RCTs) and 14 RCTs were included (3 non-surgery, 10 surgery, 8 post-surgery). For small or medium RotCufftears, moderate evidence was found in favor of surgery versus physiotherapy in mid- and long-term. In surgery, tendon-to-bone fixation with one metal suture anchor loaded with double sutures (TB) was more effective (moderate evidence) than a side-to-side repair with permanent sutures (SS) in the mid- and long-term; limited evidence for effectiveness was found in favor of debridement versus anchor replacement and suture repair of the type II SLAP tear in the long-term. Further, no evidence was found in favor of any non-surgical, surgical or post-surgical intervention.

In conclusion, although surgery seems to give better results com-pared to non-surgery and TB is more effective than SS in rotator cuff repair (RCR), it remains hard to draw firm evidence-based conclusions for effectiveness of non-surgical or (post)surgical interventions to treat Rot Cuff Tears. More research is clearly needed.

Rotator Cuff/Tendinopathy

Physiotherapy. 2012 Jun;98(2):101-9.

Exercise for rotator cuff tendinopathy: a systematic review.

Littlewood C, Ashton J, Chance-Larsen K, May S, Sturrock B.

Source

School of Health & Related Research, University of Sheffield, Regent Court, 30 Regent Street, Sheffield S1 4DA, UK. c.littlewood@sheffield.ac.uk

Abstract

BACKGROUND:
Shoulder pain due to rotator cuff tendinopathy is a common problem. Exercise is one intervention used to address this problem but conclusions from previous reviews have been mixed.

OBJECTIVE:
To systematically review the effectiveness of exercise, incorporating loaded exercise (against gravity or resistance), for rotator cuff tendinopathy.

DATA SOURCES:
An electronic search of AMED, CiNAHL, Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, PEDro and SPORTDiscus was undertaken from their inception to November 2010 and supplemented by hand searching related articles and contact with topic experts. STUDY ELIGIBILITY CRITERIA: Randomised controlled trials evaluating the effectiveness of exercise, incorporating loaded exercise, in participants with rotator cuff tendinopathy. STUDY APPRAISAL AND SYNTHESIS METHODS: Included studies were appraised for risk of bias using the tool developed by the Cochrane Back review Group. Due to heterogeneity of studies, a narrative synthesis was undertaken based upon levels of evidence.

RESULTS:
Five articles detailing four studies were included, all of which were regarded as presenting a low risk of bias. Overall, the literature was supportive of the use of exercise in terms of pain and functional disability.

LIMITATIONS:
The results should be regarded with some degree of caution due to limitations associated with the studies including lack of blinding, no intervention control groups and limitations of the outcome measures used. CONCLUSION AND IMPLICATIONS OF KEY FINDINGS: The available literature is supportive of the use of exercise but due to the paucity of research and associated limitations further study is indicated.

Shoulder/exercise

Rev Bras Fisioter. 2012 Nov 2. pii: S1413-35552012005000057.

Assessment of proprioceptive exercises in the treatment of rotator cuff disorders in nursing professionals: a randomized controlled clinical trial.

Martins LV, Marziale MH.
Source

Department of General and Specialized Nursing, Universidade de São Paulo (USP), Ribeirão Preto, SP, Brazil.

Abstract

BACKGROUND:
Shoulder pain in nursing professionals may lead to limitations in occupational and daily activities and consequently interfere with quality of life.

OBJECTIVE:
To compare the effects of two physical therapy programs which differed in the proprioceptive exercises used on the nursing professionals with rotator cuff disorder, according to quality of life, work satisfaction indicators, and pain intensity.

METHOD:
This study was an experimental, randomized, prospective, comparative trial with quantitative data analysis. The data sampling was carried out between the months of June 2010 and July 2011 by means of a questionnaire containing socio-demographic and professional information, the Western Ontario Rotator Cuff Index (WORC), the Occupational Stress Indicator (OSI), and the Visual Numeric Scale (VNS). Based on randomization, subjects were divided into two groups. Group 1 (control) was submitted to stretching and strengthening exercises and cryotherapy. Group 2 (experimental) was treated with the same protocol as the control group, with the addition of proprioception exercises. The data was analyzed by means of the Statistical Package for the Social Science version 16.0 for Windows.

RESULTS:
After physical therapy intervention, significant reduction in pain levels occurred in both groups, with a significant improvement in quality of life for Group 2. No changes were observed in the work satisfaction indicators after the two types of physical therapy interventions.

CONCLUSIONS:
The proprioceptive exercises were important in the treatment of musculoskeletal disorders, however the results did not allow us to determine which treatment was the most effective as there was no significant difference between groups. Trial registration ClinicalTrials.gov NCT01465932.

PMID: 23117648 [PubMed - as supplied by publisher]

Tears

SYMPTOMATIC PROGRESSION OF ASYMPTOMATIC ROTATOR CUFF TEARS: A PROSPECTIVE STUDY OF CLINICAL AND SONOGRAPHIC VARIABLES

Mall NA, Kim HM, Keener JD, Steger-May K, Teefey SA, Middleton WD, Stobbs G, Yamaguchi K

BACKGROUND: The purposes of this study were to identify changes in tear dimensions, shoulder function, and glenohumeral kinematics when an asymptomatic rotator cuff tear becomes painful and to identify characteristics of individuals who develop pain compared with those who remain asymptomatic.

METHODS: A cohort of 195 subjects with an asymptomatic rotator cuff tear was prospectively monitored for pain development and examined annually for changes in various parameters such as tear size, fatty degeneration of the rotator cuff muscle, glenohumeral kinematics, and shoulder function. Forty-four subjects were found to have developed new pain, and the parameters before and after pain development were compared. The forty-four subjects were then compared with a group of fifty-five subjects who remained asymptomatic over a two-year period.

RESULTS: With pain development, the size of a full-thickness rotator cuff tear increased significantly, with 18% of the full-thickness tears showing an increase of >5 mm, and 40% of the partial-thickness tears had progressed to a full-thickness tear. In comparison with the assessments made before the onset of pain, the American Shoulder and Elbow Surgeons scores for shoulder function were significantly decreased and all measures of shoulder range of motion were decreased except for external rotation at 90 of abduction. There was an increase in compensatory scapulothoracic motion in relation to the glenohumeral motion during early shoulder abduction with pain development. No significant changes were found in external rotation strength or muscular fatty degeneration. Compared with the subjects who remained asymptomatic, the subjects who developed pain were found to have significantly larger tears at the time of initial enrollment.

CONCLUSIONS: Pain development in shoulders with an asymptomatic rotator cuff tear is associated with an increase in tear size. Larger tears are more likely to develop pain in the short term than are smaller tears. Further research is warranted to investigate the role of prophylactic treatment of asymptomatic shoulders to avoid the development of pain and loss of shoulder function.

Shoulder/Rotator Cuff

Surgical Repair and Rehabilitation of a Combined 330° Capsulolabral Lesion and Partial-Thickness Rotator Cuff Tear in a Professional Quarterback: A Case Report

Kevin E. Wilk, Leonard C. Macrina, Adrian J. Yenchak, E. Lyle Cain, James R. Andrews

DOI: 10.2519/jospt.2013.3726

S**TUDY DESIGN:** Case report.

BACKGROUND: Traumatic glenohumeral dislocations with concomitant rotator cuff and capsular injuries present a unique and challenging surgical and rehabilitative condition, particularly in the overhead-throwing athlete. Multiple injuries of the shoulder complex create the potential for complications in the course of recovery and place a full return to high-level sport at risk. The purpose of this case report is to present the multiphased rehabilitation approach of an elite professional quarterback after an acute 330° capsulolabral reconstruction and rotator cuff repair as a result of a luxatio erecta injury.

CASE DESCRIPTION: A 26-year-old male professional football player, a quarterback, sustained a right luxatio erecta shoulder dislocation while trying to recover a fumble during a regular-season game. The injury occurred when he was hit in the back of his throwing shoulder, which was in an abducted and externally rotated position, while lying on the ground. Five days postinjury, he underwent a 330° capsulolabral repair, with concomitant rotator cuff repair and subacromial decompression. He completed 28 weeks of a multiphased rehabilitation program.

OUTCOMES: The patient returned to play in the National Football League (NFL) 8 months later, for the start of the next season, during which he had his most productive year as a professional quarterback, leading the league in passing yards and finishing third in the league for the number of touchdowns. Since the injury, the patient has played 6 consecutive seasons, starting over 96 consecutive, regular-season games and maintaining a very high level of play.

DISCUSSION: This case report highlights the clinical decision-making process and management of this rare, severe injury.

The purpose of this case report is to present the multiphased rehabilitation approach of an elite professional quarterback after an acute 330° capsulolabral reconstruction and rotator cuff repair as a result of a luxatio erecta injury.

LEVEL OF EVIDENCE: Therapy, level 4.
J Orthop Sports Phys Ther 2013;43(3):142-153. Epub 12 February 2013.
doi:10.2519/jospt.2013.3726 K**EY WORDS:** dislocation, luxatio erecta, shoulder, SLAP

Shoulder/full RCT function

Predictors of Pain and Function in Patients With Symptomatic, Atraumatic Full-Thickness Rotator Cuff Tears: A Time-Zero Analysis of a Prospective Patient Cohort Enrolled in a Structured Physical Therapy Program

American Journal of Sports Medicine, 02/08/2012

Harris JD et al. –

Nonsurgically modifiable factors, such as scapulothoracic dyskinesia, active abduction, and strength in forward elevation and abduction, were identified that could be addressed nonoperatively with therapy. Therefore, physical therapy for patients with symptomatic rotator cuff tears should target these modifiable factors associated with pain and loss of function.

Background: Although the prevalence of full-thickness rotator cuff tears increases with age, many patients are asymptomatic and may not require surgical repair. The factors associated with pain and loss of function in patients with rotator cuff tears are not well defined.

Purpose: To determine which factors correlate with pain and loss of function in patients with symptomatic, atraumatic full-thickness rotator cuff tears who are enrolled in a structured physical therapy program.

Methods: A multicenter group enrolled patients with symptomatic, atraumatic rotator cuff tears in a prospective, nonrandomized cohort study evaluating the effects of a structured physical therapy program. Time-zero patient data were reviewed to test which factors correlated with Western Ontario Rotator Cuff (WORC) index and American Shoulder and Elbow Surgeons (ASES) scores.

Results: A total of 389 patients were enrolled. Mean ASES score was 53.9; mean WORC score was 46.9. The following variables were associated with higher WORC and ASES scores: female sex ($P = .001$), education level (higher education, higher score; $P < .001$), active abduction (degrees; $P = .021$), and strength in forward elevation ($P = .002$) and abduction ($P = .007$). The following variables were associated with lower WORC and ASES scores: male sex ($P = .001$), atrophy of the supraspinatus ($P = .04$) and infraspinatus ($P = .003$), and presence of scapulothoracic dyskinesia ($P < .001$). Tear size was not a significant predictor (WORC) unless comparing isolated supraspinatus tears to supraspinatus, infraspinatus, and subscapularis tears ($P = .004$). Age, tear retraction, duration of symptoms, and humeral head migration were not statistically significant.

Conclusion: Nonsurgically modifiable factors, such as scapulothoracic dyskinesia, active abduction, and strength in forward elevation and abduction, were identified that could be addressed nonoperatively with therapy. Therefore, physical therapy for patients with symptomatic rotator cuff tears should target these modifiable factors associated with pain and loss of function.

Shoulder/rotator cuff

J Bone Joint Surg Am. 2012 May 2;94(9):801-8.

Evolution of nonoperatively treated symptomatic isolated full-thickness supraspinatus tears.

Fucentese SF, von Roll AL, Pfirrmann CW, Gerber C, Jost B.

Abstract

BACKGROUND:
The natural history of small, symptomatic rotator cuff tears is currently unclear. The purpose of the present study was to assess the clinical and structural outcomes for a consecutive series of patients with symptomatic, isolated full-thickness supraspinatus tears who had been offered rotator cuff repair but declined operative treatment.

METHODS:
In the study period, twenty-four patients with isolated full-thickness supraspinatus tears that had been diagnosed by means of magnetic resonance arthrography were offered rotator cuff repair and elected nonoperative treatment. The twenty men and four women had an average age of fifty-two years at the time of diagnosis. At a median of forty-two months after the diagnosis, all patients were reexamined clinically according to the Constant and Murley scoring system and all shoulders underwent standard magnetic resonance imaging.

RESULTS:
At the time of follow-up, the mean subjective shoulder score was 74% of that for a normal shoulder and the mean Constant score was 75 points (relative Constant score, 86%). The mean rotator cuff tear size did not change significantly over time (95% confidence interval, 0.51 to 1.12). In two shoulders, the tear was no longer detectable on magnetic resonance imaging, in nine shoulders the tear was smaller than it had been at the time of the initial diagnosis, in nine patients the tear had not changed, and in six patients the tear had increased in size. There was a slight but significant progression of fatty muscle infiltration of the supraspinatus, but no patient had fatty infiltration beyond stage 2 at the time of the latest follow-up (95% confidence interval, 0% to 14%).

CONCLUSIONS:
In a consecutive series of patients who had been offered repair of an isolated, symptomatic supraspinatus tear, the refusal of operative treatment resulted in surprisingly high clinical patient satisfaction and no increase of the average size of the rotator cuff tear 3.5 years after the recommendation of operative repair. This study confirms that the size of small rotator cuff tears does not invariably increase over a limited period of time. Distinguishing tears that will increase in size from those that will not needs further study.

LEVEL OF EVIDENCE: Therapeutic Level IV. See Instructions for Authors for a complete description of levels of evidence

Effectiveness of RC surgery

The societal and economic value of rotator cuff repair

The Journal of Bone & Joint Surgery, 11/21/2013 **Evidence Based Medicine**
Mather RC, et al.

Background:
Although rotator cuff disease is a common musculoskeletal problem in the United States, the impact of this condition on earnings, missed workdays, and disability payments is largely unknown. This study examines the value of surgical treatment for full-thickness rotator cuff tears from a societal perspective.

Methods:
A Markov decision model was constructed to estimate lifetime direct and indirect costs associated with surgical and continued nonoperative treatment for symptomatic full-thickness rotator cuff tears. All patients were assumed to have been unresponsive to one six-week trial of nonoperative treatment prior to entering the model. Model assumptions were obtained from the literature and data analysis. We obtained estimates of indirect costs using national survey data and patient-reported outcomes. Four indirect costs were modeled: probability of employment, household income, missed workdays, and disability payments. Direct cost estimates were based on average Medicare reimbursements with adjustments to an all-payer population. Effectiveness was expressed in quality-adjusted life years (QALYs).

Results:
The age-weighted mean total societal savings from rotator cuff repair compared with nonoperative treatment was $13,771 over a patient's lifetime. Savings ranged from $77,662 for patients who are thirty to thirty-nine years old to a net cost to society of $11,997 for those who are seventy to seventy-nine years old. In addition, surgical treatment results in an average improvement of 0.62 QALY. Societal savings were highly sensitive to age, with savings being positive at the age of sixty-one years and younger. The estimated lifetime societal savings of the approximately 250,000 rotator cuff repairs performed in the U.S. each year was $3.44 billion.

Conclusions:
Rotator cuff repair for full-thickness tears produces net societal cost savings for patients under the age of sixty-one years and greater QALYs for all patients. Rotator cuff repair is cost-effective for all populations. The results of this study should not be interpreted as suggesting that all rotator cuff tears require surgery. Rather, the results show that rotator cuff repair has an important role in minimizing the societal burden of rotator cuff disease.

Topics - rotator cuff injury ; **rotator cuff repair** ; **economics**

Evaluating Rotator Cuff Tear

JAMA. 2013 Aug 28;310(8):837-47. doi: 10.1001/jama.2013.276187.

Does this patient with shoulder pain have rotator cuff disease?: The Rational Clinical Examination systematic review.

Hermans J, Luime JJ, Meuffels DE, Reijman M, Simel DL, Bierma-Zeinstra SM.
Source

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Abstract

IMPORTANCE: Rotator cuff disease (RCD) is the most common cause of shoulder pain seen by physicians.

OBJECTIVE: To perform a meta-analysis to identify the most accurate clinical examination findings for RCD.

DATA SOURCES: Structured search in MEDLINE, EMBASE, and CINAHL from their inception through May 2013.

STUDY SELECTION:

For inclusion, a study must have met the following criteria: (1) description of history taking, physical examination, or clinical tests concerning RCD; (2) detailing of sensitivity and specificity; (3) use of a reference standard with diagnostic criteria prespecified; (4) presentation of original data, or original data could be obtained from the authors; and (5) publication in a language mastered by one of the authors (Danish, Dutch, English, French, German, Norwegian, Spanish, Swedish).

MAIN OUTCOMES AND MEASURES:

Likelihood ratios (LRs) of symptoms and signs of RCD or of a tear, compared with an acceptable reference standard; quality scores assigned using the Rational Clinical Examination score and bias evaluated with the Quality Assessment of Diagnostic Accuracy Studies tool.

RESULTS:

Twenty-eight studies assessed the examination of referred patients by specialists. Only 5 studies reached Rational Clinical Examination quality scores of level 1-2. The studies with quality scores of level 1-2 included 30 to 203 shoulders with the prevalence of RCD ranging from 33% to 81%. Among pain provocation tests, a positive painful arc test result was the only finding with a positive LR greater than 2.0 for RCD (3.7 [95% CI, 1.9-7.0]), and a normal painful arc test result had the lowest negative LR (0.36 [95% CI, 0.23-0.54]). Among strength tests, a positive external rotation lag test (LR, 7.2 [95% CI, 1.7-31]) and internal rotation lag test (LR, 5.6 [95% CI, 2.6-12]) were the most accurate findings for full-thickness tears. A positive drop arm test result (LR, 3.3 [95% CI, 1.0-11]) might help identify patients with RCD. A normal internal rotation lag test result was most accurate for identifying patients without a full-thickness tear (LR, 0.04 [95% CI, 0.0-0.58]).

CONCLUSIONS AND RELEVANCE:

Because specialists performed all the clinical maneuvers for RCD in each of the included studies with no finding evaluated in more than 3 studies, the generalizability of the results to a nonreferred population is unknown. A positive painful arc test result and a positive external rotation resistance test result were the most accurate findings for detecting RCD, whereas the presence of a positive lag test (external or internal rotation) result was most accurate for diagnosis of a full-thickness rotator cuff tear.

Plasma injections

Am J Sports Med. 2013 Jul 26.

Platelet-Rich Plasma Injections in the Treatment of Chronic Rotator Cuff Tendinopathy: A Randomized Controlled Trial With 1-Year Follow-up.

Kesikburun S, Tan AK, Yilmaz B, Yasar E, Yazicioglu K.

Source

Department of Physical Medicine and Rehabilitation, Turkish Armed Forces Rehabilitation Center, Gülhane Military Medical Academy, Ankara, Turkey.

Abstract

BACKGROUND: Rotator cuff tendinopathy (RCT) is a significant source of disability and loss of work. Platelet-rich plasma (PRP) has been suggested to be beneficial in the treatment of RCT.

PURPOSE: To investigate the effect of PRP injections on pain and shoulder functions in patients with chronic RCT. STUDY

DESIGN: Randomized controlled trial; Level of evidence, 1. METHODS:A total of 40 patients, 18 to 70 years of age, with (1) a history of shoulder pain for >3 months during overhead-throwing activities, (2) MRI findings of RCT or partial tendon ruptures, and (3) a minimum 50% reduction in shoulder pain with subacromial injections of an anesthetic were included in this placebo-controlled, double-blind randomized clinical trial. Patients were randomized into a PRP group (n = 20) or placebo group (n = 20). Patients received an ultrasound-guided injection into the subacromial space that contained either 5 mL of PRP prepared from autologous venous blood or 5 mL of saline solution. All patients underwent a 6-week standard exercise program. Outcome measures (Western Ontario Rotator Cuff Index [WORC], Shoulder Pain and Disability Index [SPADI], 100-mm visual analog scale [VAS] of shoulder pain with the Neer test, and shoulder range of motion) were assessed at baseline and at 3, 6, 12, and 24 weeks and 1 year after injection.

RESULTS: Comparison of the patients revealed no significant difference between the groups in WORC, SPADI, and VAS scores at 1-year follow-up (P = .174, P = .314, and P = .904, respectively). Similar results were found at other assessment points. Within each group, the WORC, SPADI, and VAS scores showed significant improvements compared with baseline at all time points (P < .001). In the range of motion measures, there were no significant group × time interactions.

CONCLUSION: At 1-year follow-up, a PRP injection was found to be no more effective in improving quality of life, pain, disability, and shoulder range of motion than placebo in patients with chronic RCT who were treated with an exercise program.

KEYWORDS: injection, platelet-rich plasma, randomized clinical trial, rotator cuff, tendon

PMID: 23893418

Shoulder/Rotator Cuff Tear

Long-term follow-up of cases of rotator cuff tear treated conservatively

Journal of Shoulder and Elbow Surgery, 01/27/2012
Kijima H et al. –

In cases of rotator cuff tears treated conservatively, at 13 years after diagnosis, about 90% of patients had no or only slight pain and about 70% had no disturbance in activities of daily life. However, the younger patients tended to have more significant pain or disorder in daily life more than 10 years after diagnosis.

Background

This study clarified the long-term results of conservative treatment of rotator cuff tears.

Materials and methods

This study focused on 103 shoulders diagnosed with rotator cuff tears by magnetic resonance imaging or arthrography at our institution from 1996 to 1999. Sixty-five shoulders were followed up by telephone survey and 43 of these shoulders were evaluated; 11 shoulders were excluded because the patient had died, 10 shoulders because of severe dementia, and 1 shoulder that had undergone trauma. The mean patient age for these 43 shoulders at the time of diagnosis was 62 years, and the mean follow-up period was 13 years. The pain score (30 points) and the activities-of-daily-life score (10 points) of the Japanese Orthopaedic Association shoulder scoring system were determined.

Results

The mean pain score was 25.4 points, and the proportion of patients with no pain or with only slight pain was 88%. The mean score for activities of daily life was 9.4 points, and the proportion of patients with no disturbance in daily life was 72%. The patients with fewer than 20 points out of the possible 40 points (30 points for pain score plus 10 points for activities-of-daily-life score) were significantly younger than the other patients.

Conclusions

In cases of rotator cuff tears treated conservatively, at 13 years after diagnosis, about 90% of patients had no or only slight pain and about 70% had no disturbance in activities of daily life. However, the younger patients tended to have more significant pain or disorder in daily life more than 10 years after diagnosis.

Conservative care vs. surgical repair

Bone Joint J. 2014 Jan;96(1):75-81. doi: 10.1302/0301-620X.96B1.32168.

Treatment of non-traumatic rotator cuff tears: A randomised controlled trial with one-year clinical results.

Kukkonen J, Joukainen A, Lehtinen J, Mattila KT, Tuominen EK, Kauko T, Äärimaa V.
Author information

Abstract

We have compared three different methods of treating symptomatic non-traumatic tears of the supraspinatus tendon in patients above 55 years of age.

A total of 180 shoulders (173 patients) with supraspinatus tendon tears were randomly allocated into one of three groups (each of 60 shoulders); physiotherapy (group 1), acromioplasty and physiotherapy (group 2) and rotator cuff repair, acromioplasty and physiotherapy (group 3). The Constant score was assessed and followed up by an independent observer pre-operatively and at three, six and twelve months after the intervention. Of these, 167 shoulders were available for assessment at one year (follow-up rate of 92.8%). There were 55 shoulders in group 1 (24 in males and 31 in females, mean age 65 years (55 to 79)), 57 in group 2 (29 male and 28 female, mean age 65 years (55 to 79)) and 55 shoulders in group 3 (26 male and 29 female, mean age 65 years (55 to 81)). There were no between-group differences in the Constant score at final follow-up: 74.1 (sd 14.2), 77.2 (sd 13.0) and 77.9 (sd 12.1) in groups 1, 2 and 3, respectively ($p = 0.34$). The mean change in the Constant score was 17.0, 17.5, and 19.8, respectively ($p = 0.34$).

These results suggest that at one-year follow-up, operative treatment is no better than conservative treatment with regard to non-traumatic supraspinatus tears, and that conservative treatment should be considered as the primary method of treatment for this condition. Cite this article: Bone Joint J 2014;96-B:75-81.

KEYWORDS: Acromioplasty, Constant score, Non-traumatic rotator cuff tear, Physiotherapy, Rotator cuff, Rotator cuff repair PMID: 24395315

RCT/Working Shoulders

Comparison of risk factors for shoulder pain and rotator cuff syndrome in the working population

American Journal of Industrial Medicine, 01/09/2012
Bodin J et al. –

Age was more strongly associated with rotator cuff syndrome (RCS) than with shoulder pain without RCS for both genders. Biomechanical and psychosocial factors were associated with shoulder pain and RCS and differed between genders.

Methods

A total of 3,710 workers of a French region were randomly included in the cross–sectional study between 2002 and 2005.

Personal and occupational risk factors were assessed during a physical examination and by a self–administered questionnaire.

Multinomial logistic modeling was used for the following outcomes: no shoulder pain and no RCS (reference), shoulder pain without RCS (called “shoulder pain”) and RCS, separately for men and women.

Results

. The prevalence rates of shoulder pain for men and women were 28.0% and 31.1%, respectively, and the prevalence rates of RCS were 6.6% and 8.5%, respectively.

. In men, "shoulder pain" and RCS were associated with age, high–perceived physical exertion, and arm abduction.

. Automatic work pace and low supervisor support were associated with "shoulder pain" and high psychological demand and low skill discretion with RCS.

. In women, "shoulder pain" and RCS were associated with age, repetitiveness of tasks, and low supervisor support.

High perceived physical exertion and exposure to cold temperatures were associated with “shoulder pain.”

Vascularation

Clin J Sport Med. 2013 Nov;23(6):444-9. doi: 10.1097/JSM.0b013e318295ba73.

Neovascularization prevalence in the supraspinatus of patients with rotator cuff tendinopathy.

Kardouni JR, Seitz AL, Walsworth MK, Michener LA.
Source

*Department of Physical Therapy, Virginia Commonwealth University, Richmond, Virginia; †Department of Physical Therapy, Bouvé College of Health Sciences, Northeastern University, Boston, Massachusetts; and ‡Department of Radiology, UCLA Medical Center, Los Angeles, California.

Abstract

OBJECTIVE:
A high prevalence of neovascularity in lower extremity tendinopathies has been reported. Neovascularity in those with rotator cuff tendinopathy exclusively has not been examined. The objective was to determine the prevalence of neovascularization in patients with rotator cuff tendinopathy compared with asymptomatic controls.

DESIGN:
Single-blind cross-sectional study.

SETTING:
Research laboratory.

PARTICIPANTS:
Participants (n = 40; age = 44.9 years, 23-62 years; 20 females) with rotator cuff tendinopathy (n = 20) but without full-thickness rotator cuff tears, and asymptomatic controls that were age, gender, and hand dominance matched (n = 20) to the patients.

INTERVENTIONS:
The participants laying in supine had their shoulder positioned in internal rotation and extension. Ultrasound images were collected of the supraspinatus tendon and subacromial bursae in the transverse and longitudinal planes using a linear transducer in color Doppler mode.

MAIN OUTCOME MEASURES:
Images were assessed for neovascularization by 2 trained raters who were blinded to group (rotator cuff tendinopathy or asymptomatic group).

RESULTS:
No statistically significant difference in neovascularization was identified between participants with and without rotator cuff tendinopathy ($\chi = 0.13$, df = 1, P = 0.72). Neovascularization was identified in 6 of 20 patients with rotator cuff tendinopathy (30%) and 5 of 20 asymptomatic control participants (25%).

CONCLUSIONS:
The authors found no differences in neovascularization rate in patients with rotator cuff tendinopathy (30%) and asymptomatic controls (25%). The study indicates that neovascularization is not related to presence of symptomatic tendinopathy in those with rotator cuff tendinopathy. Neovascularization may not be a relevant sonographic finding to aid the clinical assessment of those with rotator cuff tendinopathy.

PMID: 23732364

IMPINGMENTS

Shoulder

Arch Phys Med Rehabil. 2012 Nov 16. pii: S0003-9993(12)01112-4. doi: 10.1016/j.apmr.2012.11.011. [Epub ahead of print]

Defining Substantial Clinical Benefit for Patient-rated Outcome Tools for Shoulder Impingement Syndrome.

Michener LA, Snyder AR, McClure PW.

Source

Professor and Director of the COOR Laboratory, Department of Physical Therapy, Virginia Commonwealth University, Richmond, VA 23298. Electronic address: lamichen@vcu.edu.

Abstract

OBJECTIVE:
To define the substantial clinical benefit (SCB) for two shoulder outcomes scales. The SCB metric defines the change amount associated with patient perception of a large meaningful improvement, and be used to interpret change over time in the outcome score.

DESIGN: Cohort.
SETTING: Clinic.
PARTICIPANTS:
Patients (n=74) with shoulder impingement syndrome.

INTERVENTIONS:
Standardized exercise and manual therapy for 6 weeks, and outcome measures completed at initial evaluation, discharge and 6-8 weeks post-discharge.

MAIN OUTCOME MEASURE(S):
Disabilities of the Arm, Shoulder and Hand(DASH) and Pennsylvania Shoulder Score(Penn), and a 13-point Global Rating of Change(GROC). Patients were classified as 'Substantial Improved' when they reported 'quite a bit better' (11) or greater on the GROC at discharge and again 6-8 weeks after discharge. Patients with GROC <11 at discharge or follow-up were classified as 'Non-Substantial Improved'. The percentage and raw points change in the Penn and DASH that corresponded with patient-rated substantial improvement was determined with receiver operator characteristic (ROC) analyses.

RESULTS:
ROC analyses revealed the SCB for the DASH of 40% (AUC=0.79;CI=0.69-0.89) and 11-points (AUC=0.63;CI=0.50-0.76); the Penn of 20% (AUC=0.76;CI=0.65-0.87) and 21-points (AUC=0.80;CI=0.69-0.90).

CONCLUSION:
SCB of 40% for the DASH, and 20% and 21-points for the Penn represent substantial improvement over 6-weeks of care, which was sustained at 12-weeks. The SCB of 11-points for the DASH is not recommended for use due to poor discrimination. The SCB can be used to enable clinical decision-making and in future clinical trials. Alternative approaches can produce different SCB values, and should be further investigated.

 PMID: 23164979 [PubMed - as supplied by publisher

STM/TP/Shoulder/Impingement

Clin J Pain. 2013 Jun;29(6):478-86. doi: 10.1097/AJP.0b013e3182652d65.

Bilateral myofascial trigger points and pressure pain thresholds in the shoulder muscles in patients with unilateral shoulder impingement syndrome: a blinded, controlled study.

Alburquerque-Sendín F, Camargo PR, Vieira A, Salvini TF.

Source

*Department of Physical Therapy, University of Salamanca, Salamanca, Spain †Department of Physical Therapy, Federal University of São Carlos, Sao Carlos ‡Physical Therapy Graduation Program, Methodist University of Piracicaba, Piracicaba, SP, Brazil.

Abstract

OBJECTIVES:

: To identify the presence of myofascial trigger points (TrPs) and pressure pain threshold (PPT) levels in the shoulder muscles of both involved and uninvolved sides in patients with unilateral shoulder impingement syndrome (SIS).

METHODS:

: Twenty-seven patients with SIS and 20 matched control patients participated in this study. TrPs of 10 shoulder muscles and 8 PPTs, including tibialis anterior PPT, were assessed.

RESULTS:

: SIS group showed a greater number of TrPs (t=-2.697; P=0.010) than the control group. The muscles of the uninvolved side of the SIS group also presented some active TrPs. PPTs showed small differences between involved and uninvolved sides of patients with SIS and higher differences between both sides of the SIS group and dominant side of controls although with significant difference only in the supraspinatus PPT (F=3.239; P=0.045). The muscle PPTs of the patients presenting TrPs in each muscle of the involved side were lower than the PPTs of the patients without TrPs in the same muscle for both involved and uninvolved sides with few significant differences.

DISCUSSION:

: The high number of TrPs in the involved side of patients with SIS suggests the presence of peripheral sensitization. The results reject the presence of central alterations. Finally, the patients with unilateral SIS may present bilateral deficits related to myofascial pain.

PMID: 23328323

Impingement/Exercise

Exercise therapy is evidence-based treatment of shoulder impingement syndrome. Current practice or recommendation only

European Journal of Physical and Rehabilitation Medicine, 10/04/2013 Evidence Based Medicine
Ylinen J et al.

Background: Subacromial impingement syndrome is the most common indication for shoulder operation. However, exercise therapy for the conservative treatment is recommended in the first instance.

Aim: To evaluate the implementation of exercise therapy in impingement syndrome.

Design: Retrospective study using structured postal questionnaire and data collected from hospital archive.

Methods: A total of 104 consecutive patients who had undergone shoulder surgery due to impingement syndrome. Patients were asked about therapy modalities that they had received before and after the operation as well as pain (VAS) and functional impairment (ASES) at one-year follow-up.

Results: Before surgery 49% of patients had not received advice for shoulder muscle exercises. After operation all patients had received mobility exercises, but one quarter of patients still reported that they had not received instructions about shoulder strength exercises. At the follow-up the means of the ASES index was 85 and use of NSAID had decreased by 75%. However, 15% of patients had moderate functional impairment (ASES under 60).

Conclusion: About half of patients reported that they had not received advice for rotator cuff exercise therapy before surgery even though with it surgery would probably have been avoided in many cases. Although symptoms in most patients had decreased after operation, several patients still suffered from pain and decreased function. Still several patients had not received advice for shoulder strengthening exercises that are important to recovery.

Impact: The adherence to the current recommendations about exercise therapy is insufficient in clinical practice. Thus we recommend that it should be monitored in all institutions in which shoulder pain is treated.

language: English

Shoulder/impingement/manual therapy

J Bodyw Mov Ther. 2013 Apr;17(2):212-8. doi: 10.1016/j.jbmt.2012.07.004. Epub 2012 Aug 4.

Shoulder functionality after manual therapy in subjects with shoulder impingement syndrome: A case series.

Heredia-Rizo AM, López-Hervás A, Herrera-Monge P, Gutiérrez-Leonard A, Piña-Pozo F.

Source

Department of Physiotherapy, Faculty of Nursing, Physiotherapy and Podiatry, University of Sevilla, Spain. Electronic address: amheredia@us.es.

Abstract

The aim of the study was to identify the differences in functionality of the upper limb in subjects suffering from shoulder impingement syndrome after intervention by two manual therapy protocols. Randomized, single-blind study with a sample of 22 subjects (58 ± 10.86 years old) divided into two groups. The conventional-group (n = 11) received mobilizations of the shoulder and the experimental-group (n = 11) was treated with soft tissue techniques in the cervical and upper thoracic regions. These two groups received electrotherapy and postural advices. The treatment lasted three weeks (15 daily sessions of 1 h and 30 min). Both active and passive range of motion (ROM) and self-perceived functionality of the upper limb (DASH questionnaire) were measured. The experimental group showed a significant improvement in the DASH scores and both groups improved mobility in the intra-group comparison pre-intervention versus post-intervention ($p < .05$), but not statistically significant differences were found in the between-group comparison ($p > .05$). Our results suggest that a combined treatment with electrotherapy, postural hygiene and manual therapy, regardless of the protocol, improves shoulder mobility and functionality.

PMID:23561869

Shoulder/impingement/exercise/manual therapy

J Rehabil Med. 2013 May 3;45(5):488-97. doi: 10.2340/16501977-1142.

Physiotherapy in patients with clinical signs of shoulder impingement syndrome: A randomized controlled trial.

Kromer TO, de Bie RA, Bastiaenen CH.

Source

Physiotherapiezentrum, Grube 21, DE-82377 Penzberg, The Netherlands, Thilo.Kromer@EPID.unimaas.nl, tok@ptz-physio.de, thilo.kromer@maastrichtuniversity.nl.

Abstract

Objective: To investigate the effect of individualized manual physiotherapy and exercises compared with individualized exercises alone in patients with shoulder impingement syndrome.

Design: Randomized controlled trial.

Subjects: Patients with shoulder impingement of more than 4 weeks' duration. Methods: Patients in the intervention group were treated with individually adapted exercises and examination-based physiotherapy. Controls were treated with individually adapted exercises only. Both groups had 10 treatment sessions over a period of 5 weeks and subsequently continued their exercises at home for another 7 weeks.

Results were analysed at 5 and 12 weeks after the start of the study. Primary outcome measures were: Shoulder Pain and Disability Index, and Patient's Global Impression of Change. Secondary outcome measures were: mean weekly pain score; Generic Patient-Specific Scale; and Patients' Satisfaction with Treatment.

Results: A total of 46 patients were randomized to the intervention group and 44 to the control group. Although both groups showed significant improvements, there was no difference between groups for the primary and secondary outcomes at any time. Only the results for mean pain differed at 5 weeks in favour of the intervention group.

Conclusion: Individually adapted exercises were effective in the treatment of patients with shoulder impingement syndrome. Individualized manual physiotherapy contributed only a minor amount to the improvement in pain intensity. However, further research is necessary to confirm these results before definite recommendations can be made.

PMID: 23584840

Shoulder/cortisone/PT

Rheumatology (Oxford). 2013 Apr 2

Cost-effectiveness of exercise therapy after corticosteroid injection for moderate to severe shoulder pain due to subacromial impingement syndrome: a trial-based analysis.

Jowett S, Crawshaw DP, Helliwell PS, Hensor EM, Hay EM, Conaghan PG.
Source

Health Economics Unit, School of Health and Population Sciences, University of Birmingham, Birmingham, Leeds Musculoskeletal & Rehabilitation Service, Leeds Community Healthcare NHS Trust, Leeds, Division of Musculoskeletal Disease, Leeds Institute of Molecular Medicine, University of Leeds, Leeds, NIHR Leeds Musculoskeletal Biomedical Research Unit, Leeds and Arthritis Research UK Primary Care Research Centre, Keele University, Keele, Staffordshire, UK.

Abstract

Objective. To perform a cost-effectiveness analysis of subacromial corticosteroid injection combined with exercise compared with exercise alone in patients with moderate to severe shoulder pain from subacromial impingement syndrome.

Methods. A within-trial cost-effectiveness analysis with 232 patients randomized to physiotherapy-led injection combined with exercise (n = 115) or exercise alone (n = 117). The analysis was from a health care perspective with 24-week follow-up. Resource use information was collected from all patients on interventions, medication, primary and secondary care contacts, private health care use and over-the-counter purchases. The measure of outcome was quality-adjusted life years (QALYs), calculated from EQ-5D responses at baseline and three further time points. An incremental cost-effectiveness analysis was conducted.

Results. Mean per patient NHS costs (£255 vs £297) and overall health care costs (£261 vs £318) were lower in the injection plus exercise arm, but this difference was not statistically significant. Total QALYs gained were very similar in the two trial arms (0.3514 vs 0.3494 QALYs), although slightly higher in the injection plus exercise arm, indicating that injection plus exercise may be the dominant treatment option. At a willingness to pay of £20,000 per additional QALY gained, there was a 61% probability that injection plus exercise was the most cost-effective option.

Conclusion. Injection plus exercise delivered by therapists may be a cost-effective use of resources compared with exercise alone and lead to lower health care costs and less time off work.

Trial registration: International Standard Randomised Controlled Trial Number Register, http://www.controlled-trials.com/isrctn/, ISRCT 25817033.

PMID: 23630367

Shoulder/Impingement/diagnosis

Med Biol Eng Comput. 2013 Apr 10.

Shoulder impingement revisited: evolution of diagnostic understanding in orthopedic surgery and physical therapy.

Braman JP, Zhao KD, Lawrence RL, Harrison AK, Ludewig PM.
Source

Department of Orthopaedic Surgery, University of Minnesota, 2512 South 7th Street, Minneapolis, MN, 55454, USA.

Abstract
"Impingement syndrome" is a common diagnostic label for patients presenting with shoulder pain. Historically, it was believed to be due to compression of the rotator cuff tendons beneath the acromion. It has become evident that "impingement syndrome" is not likely an isolated condition that can be easily diagnosed with clinical tests or most successfully treated surgically. Rather, it is likely a complex of conditions involving a combination of intrinsic and extrinsic factors. A mechanical impingement phenomenon as an etiologic mechanism of rotator cuff disease may be distinct from the broad diagnostic label of "impingement syndrome". Acknowledging the concepts of mechanical impingement and movement-related impairments may better suit the diagnostic and interventional continuum as they support the existence of potentially modifiable impairments within the conservative treatment paradigm.

Therefore, it is advocated that the clinical diagnosis of "impingement syndrome" be eliminated as it is no more informative than the diagnosis of "anterior shoulder pain". While both terms are ambiguous, the latter is less likely to presume an anatomical tissue pathology that may be difficult to isolate either with a clinical examination or with diagnostic imaging and may prevent potentially inappropriate surgical interventions.

We further recommend investigation of mechanical impingement and movement patterns as potential mechanisms for the development of shoulder pain, but clearly distinguished from a clinical diagnostic label of "impingement syndrome". For shoulder researchers, we recommend investigations of homogenous patient groups with accurately defined specific pathologies, or with subgrouping or classification based on specific movement deviations. Diagnostic labels based on the movement system may allow more effective subgrouping of patients to guide treatment strategies.

PMID: 23572144

Scapula position/impingement

Is there a relationship between subacromial impingement syndrome and scapular orientation? A systematic review

British Journal of Sports Medicine, 10/31/2013 Review Article
Ratcliffe E, et al.

Background Alterations in scapular orientation and dynamic control, specifically involving increased anterior tilt and downward rotation, are considered to play a substantial role in contributing to a subacromial impingement syndrome (SIS). Non-surgical intervention aims at restoring normal scapular posture. The research evidence supporting this practice is equivocal.

Objective The aim of this study was to systematically review the relevant literature to examine whether a difference exists in scapular orientation between people without shoulder symptoms and those with SIS. **Data sources** MEDLINE, AMED, EMBASE, CINAHL, PEDro and SPORTDiscus databases were searched using relevant search terms up to August 2013. Additional studies were identified by hand-searching the reference lists of pertinent articles.

Review methods Of the 7445 abstracts identified, 18 were selected for further analysis. Two reviewers independently assessed the studies for inclusion, data extraction and quality, using a modified Downs and Black quality assessment tool.

Results 10 trials were included in the review. Scapular position was determined through two-dimensional radiological measurements, 360° inclinometers and three-dimensional motion and tracking devices. The findings were inconsistent. Some studies reported patterns of reduced upward rotation, increased anterior tilting and medial rotation of the scapula. In contrast, others reported the opposite, and some identified no difference in motion when compared to asymptomatic controls.

Conclusions The underlying aetiology of SIS is still debated. The results of this review demonstrated a lack of consistency of study methodologies and results. Currently, there is insufficient evidence to support a clinical belief that the scapula adopts a common and consistent posture in SIS. This may reflect the complex, multifactorial nature of the syndrome. Additionally, it may be due to the methodological variations and shortfalls in the available research. It also raises the possibility that deviation from a ‘normal’ scapular position may not be contributory to SIS but part of normal variations. Further research is required to establish whether a common pattern exists in scapular kinematics in SIS patients or whether subgroups of patients with common patterns can be identified to guide management options. Non-surgical treatment involving rehabilitation of the scapula to an idealised normal posture is currently not supported by the available literature.

Impingement/Rotator cuff/exercise

Eur J Phys Rehabil Med. 2013 Mar 13.

Exercise therapy is evidence-based treatment of shoulder impingement syndrome - Current practice or recommendation only.

Ylinen J, Vuorenmaa M, Paloneva J, Kiviranta I, Kautiainen H, Oikari M, Häkkinen A.

Source

Department of Physical and Rehabilitation Medicine Jyväskylä Central Hospital, Jyväskylä, Finland - jari.ylinen@ksshp.fi.

Abstract

Background: Subacromial impingement syndrome is the most common indication for shoulder operation. However, exercise therapy for the conservative treatment is recommended in the first instance.

Aim: To evaluate the implementation of exercise therapy in impingement syndrome.

Design: Retrospective study using structured postal questionnaire and data collected from hospital archive. Methods: A total of 104 consecutive patients who had undergone shoulder surgery due to impingement syndrome. Patients were asked about therapy modalities that they had received before and after the operation as well as pain (VAS) and functional impairment (ASES) at one-year follow-up.

Results: Before surgery 49% of patients had not received advice for shoulder muscle exercises. After operation all patients had received mobility exercises, but one quarter of patients still reported that they had not received instructions about shoulder strength exercises. At the follow-up the means of the ASES index was 85 and use of NSAID had decreased by 75%. However, 15% of patients had moderate functional impairment (ASES under 60).

Conclusion: About half of patients reported that they had not received advice for rotator cuff exercise therapy before surgery even though with it surgery would probably have been avoided in many cases. Although symptoms in most patients had decreased after operation, several patients still suffered from pain and decreased function. Still several patients had not received advice for shoulder strengthening exercises that are important to recovery.

Clinical Rehabilitation Impact: The adherence to the current recommendations about exercise therapy is insufficient in clinical practice. Thus we recommend that it should be monitored in all institutions in which shoulder pain is treated.

PMID: 23480979

Impingement/MRI

Knee Surgery, Sports Traumatology, Arthroscopy February 2014

Quantitative and qualitative analyses of subacromial impingement by kinematic open MRI

Atsushi Tasaki, Akimoto Nimura, Taiki Nozaki, Akira Yamakawa, Mamoru Niitsu, Wataru Morita, Yoshimitsu Hoshikawa, Keiichi Akita

Abstract

Purpose

Quantitative and qualitative kinematic analyses of subacromial impingement by 1.2T open MRI were performed to determine the location of impingement and the involvement of the acromioclavicular joint.

Methods

In 20 healthy shoulders, 10 sequential images in the scapular plane were taken in a 10-s pause at equal intervals from 30° to maximum abduction in neutral and internal rotation. The distances between the rotator cuff (RC) and the acromion and the acromioclavicular joint were measured. To comprehend the positional relationships, cadaveric specimens were also observed.

Results

Although asymptomatic, the RC came into contact with the acromion and the acromioclavicular joint in six and five cases, respectively. The superior RC acted as a depressor for the humeral head against the acromion as the shoulder elevated. The mean elevation angle and distance at the closest position between the RC and the acromion in neutral rotation were 93.5° and 1.6 mm, respectively, while those between the RC and the acromioclavicular joint were 86.7° and 2.0 mm. When comparing this distance and angle, there was no significant difference between the RC to the acromion and to the acromioclavicular joint. The minimum distance between the RC and the acromion was significantly shorter than that between the greater tuberosity and the acromion. The location of RC closest to the acromion and the acromioclavicular joint differed significantly.

Conclusion

Although asymptomatic, contact was found between the RC and the acromion and the acromioclavicular joint. The important role of the RC to prevent impingement was observed, and hence, dysfunction of the RC could lead to impingement that could result in a RC lesion. The RC lesions may differ when they are caused by impingement from either the acromion or the acromioclavicular joint.

Shoulder/subacromial pains impact on strength

Man Ther. 2012 Apr 13.

The role of experimentally-induced subacromial pain on shoulder strength and throwing accuracy.

Wassinger CA, Sole G, Osborne H.

Source

Department of Physical Therapy, East Tennessee State University, PO Box 70624, Johnson City, TN 37604, USA.

Abstract

Shoulder injuries often comprise two separate yet related components, structural tissue damage and pain. The role of each of these components on shoulder function is difficult to ascertain. Experimental pain models allow the assessment of consequences of localized pain when applied to healthy individuals. By understanding the role of pain on shoulder function, clinicians will be able to more efficiently assess and treat shoulder injuries. The objective of the study was to evaluate the role of experimentally-induced sub-acromial pain on shoulder isokinetic rotational strength and throwing accuracy. This was a block counterbalanced, crossover, repeated measures study design utilizing 20 individuals without self-reported shoulder or cervical pathology. Shoulder function was measured with and without experimental pain injection (2 mL of 5% hypertonic saline) in the sub-acromial space. Functional tasks consisted of shoulder rotational strength utilizing isokinetic testing and throwing accuracy via the functional throwing performance index. The hypertonic saline induced moderate pain levels in all participants (4.3-5.1/10).

Normalized shoulder internal ($t = 3.76$, $p = 0.001$) and external ($t = 3.12$, $p = 0.006$) rotation strength were both diminished in the painful condition compared to the pain free condition. Throwing accuracy was also reduced while the participants experienced pain ($t = 3.99$, $p = 0.001$). Moderate levels of experimental shoulder pain were sufficient to negatively influence shoulder strength and throwing accuracy in participants without shoulder pathology.

Rotator cuff inhibition/AC joint

J Shoulder Elbow Surg. 2012 Aug 30.

Experimental pain inhibits infraspinatus activation during isometric external rotation.

Stackhouse SK, Eisennagel A, Eisennagel J, Lenker H, Sweitzer BA, McClure PW.
Source

Department of Physical Therapy, Arcadia University, Glenside, PA, USA.

Abstract

BACKGROUND:
The effect of pain on muscle activation is poorly understood. This study examined the effects of acute experimental pain on rotator cuff muscle force and voluntary activation (VA). We hypothesized that acute subacromial pain would cause inhibition of infraspinatus VA with a corresponding decrease in external rotation force.

MATERIALS AND METHODS:
Seventeen healthy adults with no known shoulder pathology were tested. Isolated external rotation force was tested on a dynamometer. Participants performed 2 baseline maximum voluntary isometric contractions of external rotation, during which maximal electrical stimulation was used to assess VA. To elicit pain, 1.5 mL 5% hypertonic saline was injected into the subacromial space, and testing of maximum voluntary isometric contractions force and VA was repeated 3 times at 5-minute intervals.

RESULTS:
Mean ± standard deviation initial pain from the injection was 6.6 ± 1.3 points of 10 possible and produced a 32.8% decline in force and a 22.7% decline in VA ($P < .05$). Pain diminished over a 10-minute period. As pain resolved, force and VA improved ($P < .0125$). There was a strong relationship between force and VA ($r(2) = 0.78$, $P < .05$) and a moderate relationship between pain and VA ($r(2) = 0.31$, $P < .05$).

CONCLUSIONS:
Experimental subacromial pain elicits a decline in force and VA of the infraspinatus. Although this study only examines acute experimental pain, it supports the concept that pain affects rotator cuff muscle recruitment and function, which may contribute to abnormal shoulder mechanics in patients with rotator cuff pathology.

PMID: 22939406 [PubMed - as supplied by publisher

Shoulder/impingement/injections

J Bone Joint Surg Br. 2012 Sep;94(9):1246-52.

The effectiveness of injections of hyaluronic acid or corticosteroid in patients with subacromial impingement: A three-arm randomised controlled trial.

Penning LI, de Bie RA, Walenkamp GH.

Source

Maastricht University Medical Centre Research School CAPHRI, Department of Orthopaedic Surgery, PO Box 5800, 6202 AZ Maastricht, The Netherlands.

Abstract

A total of 159 patients (84 women and 75 men, mean age of 53 (20 to 87)) with subacromial impingement were randomised to treatment with subacromial injections using lidocaine with one of hyaluronic acid (51 patients), corticosteroid (53 patients) or placebo (55 patients).

Patients were followed up for 26 weeks. The primary outcome was pain on a visual analogue score (VAS), and secondary outcomes included the Constant Murley score, shoulder pain score, functional mobility score, shoulder disability questionnaire and pain-specific disability score. The different outcome measures showed similar results. After three, six and 12 weeks corticosteroid injections were superior to hyaluronic acid injections and only at six weeks significantly better than placebo injections.

The mean short-term reduction in pain on the VAS score at 12 weeks was 7% (sd 2.7; 97.5% confidence interval (CI) 0.207 to 1.55; $p = 0.084$) in the hyaluronic acid group, 28% (sd 2.8; 97.5% CI 1.86 to 3.65; $p < 0.001$) in the corticosteroid group and 23% (sd 3.23; 97.5% CI 1.25 to 3.26; $p < 0.001$) in the placebo group. At 26 weeks there was a reduction in pain in 63% (32 of 51) of patients in the hyaluronic acid group, 72% (38 of 53) of those in the corticosteroid group and 69% (38 of 55) of those in the placebo group.

We were not able to show a convincing benefit from hyaluronic acid injections compared with corticosteroid or placebo injections. Corticosteroid injections produced a significant reduction in pain in the short term (three to 12 weeks), but in the long term the placebo injection produced the best results.

PMID: 22933498 [PubMed - in process]

Shoulder Impingement/Injection

J Shoulder Elbow Surg. 2012 Feb 25.

Does hyaluronate injection work in shoulder disease in early stage? A multicenter, randomized, single blind and open comparative clinical study.

Kim YS, Park JY, Lee CS, Lee SJ.
Source

Department of Orthopaedic Surgery, Catholic University School of Medicine, Seoul, South Korea.

Abstract
BACKGROUND:
This study assessed the hypothesis that injection of high-molecular weight hyaluronate in the treatment of subacromial impingement syndrome is effective and safe, compared with corticosteroid injection in the shoulder joint.

METHODS:
One hundred five patients were allocated randomly into 2 groups: 1 group was injected once a week for 3 weeks with hyaluronate and the other group was injected once with corticosteroid. All injections were guided to the subacromial space by an ultrasonogram. Eighty patients were followed up for 12 weeks after the injection: 38 patients in the hyaluronate group and 42 patients in the corticosteroid group. The functional outcome was measured using the American Shoulder and Elbow Surgeons standardized shoulder assessment form (ASES).

RESULTS:
The Visual Analogue Scale (VAS) score at 12 weeks was decreased significantly from 58.6 ± 19.3 to 24.6 ± 23.1 in the hyaluronate group ($P < .0001$) and from 57.2 ± 19.9 to 36.9 ± 26.5 ($P < .0001$) in the corticosteroid group. There was a significant difference in the VAS score between the hyaluronic acid group and corticoid group ($P = .0180$) at 12 weeks. The functional ASES scores in the hyaluronate and corticosteroid groups were increased from 17.6 ± 4.8 to 22.4 ± 6.5 and from 17.3 ± 4.9 to 21.7 ± 5.8, respectively, at 12 weeks ($P = .4825$). There was no difference in the number of patients requiring rescue medication between the hyaluronate group and corticosteroid group at 12 weeks ($P = .9254$).

CONCLUSION:
A subacromial hyaluronate injection to treat impingement syndrome produces similar pain and functional improvement to corticosteroid at a short-term follow-up.

PMID: 22366365 [PubMed - as supplied by publisher

Impingement/PT

Br J Sports Med. 2013 Nov 11. doi: 10.1136/bjsports-2012-091802.

Subacromial impingement syndrome--effectiveness of physiotherapy and manual therapy.

Gebremariam L, Hay EM, van der Sande R, Rinkel WD, Koes BW, Huisstede BM.

Source

Department of General Practice, Erasmus MC-University Medical Center Rotterdam, Rotterdam, The Netherlands.

Abstract

BACKGROUND:

The subacromial impingement syndrome (SIS) includes the rotator cuff syndrome, tendonitis and bursitis of the shoulder. Treatment includes surgical and non-surgical modalities. Non-surgical treatment is used to reduce pain, to decrease the subacromial inflammation, to heal the compromised rotator cuff and to restore satisfactory function of the shoulder. To select the most appropriate non-surgical intervention and to identify gaps in scientific knowledge, we explored the effectiveness of the interventions used, concentrating on the effectiveness of physiotherapy and manual therapy.

METHODS:

The Cochrane Library, PubMed, EMBASE, PEDro and CINAHL were searched for relevant systematic reviews and randomised clinical trials (RCTs). Two reviewers independently extracted data and assessed the methodological quality. A best-evidence synthesis was used to summarise the results.

RESULTS:

Two reviews and 10 RCTs were included. One RCT studied manual therapy as an add-on therapy to self-training. All other studies studied the effect of physiotherapy: effectiveness of exercise therapy, mobilisation as an add-on therapy to exercises, ultrasound, laser and pulsed electromagnetic field. Moderate evidence was found for the effectiveness of hyperthermia compared to exercise therapy or ultrasound in the short term. Hyperthermia and exercise therapy were more effective in comparison to controls or placebo in the short term (moderate evidence). For the effectiveness of hyperthermia, no midterm or long-term results were studied. In the midterm, exercise therapy gave the best results (moderate evidence) compared to placebo or controls. For other interventions, conflicting, limited or no evidence was found.

CONCLUSIONS:

Some physiotherapeutic treatments seem to be promising (moderate evidence) to treat SIS, but more research is needed before firm conclusions can be drawn.

KEYWORDS: Evidence based reviews, Exercise rehabilitation, Physiotherapy, Shoulder injuries, Soft tissue injuries PMID: 24217037

Shoulder/Slap

J Shoulder Elbow Surg. 2012 Feb 24.

The influence of superior labrum anterior to posterior (SLAP) repair on restoring baseline glenohumeral translation and increased biceps loading after simulated SLAP tear and the effectiveness of SLAP repair after long head of biceps tenotomy.

Patzer T, Habermeyer P, Hurschler C, Bobrowitsch E, Wellmann M, Kircher J, Schofer MD.
Source

Department of Orthopaedics, University Hospital of Düsseldorf, Düsseldorf, Germany.

Abstract

HYPOTHESIS:

Biomechanical studies have shown increased glenohumeral translation and loading of the long head biceps (LHB) tendon after superior labrum anterior to posterior (SLAP) tears. This may explain some of the typical clinical findings, including the prevalence of humeral chondral lesions, after SLAP lesions. The first hypothesis was that SLAP repair could restore the original glenohumeral translation and reduce the increased LHB load after SLAP lesions. The second hypothesis was that SLAP repair after LHB tenotomy could significantly reduce the increased glenohumeral translation.

MATERIALS AND METHODS:

Biomechanical testing was performed on 21 fresh frozen human cadaveric shoulders with an intact shoulder girdle using a sensor-guided industrial robot to apply 20 N of compression in the joint and 50 N translational force at 0°, 30°, and 60° of abduction. LHB loading was measured by a load-cell with 5 N and 25 N preload. Type IIC SLAP lesions were created arthroscopically, and a standardized SLAP repair was done combined with or without LHB tenotomy.

RESULTS:

No significant difference of glenohumeral translation and increased LHB load in SLAP repair compared with the intact shoulder was observed under 5 N and 25 LHB preload, except for anterior translation under 25 N LHB preload. After LHB tenotomy after SLAP lesions, no significant difference of translation was observed with or without SLAP repair.

CONCLUSIONS:

SLAP repair without associated LHB tenotomy helps normalize glenohumeral translation and LHB loading. The stabilizing effect of the SLAP complex is dependent on the LHB. After biceps tenotomy, SLAP repair does not affect glenohumeral translation.

PMID: 22365557 [PubMed - as supplied by publisher]

Stabilization exercise

Journal of Physical Therapy Science Vol. 25 (2013) No. 11 November p. 1359-1362
http://dx.doi.org/10.1589/jpts.25.1359 / DN/JST.JSTAGE/jpts/25.1359

Effects of Shoulder Stabilization Exercise on Pain and Functional Recovery of Shoulder Impingement Syndrome Patients

Sang-In Park[1)], Yong-Kyu Choi[1)], Jung-Ho Lee[2)], Young-Min Kim[3)]

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Keywords: **Shoulder**, **Impingement syndrome**, **Stabilization exercise**

[Purpose] This study examined the effects of scapular stabilization exercises immediately after surgery on pain and function in patients diagnosed with shoulder impingement syndrome.

[Subjects] The subjects were assigned by random sampling to an experimental group (n=15) to which stabilization exercise was applied and a control group (n=15) to which ordinary physical treatment was applied.

[Methods] To evaluate the degree of pain, a 100 mm visual analogue scale (VAS) was used. The Constant-Murley Scale (CMS) was used to evaluate the functions of the shoulder joints. To determine the range of motion, a goniometer was used to measure range of shoulder motion. The simple shoulder test (SST) was used to determine the condition of the shoulder joints of the subjects.

[Results] There were significant differences in all the items of the experimental group. The results of comparison of the therapeutic effect in the experimental and control groups revealed significant differences in active abduction, passive abduction, VAS, SST, and the CMS, except for pain.

[Conclusion] The results suggest that shoulder stabilization exercise positively affects pain alleviation and functional recovery in shoulder impingement patients.

Subacromial Impingement/Shoulder

Subacromial Impingement Syndrome

BMJ 2012 Feb 20

A specific exercise strategy that focuses on strengthening eccentric exercises for the rotator cuff and concentric/eccentric exercises for the scapula stabilizers is effective in reducing pain and improving shoulder function in patients with persistent subacromial impingement syndrome, say authors of an article published online in *BMJ*. By extension, they add, this exercise strategy reduced the need for arthroscopic subacromial decompression within the 3-month timeframe used in the study.

This randomized, participant and single assessor blinded controlled study was conducted in an orthopedic department in a Swedish university hospital. Orthopedic specialists recruited 102 patients with longstanding (more than 6 months) persistent subacromial impingement syndrome that did not respond to earlier conservative treatment.

The specific exercise strategy consisted of strengthening eccentric exercises for the rotator cuff and concentric/eccentric exercises for the scapula stabilizers in combination with manual mobilization. The control exercise program consisted of unspecific movement exercises for the neck and shoulder. Patients in both groups received 5 to 6 individual guided treatment sessions during 12 weeks. In between these supervised sessions the participants performed home exercises once or twice a day for 12 weeks.

The primary outcome was the Constant-Murley shoulder assessment score evaluating shoulder function and pain. Secondary outcomes were patients' global impression of change because of treatment and decision regarding surgery.

Most (97, 95%) participants completed the 12-week study. There was a significantly greater improvement in the Constant-Murley score in the specific exercise group than in the control exercise group (24 points vs 9 points). Significantly more patients in the specific exercise group reported successful outcome (defined as large improvement or recovered) in the patients' global assessment of change because of treatment— 69% (35/51) vs 24% (11/46); odds ratio 7.6 (95% confidence interval 3.1 to 18.9). A significantly lower proportion of patients in the specific exercise group subsequently chose to undergo surgery—20% (10/51) vs 63% (29/46); odds ratio 7.7 (95% confidence interval 3.1 to 19.4).

/Manual therapy

J Manipulative Physiol Ther. 2012 Nov;35(9):720-6. doi: 10.1016/j.jmpt.2012.10.009.

Evidence-based treatment methods for the management of shoulder impingement syndrome among dutch-speaking physiotherapists: an online, web-based survey.

Struyf F, De Hertogh W, Gulinck J, Nijs J.
Source

Doctor-Assistant, Artesis University College, Antwerp, Belgium. Electronic address: Fillip.struyf@vub.ac.be.

Abstract

OBJECTIVE:
The purpose of this study is to examine whether Dutch-speaking physiotherapists in Belgium report using evidence-based practice methods for the treatment for patients with shoulder impingement syndrome (SIS).

METHODS:
An online questionnaire, consisting of open-ended and multiple choice questions, was sent to Dutch-speaking members of the representative Belgian physiotherapists society that likely treated patients with shoulder pain. The electronic survey was sent to members of the Belgian Physiotherapists Society (AXXON) (n = 3877). Therapists were asked to report interventions that they used for the treatment for patients with SIS. Survey responses were interpreted using current literature that supports various active treatments for SIS, including supervised exercise, home exercise, and exercise therapy combined with manual therapy.

RESULTS:
A total of 119 (3%) of the AXXON members completed the online survey (68 men; mean age, 38 years). Sixty-one percent of the respondents were manual therapists, and 36% were sports physiotherapists. Exercise therapy was the most often reported therapeutic intervention (96.6%). Manual mobilization was most frequently reported for the treatment of SIS (94.1%), followed by postural training (85.7%) and stretching (76.5%). The remaining interventions were applied by less than 54% of the responders.

CONCLUSIONS:
The results suggest that exercise therapy and manual therapy were reportedly used by most physiotherapists responding to this survey. These practices are in line with current evidence for the treatment of SIS.

 PMID: 23206967

Shoulder Impingement

Diagnostic Accuracy of Clinical Tests for Subacromial Impingement Syndrome: A Systematic Review and Meta-Analysis

Marwan Alqunaee, RCSI, Rose Galvin, BSc (Physio), PhD, Tom Fahey, MD, Objective To examine the accuracy of clinical tests for diagnosing subacromial impingement syndrome (SIS).

Data Sources

A systematic literature search was conducted in January 2011 to identify all studies that examined the diagnostic accuracy of clinical tests for SIS. The following search engines were used: Cochrane Library, EMBASE, Science Direct, and PubMed.

Study Selection

Two reviewers screened all articles. We included prospective or retrospective cohort studies that examined individuals with a painful shoulder, reported any clinical test for SIS, and used arthroscopy or open surgery as the reference standard. The search strategy yielded 1338 articles of which 1307 publications were excluded based on title/abstract. Sixteen of the remaining 31 articles were included. The PRISMA (preferred reporting items for systematic reviews and meta-analyses) guidelines were followed to conduct this review.

Data Extraction

The number of true positives, false positives, true negatives, and false negatives for each clinical test were extracted from relevant studies, and a 2×2 table was constructed. Studies were combined using a bivariate random-effects model. Heterogeneity was assessed using the variance of logit-transformed sensitivity and specificity.

Data Synthesis

Ten studies with 1684 patients are included in the meta-analysis. The Hawkins-Kennedy test, Neer's sign, and empty can test are shown to be more useful for ruling out rather than ruling in SIS, with greater pooled sensitivity estimates (range, .69–.78) than specificity (range, .57–.62). A negative Neer's sign reduces the probability of SIS from 45% to 14%. The drop arm test and lift-off test have higher pooled specificities (range, .92–.97) than sensitivities (range, .21–.42), indicating that they are more useful for ruling in SIS if the test is positive.

Conclusions

This systematic review quantifies the diagnostic accuracy of 5 clinical tests for SIS, in particular the lift-off test. Accurate diagnosis of SIS in clinical practice may serve to improve appropriate treatment and management of individuals with shoulder complaints.

Shoulder/impingement/manual therapy

J Bodyw Mov Ther. 2013 Apr;17(2):212-8. doi: 10.1016/j.jbmt.2012.07.004. Epub 2012 Aug 4.

Shoulder functionality after manual therapy in subjects with shoulder impingement syndrome: A case series.

Heredia-Rizo AM, López-Hervás A, Herrera-Monge P, Gutiérrez-Leonard A, Piña-Pozo F.

Source

Department of Physiotherapy, Faculty of Nursing, Physiotherapy and Podiatry, University of Sevilla, Spain. Electronic address: amheredia@us.es.

Abstract

The aim of the study was to identify the differences in functionality of the upper limb in subjects suffering from shoulder impingement syndrome after intervention by two manual therapy protocols. Randomized, single-blind study with a sample of 22 subjects (58 ± 10.86 years old) divided into two groups. The conventional-group (n = 11) received mobilizations of the shoulder and the experimental-group (n = 11) was treated with soft tissue techniques in the cervical and upper thoracic regions. These two groups received electrotherapy and postural advices. The treatment lasted three weeks (15 daily sessions of 1 h and 30 min). Both active and passive range of motion (ROM) and self-perceived functionality of the upper limb (DASH questionnaire) were measured. The experimental group showed a significant improvement in the DASH scores and both groups improved mobility in the intra-group comparison pre-intervention versus post-intervention ($p < .05$), but not statistically significant differences were found in the between-group comparison ($p > .05$).

Our results suggest that a combined treatment with electrotherapy, postural hygiene and manual therapy, regardless of the protocol, improves shoulder mobility and functionality.

 PMID:23561869

Shoulder/impingement

Arch Phys Med Rehabil. 2012 Dec;93(12):2206-9. doi: 10.1016/j.apmr.2012.06.026. Epub 2012 Jul 10.

Central hypersensitivity in patients with subacromial impingement syndrome.

Paul TM, Soo Hoo J, Chae J, Wilson RD.
Source

Case Western Reserve University School of Medicine, Cleveland, OH.

Abstract

Paul TM, Soo Hoo J, Chae J, Wilson RD. Central hypersensitivity in patients with subacromial impingement syndrome.

OBJECTIVE:
To investigate the presence of primary and secondary hyperalgesia among subjects with chronic subacromial impingement syndrome (SIS) compared with pain-free controls.

DESIGN:
Cross-sectional design.

SETTING:
Outpatient rehabilitation clinic, urban, academic medical center.

PARTICIPANTS:
Volunteer sample (N=62) (31 with SIS, 31 controls).

INTERVENTIONS:
Not applicable.

MAIN OUTCOME MEASURES:
Pressure-pain thresholds (PPTs) were measured at the middle deltoid of the affected/dominant arm (primary or secondary hyperalgesia) and the middle deltoid and tibialis anterior of the unaffected/nondominant side (secondary hyperalgesia) in SIS and healthy controls, respectively. Differences in PPTs were analyzed by Wilcoxon rank sum test and with linear regression analysis controlling for sex, a known confounder of PPTs.

RESULTS:
After adjusting for sex, subjects with SIS had significantly lower PPTs than did controls at all locations. Controls had a 1.4kg/cm(2) (95% confidence interval [CI], 1.2-1.5) higher PPT at their affected shoulder than did those with SIS, a 0.7kg/cm(2) (95% CI, 0.5-0.9) higher PPT at their nonaffected shoulder, and a 1.1kg/cm(2) (95% CI, 1.1-1.2) higher PPT at their contralateral tibialis anterior. Observers were not blinded to patient groupings but were blinded to the level of applied pressure.

CONCLUSIONS:
This study provides further evidence that patients with SIS have significantly lower PPTs than do controls in both local and distal areas from their affected arm consistent with primary and secondary hyperalgesia, respectively. Data suggest the presence of central sensitization among subjects with chronic SIS.

 PMID: 22789774 [PubMed - in process] PMCID: PMC3508388

Exercise/Impingement

Clinical and MRI findings after high dosage medical exercise therapy in patients with long lasting subacromial pain syndrome: a case series on six patients.

OsterÃ¥s H, Myhr G, Haugerud L, Torstensen TA
Journal of bodywork and movement therapies Add to My Journals List

201010 14(4):352-60 Language: eng Country: United States Department of Physical Therapy, Faculty of Health Education and Social Work, Sør-Trøndelag University College, Ranheimsv 10, N-7004 Trondheim, Norway. havard.osteras@hist.no

SUMMARY BACKGROUND AND PURPOSE:

The primary aim of this case series was to investigate the effect of a high dosage medical exercise therapy program on shoulder pain in patients with subacromial pain syndrome. SUBJECTS: Six subjects were assigned to a medical exercise therapy group.

METHODS:

They received three treatments a week over three months. Outcome measures were descriptions of the subacromial space including supraspinatus tendon diameter, function, pain, and active range of motion in the shoulder girdle.

RESULTS:

The subjects showed improvement posttest compared to pretest with respect to pain, function, range of motion, and isometric strength. An MRI demonstrated no change in tendon thickness after the treatment. Inflammatory signs such as fluid in the subacromial bursa decreased in some patients.

DISCUSSION AND CONCLUSION:

In patients with uncomplicated subacromial pain syndrome, high dosage medical exercise therapy might be an efficient treatment approach. The clinical effects might be explained by morphological changes in the subacromial space.

Exercise/Motor Control/Impingement

J **Shoulder** Elbow Surg. 2013 Apr;22(4):e11-9. doi: 10.1016/j.jse.2012.06.010. Epub 2012 Sep 1.

Motor control retraining exercises for shoulder impingement: effects on function, muscle activation, and biomechanics in young adults.

Worsley P1, Warner M, Mottram S, Gadola S, Veeger HE, Hermens H, Morrissey D, Little P, Cooper C, Carr A, Stokes M.
Author information

Abstract

OBJECTIVE:
Evidence for effective management of **shoulder impingement** is limited. The present study aimed to quantify the clinical, neurophysiological, and biomechanical **effects** of a scapular **motor control retraining** for **young** individuals with **shoulder impingement** signs.

METHOD:
Sixteen **adults** with **shoulder impingement** signs (mean age 22 ± 1.6 years) underwent the intervention and 16 healthy participants (24.8 ± 3.1years) provided reference data. **Shoulder function** and pain were assessed using the **Shoulder** Pain and Disability Index (SPADI) and other questionnaires. Electromyography (EMG) and 3-dimensional motion analysis was used to record **muscle activation** and kinematic data during arm elevation to 90° and lowering in 3 planes. Patients were assessed pre and post a 10-week **motor control** based intervention, utilizing scapular orientation **retraining**.

RESULTS:
Pre-intervention, patients reported pain and reduced **function** compared to the healthy participants (SPADI in patients 20 ± 9.2; healthy 0 ± 0). Post-intervention, the SPADI scores reduced significantly ($P < .001$) by a mean of 10 points (±4). EMG showed delayed onset and early termination of serratus anterior and lower trapezius **muscle** activity pre-intervention, which improved significantly post-intervention ($P < .05$). Pre-intervention, patients exhibited on average 4.6-7.4° less posterior tilt, which was significantly lower in 2 arm elevation planes ($P < .05$) than healthy participants. Post-intervention, upward rotation and posterior tilt increased significantly ($P < .05$) during 2 arm movements, approaching the healthy values.

CONCLUSION:
A 10-week **motor control** intervention for **shoulder impingement** increased **function** and reduced pain. Recovery mechanisms were indicated by changes in **muscle** recruitment and scapular kinematics. The efficacy of the intervention requires further examined in a randomized **control** trial.

INSTABILITIES

Movement patterns

J Shoulder Elbow Surg. 2013 Dec 26. pii: S1058-2746(13)00505-3. doi: 10.1016/j.jse.2013.09.021.

Movement control in patients with shoulder instability: a comparison between patients after open surgery and nonoperated patients.

Arzi H1, Krasovsky T2, Pritsch M1, Liebermann DG3.
Author information

Abstract

BACKGROUND:
Open surgery to correct shoulder instability is deemed to facilitate recovery of static and dynamic motor functions. Postoperative assessments focus primarily on static outcomes (e.g., repositioning accuracy). We introduce kinematic measures of arm smoothness to assess shoulder patients after open surgery and compare them with nonoperated patients. Performance among both groups of patients was hypothesized to differ. Postsurgery patients were expected to match healthy controls.

METHODS:
All participants performed pointing movements with the affected/dominant arm fully extended at fast, preferred, and slow speeds (36 trials per subject). Kinematic data were collected (100 Hz, 3 seconds), and mixed-design analyses of variance (group, speed) were performed with movement time, movement amplitude, acceleration time, and model-observed similarities as dependent variables. Nonparametric tests were performed for number of velocity peaks.

RESULTS:
Nonoperated and postsurgery patients showed similarities at preferred and faster movement speeds but not at slower speed. Postsurgery patients were closer to maximally smoothed motion and differed from healthy controls mainly during slow arm movements (closer to maximal smoothness, larger movement amplitude, shorter movement time, and lower number of peaks; i.e., less movement fragmentation).

CONCLUSIONS:
Arm kinematic analyses suggest that open surgery stabilizes the shoulder but does not necessarily restore normal movement quality. Patients with recurrent anterior shoulder instability (RASI) seem to implement a "safe" but nonadaptive mode of action whereby preplanned stereotypical movements may be executed without depending on feedback. Rehabilitation of RASI patients should focus on restoring feedback-based movement control. Clinical assessment of RASI patients should include higher order kinematic descriptors.

 KEYWORDS: Basic Science Study, Kinematics, Smoothness, arm kinematics, kinesthesis, open surgery, shoulder instability PMID: 24374151

Posterior instability

Am J Sports Med. 2013 Aug 27.

Risk Factors for Posterior Shoulder Instability in Young Athletes.

Owens BD, Campbell SE, Cameron KL.

Source

John A. Feagin Jr Sports Medicine Fellowship, Keller Army Hospital, United States Military Academy, West Point, New York.

Abstract

BACKGROUND: While posterior glenohumeral instability is becoming increasingly common among young athletes, little is known of the risk factors for injury.

PURPOSE: To determine the modifiable and nonmodifiable risk factors for posterior shoulder instability in a high-risk cohort.

STUDY DESIGN: Case-control study (prognosis); Level of evidence, 2.

METHODS: A prospective cohort study in which 714 young athletes were followed from June 2006 through May 2010 was conducted. Baseline testing included a subjective history of instability, instability testing by a sports medicine fellowship-trained orthopaedic surgeon, range of motion, strength measurement with a handheld dynamometer, and bilateral noncontrast magnetic resonance imaging of the shoulder. A musculoskeletal radiologist measured glenoid version, height, depth, rotator interval (RI) height, RI width, RI area, and RI index. Participants were followed to document all acute posterior shoulder instability events during the 4-year follow-up period. The time to the posterior shoulder instability event during the follow-up period was the primary outcome of interest. Univariate and multivariable Cox proportional hazards regression models were used to analyze the data.

RESULTS: Complete data on 714 participants were obtained. During the 4-year surveillance period, 46 shoulders sustained documented glenohumeral instability events, of which only 7 were posterior in direction. The baseline factors that were associated with subsequent posterior instability during follow-up were increased glenoid retroversion ($P < .0001$), increased external rotation strength in adduction ($P = .029$) and at 45° of abduction ($P = .015$), and increased internal rotation strength in adduction ($P = .038$).

CONCLUSION: This is the largest known prospective study to follow healthy participants in the development of posterior shoulder instability. Posterior instability represents 10% of all instability events. The most significant risk factor was increased glenoid retroversion. While increased internal/external strength was also associated with subsequent instability, it is unclear whether these strength differences are causative or reactive to the difference in glenoid anatomy. This work confirms that increased glenoid retroversion is a significant prospective risk factor for posterior instability.

KEYWORDS: glenoid retroversion, injury prevention, posterior instability, shoulder instability

PMID: 23982394

Shoulder/Dislocation

Sports Med Arthrosc. 2013 Sep;21(3):155-65. doi: 10.1097/JSA.0b013e31829f608c.

Using evidence-based algorithms to improve clinical decision-making: the case of a first-time anterior shoulder dislocation.

Federer AE, Taylor DC, Mather RC 3rd.
Source

Rush University Medical College, Chicago, IL, USA.

Abstract
Decision making in health care has evolved substantially over the last century. Up until the late 1970s, medical decision making was predominantly intuitive and anecdotal. It was based on trial and error and involved high levels of problem solving. The 1980s gave way to empirical medicine, which was evidence based probabilistic, and involved pattern recognition and less problem solving. Although this represented a major advance in the quality of medical decision making, limitations existed. The advantages of the gold standard of the randomized controlled clinical trial (RCT) are well-known and this technique is irreplaceable in its ability to answer critical clinical questions. However, the RCT does have drawbacks. RCTs are expensive and can only capture a snapshot in time. As treatments change and new technologies emerge, new expensive clinical trials must be undertaken to reevaluate them. Furthermore, in order to best evaluate a single intervention, other factors must be controlled. In addition, the study population may not match that of another organization or provider. Although evidence-based medicine has provided powerful data for clinicians, effectively and efficiently tailoring it to the individual has not yet evolved. We are now in a period of transition from this evidence-based era to one dominated by the personalization and customization of care. It will be fueled by policy decisions to shift financial responsibility to the patient, creating a powerful and sophisticated consumer, unlike any patient we have known before. The challenge will be to apply medical evidence and personal preferences to medical decisions and deliver it efficiently in the increasingly busy clinical setting.

In this article, we provide a robust review of the concepts of customized care and some of techniques to deliver it. We will illustrate this through a personalized decision model for the treatment decision after a first-time anterior shoulder dislocation.

PMID: 23924748

FROZEN SHOULDER

RADIOGRAPHIC

Eur J Radiol. 2014 Feb;83(2):345-8. doi: 10.1016/j.ejrad.2013.10.017. Epub 2013 Oct 29.

MRI of adhesive capsulitis of the shoulder: Distension of the bursa in the superior subscapularis recess is a suggestive sign of the pathology.

Carbone S1, Napoli A2, Gumina S3.
Author information

Abstract

OBJECTIVE:
To evaluate the diagnostic values of the superior subscapularis recess sign in patients with shoulder adhesive capsulitis. The sign consists in evaluating in MRI of the shoulder the presence of fluid distension of the bursa in the superior subscapularis recess.

MATERIALS AND METHODS:
We evaluated MRI of 165 shoulders in 48 consecutive patients with a diagnosis of shoulder adhesive capsulitis in the freezing phase (group I), in 49 short-wide superior cuff tear (group II) and in 65 controls (group III) between 2010 and 2013. On the T2 weighted images, we evaluated the presence of an high intensity signal within the superior subscapularis recess, consistent with fluid distension of the bursa.

RESULTS:
The sign was found in 43/48 patients (89.58%) with shoulder adhesive capsulitis in 3/49 (6.12%) patients with superior cuff tear and in 1/65 controls (1.53%) ($p<0.001$). The mean diagnostic values were: sensibility 0.91; specificity 0.96-0.98; positive predictive value 0.93-0.97; negative predictive value 0.92-0.94; likelihood ratios for an abnormal test result 15.16-60.6; likelihood ratios for a normal test result 0.086-0.095.

CONCLUSION:
For the orthopedic surgeon or the clinician, the sign is useful to confirm in MRI the clinical diagnosis of shoulder adhesive capsulitis; accordingly, the radiologist should describe and relate this sign to the pathology in the report, looking eventually for further typical sign of shoulder adhesive capsulitis.

KEYWORDS: Diagnosis, Freezing phase, Frozen shoulder, Shoulder adhesive capsulitis, Subscapularis recess PMID: 24246364

Shoulder/Frozen

Maximizing Total End Range Time is Safe and Effective for the Conservative Treatment of Frozen Shoulder Patients.

Dempsey AL, Mills T, Karsch RM, Branch TP

American journal of physical medicine & rehabilitation / Association of Academic Physiatrists
20110990(9):738-45Language: engCountry: United StatesFrom the Department of Orthopaedic Surgery and Sports Medicine, University of Kentucky College of Medicine, Lexington, KY (ALD); and University Orthopaedics & Sports Medicine, Decatur, Georgia (TM, RMK, TPB).

OBJECTIVE: : The purpose of this retrospective cohort study was to compare range of motion, subjective outcomes, and the prevalence of reoperation in groups of frozen shoulder patients with either low or moderate/high irritability treated with the same total end range time-maximizing protocol.

DESIGN: : A total of 36 patients were treated with the total end range time-maximizing protocol (12 patients with low irritability and 24 patients with moderate/high irritability). American Shoulder and Elbow Society Standardized Shoulder Assessment Form (ASES) scores and external rotation and abduction were recorded before and after the rehabilitation protocol and were compared between the two groups.

RESULTS: : For both groups, external rotation and abduction of the involved shoulder significantly increased from pretreatment to posttreatment, and the posttreatment external rotation and abduction of the involved shoulder did not differ from those of the uninvolved shoulder. There were no differences between the groups in either external rotation ($P = 0.71$) or abduction ($P = 0.46$). ASES scores were significantly lower and pain scores were significantly higher for the moderate/high irritability group both before and after treatment than for the low irritability group; however, the moderate/high irritability group demonstrated significantly greater gains in both ASES and pain scores. One patient in the low irritability group underwent a lysis of adhesions.

CONCLUSIONS: : We conclude that a total end range time-maximizing rehabilitation protocol is a safe, effective treatment option for patients with frozen shoulder.

Shoulder/Mulligan

J Manipulative Physiol Ther. 2012 Aug 23.

Mobilization With Movement and Kinesiotaping Compared With a Supervised Exercise Program for Painful Shoulder: Results of a Clinical Trial.

Djordjevic OC, Vukicevic D, Katunac L, Jovic S.

Source

Medical Doctor, Specialist in Physical Medicine and Rehabilitation, Specialist in Plastic and Reconstructive Surgery, Clinic for Rehabilitation "Dr Miroslav Zotovic," Belgrade, Serbia.

Abstract

OBJECTIVE:

The purpose of this study was to compare the efficacy of Mobilization with Movement (MWM) and kinesiotaping (KT) techniques with a supervised exercise program in participants with patients with shoulder pain.

METHODS:

Twenty subjects with shoulder pain were included if subjects were diagnosed by the referring physician with either rotator cuff lesion with impingement syndrome or impingement shoulder syndrome. Participants were randomly assigned to 1 of 2 groups after clinical and radiologic assessment: group 1 was treated with MWM and KT techniques, whereas group 2 was treated with a supervised exercise program. The main outcome measures were active pain-free shoulder abduction and flexion tested on days 0, 5, and 10.

RESULTS:

Improvement in active pain-free shoulder range of motion was significantly higher in the group treated with MWM and KT. Repeated-measures analysis of variance indicated significant effects of treatment, time, and treatment × time interaction.

CONCLUSION:

This study suggests that MWM and KT may be an effective and useful treatment in range of motion augmentation of subjects with rotator cuff lesion and impingement syndrome or impingement shoulder syndrome.

PMID: 22921332 [PubMed - as supplied by publisher]

Shoulder/Mulligan

J Rehabil Med. 2012 Oct 5. doi: 10.2340/16501977-1064.

Evaluation of Mulligan's technique for adhesive capsulitis of the Shoulder.

Doner G, Guven Z, Atalay A, Celiker R.
Source

Özel Academic Hospital, Nuh Kuyusu Cad Bağlarbaşı 34664, Üsküdar, İstanbul, Turkey.

Abstract

Objective: To evaluate Mulligan's technique for relieving pain and improving functional capacity of the shoulder in patients with adhesive capsulitis in the stiffness phase. Design: Randomized controlled study.

Methods: A total of 40 subjects were randomly allocated into 2 groups: (i) group 1 (n = 20) were treated with hot pack, transcutaneous electrical nerve stimulation, and passive stretching exercises; (ii) group 2 (n = 20) were treated with hot pack, transcutaneous electrical nerve stimulation and Mulligan's technique. Mulligan's technique combines the sustained application of a manual "gliding" force to a joint, with the aim of repositioning bone positional faults while enabling concurrent physiological (osteo-kinematic) motion of the joint. All cases were evaluated using visual analogue scales for pain, passive and active range of motion, Constant score, Shoulder Disability Questionnaire, and patient and therapist satisfaction at baseline, after completion of treatment sessions and at the end of 3 months of follow-up.

Results: Marked improvement was noted in both groups after completion of treatment sessions and at the third month of follow-up compared with baseline. The improvements in outcome measures, namely pain, range of motion, shoulder scores, and patient and physiotherapist satisfaction, were significantly greater in subjects in group 2, who were treated with Mulligan's technique.

Conclusion: Mulligan's technique and passive stretching exercises are both effective in reducing pain, and restoring range of motion and function. However, compared with stretching exercises, Mulligan's technique led to better improvements in terms of pain, range of motion, shoulder scores, and patient and physiotherapist satisfaction.

PMID: 23037929

Shoulder/adhesive capsulitis

Int Orthop. 2012 Jan;36(1):101-6. Epub 2011 Aug 11.

Shoulder adhesive capsulitis: manipulation and arthroscopic arthrolysis or intra-articular steroid injections?

De Carli A, Vadalà A, Perugia D, Frate L, Iorio C, Fabbri M, Ferretti A.

Source

Orthopaedic Unit and Kirk Kilgour Sports Injury Centre, S Andrea Hospital, University of Rome Sapienza, Via Grottarossa 1035, Rome, Italy.

Abstract

PURPOSE:

The aim of this study was to compare shoulder manipulation and arthroscopic arthrolysis with glenohumeral steroid injections in patients affected by idiopathic adhesive shoulder capsulitis.

METHODS:

In this prospective study we randomly assigned patients to enter group A (23 patients, shoulder manipulation and arthroscopic arthrolysis) and group B (21 patients, glenohumeral steroid injections). Patients were followed-up at three, six and 12 weeks, and at six and 12 months with the Constant and Murley, ASES, UCLA and SST evaluation scales. Moreover, passive forward flexion, abduction, and internal and external rotations were recorded.

RESULTS:

Range of motion showed satisfactory results in both groups at final follow-up: in group A the mean ABD increased from 60° to 154°, ER from 20° to 40°, and FF from 75° to 174°; in group B, ABD raised from 76° to 145°, ER from 20° to 35°, and FF from 115° to 164°. All the evaluation scales performed increased significantly at final follow-up in both groups. However, while patients of group A had already reached significant improvement at the six-week follow-up ($p < 0.03$), in group B this happened only at the 12 week follow-up ($p < 0.03$).

CONCLUSIONS:

Both types of treatment were effective in improving final range of motion; however, while patients of group A accomplished their goal by the six-week follow-up, in group B the same result was obtained at the 12-week follow-up.

Shoulder/frozen

Clin Orthop Relat Res. 2012 Aug 21.

Motion and Pain Relief Remain 23 Years After Manipulation Under Anesthesia for Frozen Shoulder.

Vastamäki H, Vastamäki M.
Source

ORTON Research Institute, Invalid Foundation, Helsinki, Finland.

Abstract

BACKGROUND:
Manipulation under anesthesia (MUA) as treatment for idiopathic frozen shoulder increases motion, provides pain relief, and restores function, but it is unclear whether the improvements persist long term.

QUESTIONS/PURPOSES:
We therefore investigated whether (1) ROM was restored, (2) pain was relieved, and (3) function was restored and maintained after several decades in patients with idiopathic frozen shoulder treated by MUA.

METHODS:
We followed 15 patients (16 shoulders; 12 in women) at 3 months, 7 years, and 19 to 30 years after MUA for frozen shoulder. Their mean age at MUA was 48.5 years. Four patients had diabetes. The time between the onset of symptoms and manipulation averaged 7.6 months. We determined pain by a patient-generated VAS (range, 0-10; 0 = none, 10 = maximal). We recorded ROM and Constant-Murley scores at last followup.

RESULTS:
At 7 years, improvement had occurred in forward flexion to 155°, abduction to 175°, external rotation to 51°, and internal rotation to the T7 level. During the next 16 years, ROM deteriorated by 8° to 23° at last followup, but still equaled ROM of the contralateral shoulder. On the VAS, pain at last followup averaged 1.5 with exertion, 0.3 at rest, and 0.8 at night. The Constant-Murley score was 70 (range, 34-88); 12 patients reached the age- and sex-adjusted normal Constant-Murley score.

CONCLUSIONS:
In this group of patients treatment of idiopathic frozen shoulder by MUA led to improvement in shoulder motion and function at a mean 23 years after the procedure.

LEVEL OF EVIDENCE:
Level IV, therapeutic study. See Instructions for Authors for a complete description of levels of evidence

Manipulation

Manipulation under local anesthesia in idiopathic frozen shoulder--a new effective and simple technique.

Khan JA, Devkota P, Acharya BM, Pradhan NM, Shreshtha SK, Singh M, Mainali L

Nepal Med Coll J 200912 11(4):247-53 Language: eng Country: Nepal Department of Orthopedics, Patan Hospital, Lagankhel, Nepal. drjaved123@yahoo.com

Manipulation under anesthesia has been used to speed up the recovery of frozen shoulder (FS), which is said to be a self-limiting disease. This is a randomized prospective clinical trial performed in a tertiary care hospital. Thirty-one patients with idiopathic unilateral frozen shoulder underwent suprascapular nerve block and intraarticular local anesthesia with Methyl prednisolone acetate followed by manipulation of the glenohumeral joint. Differences in range of motion and pain were assessed before manipulation and at 7 days 6 weeks and 12 weeks. Passive range of motion increased significantly for abduction, external rotation, and internal rotation. Significant decrease in visual analogue pain (VAS) scores between initial and follow-up assessments was observed.

Our results revealed that manipulation under suprascapular nerve block and intra-articular local anesthesia is a very simple, safe, cost effective and minimally invasive procedure for shortening the course of an apparently self-limiting disease and can improve shoulder function and symptoms quickly. PMID: 20635603

Frozen/ Causes

J Orthop Sci. 2013 Dec 4.

Primary frozen shoulder: brief review of pathology and imaging abnormalities.

Tamai K, Akutsu M, Yano Y.
Source

Department of Orthopaedic Surgery, Dokkyo Medical University, 880 Kitakobayashi, Mibu, Tochigi, 321-0293, Japan, ktamai@dokkyomed.ac.jp.

Abstract
BACKGROUND:
Primary frozen shoulder (FS) is a painful contracture of the glenohumeral joint that arises spontaneously without an obvious preceding event. Investigation of the intra-articular and periarticular pathology would contribute to the treatment of primary FS.

REVIEW OF LITERATURE:
Many studies indicate that the main pathology is an inflammatory contracture of the shoulder joint capsule. This is associated with an increased amount of collagen, fibrotic growth factors such as transforming growth factor-beta, and inflammatory cytokines such as tumor necrosis factor-alpha and interleukins. Immune system cells such as B-lymphocytes, T-lymphocytes and macrophages are also noted. Active fibroblastic proliferation similar to that of Dupuytren's contracture is documented. Presence of inflammation in the FS synovium is supported by the synovial enhancement with dynamic magnetic resonance study in the clinical setting.

CONCLUSION:
Primary FS shows fibrosis of the joint capsule, associated with preceding synovitis. The initiator of synovitis, however, still remains unclear. Future studies should be directed to give light to the pathogenesis of inflammation to better treat or prevent primary FS.

PMID: 24306579

Frozen shoulder/manual therapy

Man Ther. 2012 Feb;17(1):47-52. doi: 10.1016/j.math.2011.08.006. Epub 2011 Sep 25.

Effectiveness of the end-range mobilization and scapular mobilization approach in a subgroup of subjects with frozen shoulder syndrome: a randomized control trial.

Yang JL, Jan MH, Chang CW, Lin JJ.

Source

Department of Physical Medicine & Rehabilitation, National Taiwan University Hospital, No.1 Changde Street, Zhongzheng District, Taipei City 100, Taiwan.

Abstract

Treatment strategies targeting abnormal shoulder kinematics may prevent pathology or if the pathology develops, shorten its duration. We examined the effectiveness of the end-range mobilization/scapular mobilization treatment approach (EMSMTA) in a subgroup of subjects with frozen shoulder syndrome (FSS). Based on the kinematics criteria from a prediction method, 34 subjects with FSS were recruited. Eleven subjects were assigned to the control group, and 23 subjects who met the criteria were randomly assigned to the criteria-control group with a standardized physical therapy program or to the EMSMTA group. Subjects attended treatment sessions twice a week for 8 weeks. Range of motion (ROM), disability score, and shoulder complex kinematics were obtained at the beginning, 4 weeks, and 8 weeks. Subjects in the EMSMTA group experienced greater improvement in outcomes compared with the criteria-control group at 4 weeks (mean difference=0.2 of normalized hand-behind-back reach) and 8 weeks (mean difference=22.4 degrees humeral external rotation, 0.31 of normalized hand-behind-back reach, 7.5 disability, 5 degrees tipping and 0.32 rhythm ratio). Similar improvements were found between the EMSMTA group and control group.

The EMSMTA was more effective than a standardized physical therapy program in a subgroup of subjects who fit the criteria from a prediction method.

Hypermobility/frozen

The relationship between generalized joint hypermobility and adhesive capsulitis of the shoulder *Full Text*

Turkish Journal of Rheumatology, 12/13/2013 **Review Article**
Terzi Y, et al.

Objectives: This study aims to investigate the possible relationship between generalized joint hypermobility (GJH) and adhesive capsulitis (AC) of the shoulder.
Patients and methods: A total of 240 patients were enrolled in this study, including 120 patients diagnosed with AC in a study group and 120 patients diagnosed with primary subacromial impingement syndrome in the control group. We evaluated the pain severity, range of motion of the shoulder joint, functional status, disability, and hypermobility in both groups. The Beighton score was used to evaluate the GJH while the revised Brighton criteria were utilized for the patients with benign joint hypermobility syndrome (BJHS).

Results: In the adhesive capsulitis group, GJH was significantly rare ($p<0.05$) with only one patient (0.08%) whereas BJHS was not found. In the control group, nine patients (7.5%) had GJH, and five (4.2%) had BJHS.

Conclusion: Our study results suggest that GJH may be a protective or preventive factor in the development of AC. In clinical practice, we believe that in GJH patients we can be more optimistic regarding the concern of the conversion of shoulder pain to AC. If this has already taken place, then these patients may respond more positively to treatment in cases involving GJH.

PT

J Back Musculoskelet Rehabil. 2013 Nov 27.

The effectiveness of physiotherapeutic interventions in treatment of frozen shoulder/adhesive capsulitis: A systematic review.

Jain TK, Sharma NK.
Source

Department of Physical Therapy and Rehabilitation Science, University of Kansas Medical Center, Kansas City, KS, USA.

Abstract

BACKGROUND AND OBJECTIVE:
Frozen shoulder is a common condition, yet its treatment remains challenging. In this review, the current best evidence for the use of physical therapy interventions (PTI) is evaluated.METHOD: MEDLINE, CINAHL, Cochrane, PEDro, ProQuest, Science Direct, and Sport Discus were searched for studies published in English since 2000.

RESULTS:
39 articles describing the PTI were analyzed using Sackett's levels of evidence and were examined for scientific rigor. The PTI were given grades of recommendation that ranged from A to C.

CONCLUSIONS:
Therapeutic exercises and mobilization are strongly recommended for reducing pain, improving range of motion (ROM) and function in patients with stages 2 and 3 of frozen shoulder. Low-level laser therapy is strongly suggested for pain relief and moderately suggested for improving function but not recommended for improving ROM. Corticosteroid injections can be used for stage 1 frozen shoulder. Acupuncture with therapeutic exercises is moderately recommended for pain relief, improving ROM and function. Electro- therapy can help in providing short-term pain relief. Continuous passive motion is recommended for short-term pain relief but not for improving ROM or function. Deep heat can be used for pain relief and improving ROM. Ultrasound for pain relief, improving ROM or function is not recommended.

KEYWORDS: Mobilization, function, pain, range of motion, therapeutic exercises PMID: 24284277

SURGERIES

Labral/slap

Knee Surg Sports Traumatol Arthrosc. 2013 Dec 10.

Trends in the diagnosis of SLAP lesions in the US military.

Waterman BR, Cameron KL, Hsiao M, Langston JR, Clark NJ, Owens BD.

Source

Orthopaedic Surgery Service, William Beaumont Army Medical Center, 5005 North Piedras St, El Paso, TX, 79920-5001, USA, brian.r.waterman@gmail.com.

Abstract

PURPOSE:
Shoulder pathology, particularly SLAP (superior labrum anterior-posterior) lesions, is prevalent in overhead athletes and physically active individuals. The aim of this study is to quantify the burden of SLAP lesions in the military and establish risk factors for diagnosis.

METHODS:
A retrospective analysis of all service members diagnosed with a SLAP lesion (International Classification of Disease, Ninth Revision code 840.70) in the Defense Medical Epidemiological Database between 2002 and 2009 was performed. Available epidemiological risk factors including age, sex, race, military rank, and branch of service were evaluated using multivariate Poisson regression analysis, and cumulative and subgroup incidence rates were calculated.

RESULTS:
During the study period, approximately 23,632 SLAP lesions were diagnosed among a population at risk of 11,082,738, resulting in an adjusted incidence rate of 2.13 per 1,000 person-years. The adjusted annual incidence rate for SLAP lesions increased from 0.31 cases per 1,000 person-years in 2002 to 1.88 cases per 1,000 person-years in 2009, with an average annual increase of 21.2 % (95 % CI 20.7 %, 22.0 %, $p < 0.0001$) during the study period. Age, sex, race, branch of military service, and military rank were independent risk factors associated with the incidence rate of SLAP lesion ($p < 0.01$). Male service members were over twofold more likely (IRR, 2.12; 95 % CI 2.01, 2.23) to sustain a SLAP lesion when compared with females. Increasing age category was associated with a statistically significant increase in the incidence rate for SLAP lesions in the present study ($p < 0.001$). After controlling for the other variables, those individuals of white race, enlisted ranks, or Marine Corps service experienced the highest incidence rates for SLAP.

CONCLUSION:
This is the first study to establish the epidemiology of SLAP lesions within an active military cohort in the American population. Sex, age, race, military rank, and branch of military service were all independently associated with the incidence rate of SLAP lesions in this physically active population at high risk for shoulder injury. LEVEL OF EVIDENCE: II.

PMID: 24318507

Role of Lats and Pects

J Shoulder Elbow Surg. 2014 Feb 20. pii: S1058-2746(13)00605-8. doi: 10.1016/j.jse.2013.11.030.

The role of pectoralis major and latissimus dorsi muscles in a biomechanical model of massive rotator cuff tear.

Campbell ST1, Ecklund KJ2, Chu EH1, McGarry MH1, Gupta R2, Lee TQ3.

Abstract

BACKGROUND:
Superior migration of the humeral head after massive rotator cuff tear (mRCT) is thought to lead to cuff tear arthropathy. Previous biomechanical studies have demonstrated the ability of the pectoralis major and latissimus dorsi (PM/LD) muscles to resist this migration. This study examined the role of PM/LD muscles on glenohumeral joint forces and acromiohumeral contact pressures in a mRCT model.

METHODS:
Six cadaveric shoulders were tested using a custom shoulder-testing system. Muscle insertions of the rotator cuff, deltoid, and PM/LD were preserved and used for muscle loading. Specimens were tested in 3 different humeral rotation positions at 0° abduction and 2 rotation positions at 60° abduction. Testing was performed for intact specimens, after supraspinatus removal, and after supraspinatus/infraspinatus/teres minor removal. PM/LD were loaded or unloaded to determine their effect. Humeral head kinematics, glenohumeral joint forces, and acromiohumeral contact area and pressure were measured.

RESULTS:
For the mRCT condition at 0° abduction, unloading the PM/LD resulted in superior shift of the humeral head. Acromiohumeral contact pressures were undetectable when the PM/LD were loaded but increased significantly after PM/LD unloading. After mRCT, superior joint forces were increased and compressive forces were decreased compared with intact; loading the PM/LD resolved these abnormal forces in some testing conditions.

CONCLUSION:
In mRCT, the PM and LD muscles are effective in improving glenohumeral kinematics and reducing acromiohumeral pressures. Strengthening or neuromuscular training of this musculature, or both, may delay the progression to cuff tear arthropathy.

 KEYWORDS: Massive rotator cuff tear, acromiohumeral pressure, latissimus dorsi, pectoralis major, rotator cuff tear arthropathy PMID: 24560467

Rotator Cuff repair/Supraspinatus

J Bone Joint Surg Am. 2013 Oct 2;95(19):1785-1791.

Cross-Sectional Area of the Supraspinatus Muscle After Rotator Cuff Repair: An Anatomic Measure of Outcome.

Jo CH, Shin JS.
Source

Department of Orthopedic Surgery, Seoul National University College of Medicine, SMG-SNU Boramae Medical Center, 20 Boramae-ro 5-gil, Dongjak-gu, 156-707 Seoul, South Korea. E-mail address for C.H. Jo: chrisjo@snu.ac.kr.

Abstract
BACKGROUND:
The change in the cross-sectional area of a repaired muscle, measured with use of magnetic resonance imaging (MRI), could be an indicator of recovery of muscle function. The aims of this study were to evaluate the change in the area of the supraspinatus muscle between the immediately postoperative and one-year postoperative MRIs and to identify factors associated with the change.

METHODS:
Eighty-eight patients with a full-thickness rotator cuff tear were included. MRI was performed three days and one year after surgery. Patients were classified into two groups according to whether the area of the supraspinatus increased or decreased between these two time points. Outcomes including pain, shoulder motion, strength, and commonly used clinical scores were assessed preoperatively and at three, six, and twelve months after surgery. Changes in the rotator cuff muscles and retear of the repaired tendon were also evaluated.

RESULTS:
The area of the supraspinatus muscle increased in twenty-nine (33%) of the patients and decreased in fifty-nine (67%). The change in area was 36.75 ± 27.94 mm2 in the group in which it increased and -94.25 ± 70.38 mm2 in the group in which it decreased (p < 0.001). Multiple regression analysis indicated that a lower preoperative Simple Shoulder Test (SST) score, better gross visual grade of the tendon at surgery, and greater strength of the supraspinatus at six months postoperatively were associated with an increase in the area. No retear or Sugaya grade of 3 was found in any patient in whom the area increased, whereas 34% of the patients in whom the area decreased had a retear (p < 0.001).

CONCLUSIONS:
This study showed that the cross-sectional area of the supraspinatus muscle could either increase or decrease during the first year after rotator cuff repair and that robust healing (indicated by a Sugaya grade of 1 or 2) and good tendon quality at surgery were important factors associated with an increase in the area.

LEVEL OF EVIDENCE: Prognostic Level II. See Instructions for Authors for a complete description of levels of evidence. PMID: 24088971

COMPLICATIONS

Complication rates, dislocation, pain, and postoperative range of motion after reverse shoulder arthroplasty in patients with and without repair of the subscapularis

Journal of Shoulder and Elbow Surgery, 08/03/2011
Clark JC et al. –

Repairing the subscapularis has no appreciable effect on complication rate, dislocation events, or range of motion gains and pain relief.
Background
Despite improved results with reverse shoulder arthroplasty (RSA), questions still remain regarding certain technical aspects of the operation. One particular area of question is the effect of subscapularis repair on complication rates, dislocation, pain, and overall range of motion. Some authors suggest that when a deltopectoral approach is used, not repairing the subscapularis leads to a higher complication rate, especially for dislocation.
Materials and methods
From a reverse total shoulder arthroplasty database of 3 surgeons at 1 institution, we identified 55 patients who underwent RSA using the deltopectoral approach without subscapularis repair and 65 patients with subscapularis repair.
Results
Complications were documented in 11 of 55 shoulders (20%) without subscapularis repair and in 13 of 65 shoulders (20%) with subscapularis repair. Dislocation occurred in 3 shoulders in the nonrepair group and in 2 shoulders in the repair group. These data indicate that nonrepair of the subscapularis did not have a significant effect on the risk of any complication, dislocation, infection, disassociation, or function.
Conclusion
Repairing the subscapularis has no appreciable effect on complication rate, dislocation events, or range of motion gains and pain relief.

http://www.jshoulderelbow.org/article/PIIS1058274611001662/abstract?rss=yes
Clark JC et al. Complication rates, dislocation, pain, and postoperative range of motion after reverse shoulder arthroplasty in patients with and without repair of the subscapularis. *Journal of Shoulder and Elbow Surgery*. Aug 2011. *(Entered August 2011)*
Category: Upper Quarter Bib- Shoulder Surgery

Total shoulder

Early Follow-up of Reverse Total Shoulder Arthroplasty in Patients Sixty Years of Age or Younger

Stephanie J. Muh, MD[1]; Jonathan J. Streit, MD[1]; John Paul Wanner, BS[2]; Christopher J. Lenarz, MD[1]; Yousef Shishani, MD[2]; Douglas Y. Rowland, PhD[1]; Clay Riley, MD[3]; Robert J. Nowinski, DO[4]; T. Bradley Edwards, MD[3]; Reuben Gobezie, MD[2]

The Journal of Bone & Joint Surgery, Volume 95, Issue 20
October 16, 2013

Background:
Reverse shoulder arthroplasty (RSA) is an accepted treatment that provides reproducible results in the treatment of shoulder arthritis and rotator cuff deficiency. Concerns over the longevity of the prosthesis have resulted in this procedure being reserved for the elderly. There are limited data in the literature with regard to outcomes in younger patients. We report on the early outcomes of RSA in a group of patients who were sixty years or younger and who were followed for a minimum of two years.
Methods:
A retrospective multicenter review of sixty-six patients (sixty-seven RSAs) with a mean age of 52.2 years was performed. The indications included rotator cuff insufficiency (twenty-nine), massive rotator cuff disorder with osteoarthritis (eleven), failed primary shoulder arthroplasty (nine), rheumatoid arthritis (six), posttraumatic arthritis (four), and other diagnoses (eight). Forty-five shoulders (67%) had at least one prior surgical intervention, and thirty-one shoulders (46%) had multiple prior surgical procedures.
Results:
At a mean follow-up time of 36.5 months, mean active forward elevation of the arm as measured at the shoulder improved from 54.6° to 134.0° and average active external rotation improved from 10.0° to 19.6°. A total of 81% of patients were either very satisfied or satisfied. The mean American Shoulder and Elbow Surgeons (ASES) score and visual analog scale (VAS) score for pain improved from 40.0 to 72.4 and 7.5 to 3.0, respectively. The ability to achieve postoperative forward arm elevation of at least 100° was the only significant predictor of overall patient satisfaction ($p < 0.05$) that was identified in this group. There was a 15% complication rate postoperatively, and twenty-nine shoulders (43%) had evidence of scapular notching at the time of the latest follow-up.

Conclusions:
RSA as a reconstructive procedure improved function at the time of short-term follow-up in our young patients with glenohumeral arthritis and rotator cuff deficiency. Objective outcomes in our patient cohort were similar to those in previously reported studies. However, overall satisfaction was much lower in this patient population (81%) compared with that in the older patient population as reported in the literature (90% to 96%).