

# Abstracts

## EPIDEMIOLOGIC STUDY AND VALUE OF RESULT IN PATIENT WITH PATHOLOGIES OF SHOULDER OF THE UNIT OF MEDICINE PHYSICS OF SAN JOSE HOSPITAL

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**RESEARCH PRESENTATIONS:** Between October, 2005 to May, 2006, the sub-unit of specialization of Shoulder and Elbow belonging to the unit of Physical medicine of the Hospital San Jose realized a descriptive not experimental study in 224 patients with pathologies of Shoulder in order to know their Epidemiology and to value with international scales (Constant and modified UCLA) the efficiency of kinesics treatments. Inside the obtained results we saw there was a 20% percent of the population, with pathologies of traumatological order, is about Shoulder. The average age of the population is 61.25 years. The most affected population is women in 69.20 %. The group with major effect is the SubAcromial Syndrome with 58.93 % (followed by Fractures, Capsulitis, and others). The amount of average meetings is given by the perceptil p75 with 29.5. The 71.88 % is recovered and finishes treatment with Kinesiology, 20.09 % leaves the therapy and 8.04 % has to have a surgery. The results, with valuation of the treatments with international scales, present an improvement with one  $p < 0.005$  and good and excellent results in 85 % of the patients. Knowing these results the major efficiency is achieved in both the quality of attention to the patients and the cost centers, and also to derive to the APS the pathologies of easy resolution.

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## MUSCLE PATTERNING INSTABILITY OF THE SHOULDER. THE CLINICAL PROBLEM AND THE SCIENTIFIC EVIDENCE

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**PURPOSE:** To describe the clinical condition of 'muscle patterning instability' of the shoulder, the proposed etiology and supporting evidence for this, and the current treatment and research approaches. **DESCRIPTION:** Classification of instability according to onset (traumatic/atraumatic) and underlying etiology, has been used clinically to direct management towards surgery or rehabilitation.<sup>1,2</sup> Several authors agree on the presence of a form of instability where the central etiology is inappropriate muscle activity resulting in glenohumeral joint (GHJ) subluxation.<sup>3,4,5</sup> This has been observed both clinically and experimentally and the terminology used to describe it is varied.<sup>6,7,8</sup> We propose to use the term 'muscle patterning instability' (MPI) 9. In MPI, dislocation or subluxation may occur with a specific movement (positional instability) or in all movements and positions. This does not appear to be a function of muscle weakness, but of muscle sequencing and control. There is often a background of hypermobility and there may be both voluntary and involuntary components to the movement dysfunction.<sup>10,11,12</sup> Video case presentations will demonstrate this. Proposed aetiologies include disturbance of the sensorimotor system and altered corticospinal control of shoulder girdle musculature. A pilot study using Transcranial Magnetic Stimulation found evidence of altered corticospinal control in a patient with MPI affecting the deltoid and upper trapezius muscles, which was partially reversible with cognitive training during physiotherapy treatment<sup>11</sup>. The partial reversibility occurred alongside clinical improvement with rehabilitation. This implied a learned movement abnormality at an unconscious level, which was modifiable with therapy. To further explore differences in motor control at a cortical level the authors are performing functional brain imaging

to investigate the response in the motor cortex to movement of the shoulder in patients with MPI compared to healthy subjects and those with traumatic dislocation using Near-Infra Red Spectroscopy(NIRS).

**SUMMARY OF USE:** Further understanding of the underlying aetiology of MPI will enhance treatment approaches. Current treatment is aimed at restoring normal muscle control: physiotherapy (motor pattern retraining), pain control, and occasionally the use of Botox to inhibit excessive hypertonicity in some muscles.<sup>13</sup> Importance The literature agrees that surgical intervention in patients with MPI often has a poor outcome, and so recognition of this condition is key in ascribing appropriate conservative intervention.<sup>3,4,14,15</sup> Functional neuroimaging techniques may help to define the problem as they have become an invaluable tool in cognitive neuroscience to determine when and where neural activity in cortical brain regions is associated with the ability to perform a particular task,<sup>16,17</sup> and to facilitate understanding of neuroplastic changes associated with learning motor tasks,<sup>18,19</sup> (such as moving the shoulder in order to position the hand in space). Their use in understanding clinical movement disorders in musculoskeletal problems is a challenging and exciting area of research.

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## REHABILITATION OF SHOULDER ARTHROPLASTY

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**PURPOSE:** To present a clinical model of rehabilitation for shoulder arthroplasty. Focus will be on the clinical decision process, team approach and rational for treatment based on a specific pathology, surgical procedure, quality and function of the soft tissue, the patient's general condition and outcome. **DESCRIPTION:** The indications for shoulder

arthroplasty will be defined. The more common pathological processes and their implications in rehabilitation will be presented setting a frame work for clinical decision making and rational. The inclusion of treatment principals will form the foundation of this well defined rehabilitation process. The inpatient early post operative management phase, including exercise, exercise frequency, pain management, education and a home program with goals and objectives will be presented. The progression through the mid and late recovery phases will be presented with relative timelines, intensity of exercise with reference to healing and patient response. Attention will be paid to development of neuromuscular control, proprioception, and a normalized response to dynamic challenges in the rehabilitation progression. **SUMMARY OF USE:** This rehabilitation program is an effective logical approach for treating shoulder arthroplasty based on a construct of teamwork, combined scientific, surgical and clinical information necessary for safe appropriate and optimal postoperative management. **Importance:** The abilitation progression is a safe, comprehensive approach directed by scientific, surgical and clinical evidence. It addresses all the requirements for a successful optimum outcome when treating shoulder arthroplasty patients.

## COMPARISON OF FIVE DIFFERENT INSTRUMENTS OF DIFFICULTIES WORKERS WITH SHOULDER AND ELBOW DISORDERS ARE HAVING ON THE JOB.

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Rehabilitation often focuses on return to work as an outcome, however once back to work some patients are still experiencing less than full functioning at work. Instruments exist to capture this difficulty but have rarely been tested in shoulder and elbow patients.

**PURPOSE:** To compare the reliability and validity of four self-report measures of work productivity in workers with shoulder and elbow disorders.

**METHODS:** Five self-report indicators [DASH Work module(DASH-W); Work instability scale (WIS); Stanford Presenteeism Scale (SPS-32 item and SPS-6 item were calculated); and the Work-role function scale (WRF)] and global indicators of health and productivity were completed by 130 workers with shoulder and elbow injuries. Cronbach's alpha coefficients and descriptive statistics were done on each scale. Correlations between scales and global markers were calculated. Workers' preferences were obtained.

**RESULTS:** The average age was 43.6 years, 53% were female. 68.5% were working. Average DASH was 54.8, and self-rated productivity was 5.5/10 (10=very productive). Scales had good internal consistency (>0.85) except for SPS-6 (0.71). WRF had high missing values. Correlations between scales were only moderate (0.49<r<0.67), suggesting differences in concepts measured. The WIS had lower construct validity, but highest worker preference (42.5%). DASH-W had highest ranking, but lacked comprehensiveness. WRF ranked second statistically and by workers.

**CONCLUSION:** Different instruments will describe at-work difficulties in different ways. We have demonstrated differences in measurement properties between available instruments for at work difficulties. Different scales had different strengths. Further testing with the WRF will continue based on properties, and the WIS based on workers' preference.

## PREDICTORS OF DISABILITY IN SOFT-TISSUE DISORDERS OF THE SHOULDER: A COMPARISON OF PROGNOSTIC MODELS WHEN THE DEPENDENT OUTCOME IS FORMATTED IN THREE DIFFERENT WAYS

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Predictors of disability are instrumental in guiding clinical and administrative decision-making. But does it matter if >disability= is formatted differently as the dependent outcome? The purpose of this study was to compare the predictors identified when disability was formatted in three different ways.

**STUDY DESIGN AND METHODS:** Data were collected prospectively from a cohort of consecutive clients (n=361) with soft-tissue shoulder disorders from 81 randomly selected physiotherapists. Data were collected from both clients and physiotherapists at the beginning of physiotherapy treatment, 4 weeks and at discharge from physiotherapy (to a maximum of 12 weeks). Baseline predictors (n=28) included demographic, disorder-related and burden measures, treatment factors, clinical findings and expectations for recovery. The dependent outcome variable, disability, was measured using the DASH (Disabilities of the Arm, Shoulder and Hand) outcome measure. Three formats were considered: Final state (DASH score at discharge), change in state (change in DASH score) and the individuals pattern of scores over time (DASH clinical course clusters). Multivariable regression methods were used.

**RESULTS:** The mean age of the sample was 49.9 years. 53.7% were female and 49.0% had pain for longer than 12 weeks. Results were compared across formats. Predictors of final DASH were: Age, baseline disability (DASH), therapist prediction of client to return to usual activity, worker's compensation claim, recurrent problem and gender. Predictors of change in DASH were: Age, shoulder surgery (past 6 months), pain intensity, duration of current problem and Physical Component Score (SF-36). Predictors of DASH clinical course clusters were: Age, duration of current problem, worker's compensation claim, client's global rating of problem, Physical and Mental Component Score (SF-36), over the counter medication use and therapist prediction of client to return to usual activity.

**CONCLUSIONS:** All three formats used are reasonable indicators of clinical response; however, different sets of predictors were identified for each. Only age was present in all three models. The format of the dependent outcome variable will influence the predictive factors identified. This should be considered in defining clinical prediction rules or in systematic reviews of prognosis.

## REHABILITATION OF DELTA III REVERSE TOTAL SHOULDER REPLACEMENTS

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**PURPOSE:** To provide an educational lecture on rehabilitation of the Delta III reverse Total Shoulder Replacement (TSR).

**DESCRIPTION:** Our early experiences with rehabilitation of the Delta III TSRs has shown that they require less rehabilitation and achieve their functional goals quicker than conventional TSRs. We start early mobilisation from day one post operatively and these patients do not struggle with passive or active assisted range of movement. However, due to the soft tissue deficiencies inherent in these patients, rotational active movements and functional control can be difficult to achieve. Our treatment approach is to maximise the active muscular control that these patients can functionally use, along with optimizing scapular control and joint positioning. We feel that these strategies help to minimise problems of joint control. Patients achieve good pain relief and we have found improvements in sleep, activities of daily living and range of movement. Our early functional results are encouraging and here we present our rehabilitation protocol. From the literature there is no clear consensus on the ideal rehabilitation strategy applied to this patient group. It remains to be seen whether our rehabilitation protocol leads to improved long-term success in terms of instability and loosening, however, our early functional results show encouraging outcomes.

**SUMMARY OF USE:** We hope that our experience with the Delta III TSR's will be of use to shoulder therapists and used to help facilitate on-going improvements in the rehabilitation strategies for these patients. This will assist in further elucidating the optimal rehabilitation strategies and improve treatment efficacy in those patients who have had Delta III TSRs. Our protocol is used locally to facilitate shoulder therapists treating this patient group. It is hoped that presenting our rehabilitation of the Delta III TSR will help to further stimulate thought in this challenging area.

**IMPORTANCE:** Appropriate and careful rehabilitation post Delta III TSRs should be designed to help ensure patients achieve their optimal functional outcome. Through dissemination of rehabilitation strategies it is hoped that patient goals can be refined and improved.

## FUNCTIONAL OUTCOME OF DELTA III REVERSE SHOULDER PROTHESIS AT SIX MONTHS AND ONE YEAR – IS REHABILITATION NECESSARY?

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**PURPOSE:** To evaluate the functional outcome of the Delta III reverse Total Shoulder Replacement (TSR) performed at our institution between 2000 and 2006 and report our experience with rehabilitation of these patients. This study has been carried out to evaluate the short term functional outcome and rehabilitation needs of these patients. **SUBJECTS:** 20 consecutive patients who had undergone Delta III TSRS since 2000 have been reviewed. Two patients had died for reasons unrelated to their shoulder surgery. All patients routinely undergo a non-modified Constant Functional Score evaluation before and after surgery at 6 months, 1, 3 & 5 years. One patient had no pre-op or post-op Constant score information available and was excluded from the analysis. **MATERIALS/METHODS:** The remaining seventeen patients, (11 females) had their case notes retrospectively analyzed for diagnosis and their Constant score results were collated. The mean age of the subjects was 71, range 56–81. Fourteen had a diagnosis of rotator cuff arthropathy. Of the remaining three patients, one had a diagnosis of 18 months locked anterior dislocation, one had avascular necrosis following fracture and malunion and one patient previously had a primary hemiarthroplasty with known rotator cuff tear. **RESULTS:** The mean pre-op Constant score for the affected shoulder was 24 (range 13–29). The mean pre-op pain score was 5, where 15 is no pain and 0 is intolerable shoulder pain. Pre-op evaluations revealed all patients suffered from sleep disturbance due to their shoulder pain. Their mean pre-op shoulder flexion was 76 degrees. At 6 months post surgery the mean Constant score had increased to 56 (range 38–72). The mean pain score had improved to 12 (range 7–15) and 7 of 11 patients with full details available no longer had any sleep disturbance due to shoulder pain. Mean shoulder flexion increased to 120 degrees. Their rehabilitation progress was easier and shorter than our conventional TSR patients. At 12 months the mean Constant score for the operated shoulder was 51 (range 25–74). The mean pain score was 12 (3–15) and 5 of 8 patients with full details available for follow up no longer had any sleep disturbance due to shoulder pain. Mean shoulder flexion was 102 degrees. No rehabilitation was provided between 6 and 12 months. **CONCLUSIONS:** At 6 months, following Delta TSR, patients showed significant improvements in their Constant score evaluation. Pain was significantly improved, a significant number of patients no longer had pain that disturbed sleep and shoulder flexion was significantly improved. At 12 months, these trends are maintained. There was a slight decrease in Constant score and shoulder flexion between 6 and 12 months which may be due to some patients being assessed at 6/12 who were not yet assessed at the 12 month stage. **CLINICAL RELEVANCE:** Whilst there are still technical concerns about the long term outcome from the Delta TSR the early results from our institution revealed it is a valuable option for the treatment of rotator cuff arthropathy. Our impression of speedier recovery and less demand for physiotherapy/rehabilitation has been confirmed by comparison with conventional TSR and our current rehabilitation protocol will be presented.

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## INTENSITY OF PAIN IN PATIENTS WITH PAINFUL SHOULDER SYNDROME

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**PURPOSE:** the aim of this study was to evaluate intensity of pain and clinical characteristics of patients with Painful Shoulder Syndrome. **SUBJECTS:** seventy-seven patients referred to a Clinic of Physiotherapy. **Material/Methods:** descriptive retrospective-based study from the patients registered in the last 18 months. Patients with Painful Shoulder Syndrome due to surgery, bone fracture, post-MI arm-shoulder syndrome, stroke and bone tumor were excluded. A Numerical Visual Pain

Scale (0 to 10) was utilized to assess intensity of pain. **RESULTS:** Mean age was 50.4 ± 15.7 years and 53.2 % were female. Right shoulder was the most frequently affected (57.1%), and both shoulders were affected in 7 patients (9.1%). The most common type of lesion responsible for the painful shoulder was the rotator cuff injuries, present in 57 patients (80.7%). Severe pain was present in 32 (41.6%) of the overall group; 56.1% were female and 25.0% were male ( $p=0,006$ ), occurring in 61.1% of patients with 40 years of age or less, 42.9% of those with more than 65 years and in 34.9% of those in between 40 and 65 years of age. It affected more frequently the left shoulder (57.7% versus 31.8%,  $p=0,034$ ). In 59 (81.3%) patients, in whom specific medication for pain relief was registered, 44 (74.6%) were treated with nonsteroidal anti-inflammatory drugs, 18 with severe pain (35.2%). Overall, 12 (15.6%) complained also of cervical pain, 6 severe in intensity. **CONCLUSION:** In this sample of Painful Shoulder Syndrome patients, the rotator cuff injuries was the most common lesion, the right shoulder was most frequently involved, severe pain was more common in the left shoulder, and young adults (<40 years old) and females are those patients needing special attention for pain relief. **CLINICAL RELEVANCE:** This study calls attention to the importance of pain intensity and its association with clinical characteristics in patients with Painful Shoulder Syndrome and the best manner to orientate them.

## ESTABLISHING DESCRIPTIVE NORMATIVE DATA AND UNILATERAL RATIOS OF THE SCAPULOTHORACIC MUSCLES BASED ON HAND-HELD DYNAMOMETRY

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**PURPOSE:** Currently, no normative data exists for hand-held dynamometry for the scapulothoracic musculature. The purpose of the study was to establish normative data and unilateral ratios of the scapulothoracic muscles based on hand-held dynamometry. **DESCRIPTION:** Hand-held dynamometry was performed for the upper trapezius (elevators), middle trapezius and rhomboids (retractors), lower trapezius (depressors), and serratus anterior (upward rotator). **Subjects:** 172 subjects (344 scapulas); 24 < 14 y.o., 35 were 15–18 y.o., 79 were 19–30 y.o., and 34 > 31 years of age. 52 had no overhead sports activities, 54 unilateral overhead activities, and 66 bilateral overhead activities. **MATERIALS/METHODS:** Gender, age, height, weight, activity level, arm dominance, body mass index, and anthropometric measurements were recorded. Five motions isolating specific scapular muscles were performed on each upper extremity and were resisted by the examiner using a hand-held dynamometer. The testing was performed on each subject in a random order with 3 repetitions per muscle. The force of each muscle was recorded in kg. Following a oneway ANOVA, t-tests were also performed. The alpha levels were corrected using the Dunn-Bonferroni which was used as a post-hoc analysis for within muscles between activities analyses (CI 95%). **RESULTS:** The data did not strongly correlate to any anthropometric data. Activity level was important in establishing rank order of muscle strength. For subjects with no upper extremity sports, the order of muscles from strongest to weakest was upper trapezius (UT), serratus anterior (SA) or middle trapezius (MT) (no significant differences), followed by rhomboids (R) or lower trapezius (LT). For unilateral overhead athletes, the UT was the strongest followed by SA, MT, R or LT. The bilateral overhead athletes again showed the UT as the strongest muscle: followed by SA, MT, R, and the LT. The unilateral ratios for elevation/depression were approximately 2.5:1; for upward/downward rotation 1.5:1; and for protraction/retraction 1:1. There was no difference of ratio of strength between age groups or activity level. **CONCLUSIONS:** Activity level significantly affects rank order of muscle strength and should be represented in rehabilitation protocols. Currently there are no norms for scapulothoracic strength in a normal population. Normative data allows clinicians to analyze strength objectively, set strength goals, and better focus rehab programs. **CLINICAL RELEVANCE:** Because the scapulothoracic area provides the proximal stability for the distal mobility of the shoulder and plays an important role in shoulder complex functioning (as illustrated by one of the major topics in this Congress) better understanding of the dynamic stability of the scapulothoracic area is critical for advancing the evidence for rehabilitation and outcomes. Muscle balances of the scapulothoracic musculature are important because they may help prevent injuries. With a better understanding of rank order of mus-

cles by strength and activity level, patients can better benefit from more focused protocols. Moreover, because the results of this study normalize the data to the patient's body weight, it provides practical clinical guidelines for establishing progression and discharge criteria for patients. Future research can be applied to rank order of strength in shoulder pathologies.

## COMPARISON OF RANDOM VERSUS BLOCKED PROTOCOL DESIGN FOR UPPER EXTREMITY REHABILITATION: A PROSPECTIVE, RANDOMIZED, CONTROLLED TRAINING STUDY

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**PURPOSE:** To compare random versus blocked protocol practice in upper extremity training protocols on shoulder functional capacity and dynamic stability. **DESCRIPTION:** This is a prospective randomized controlled training study. Subjects: 35 physically active subjects were recruited from a sample of convenience from a university staff and student population. **MATERIALS/METHODS:** Subjects were stratified by gender and then randomly assigned to a C group (n=18)(blocked group) vs E group (n=17)(random group). Outcome measures included: 1) Cybex isokinetic testing for isolated power in shoulder internal and external rotation isokinetic concentric peak torque at 60, 180, and 300 °/sec, 2) angular joint replication testing for shoulder joint position sense, 3) closed kinetic chain (CKC) upper extremity stability test, and 4) Underkofler softball throw for distance for total body kinetic chain testing. The subjects performed 1 set of 10 reps of 10 different exercises in a super set format 2 times/week for 8 weeks. **RESULTS:** No significant ( $P < .05$ ) between group differences existed in the pre-test measures. A two (group by time) factor repeated measures ANOVA was performed. Also, no significant differences between groups were revealed for any outcome measures. All participants significantly improved in the CKC test ( $P < 0.001$ , CI=2.2 to 4.2 touches) and the Underkofler softball distance throw ( $P = 0.021$ , 95% CI = 8.6-86.1 in.) after the completion of the exercise protocol. **CONCLUSIONS:** Using this exercise protocol resulted in significant increases in upper extremity power as measured by the CKC upper extremity stability test and a functional throwing performance test. There were no significant increases in isokinetic strength, probably due to specificity of training and testing positions. Results demonstrated no differences between the blocked vs random training protocols. **CLINICAL RELEVANCE:** Because there is a lack of research on the strengthening effects of random versus blocked training protocols for the shoulder complex, this study demonstrated that both techniques were effective in producing training responses in selected parameters.

## THE AMERICAN SOCIETY OF SHOULDER AND ELBOW THERAPISTS CONSENSUS REHABILITATION GUIDELINE: ARTHROSCOPIC ANTERIOR STABILIZATION WITH OR WITHOUT BANKART REPAIR.

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**PURPOSE:** To disseminate the consensus rehabilitation guideline from the American Society of Shoulder and Elbow Therapists. Emphasis will be placed on the primary clinical decision-making points, and the rationale for their use. **DESCRIPTION:** Key components of this consensus rehabilitation guideline include a zero to four week period of immobilization, staged recovery of full range of motion over a 3 month period, and an evidence-based AROM and strengthening progression beginning in earnest at post-operative week six. Return to activities that place high stresses on the capsulolabral structures are individualized and carefully controlled to assure a gradual increase in load to the shoulder girdle. The guideline provides a structure for this functional progression of return to demanding athletic or work activities which is typically achieved between post-operative month four and six.

Summary of use: This rehabilitation guideline can be used as a basis for comparison to other protocols and aide clinical decision-making for patients after arthroscopic anterior stabilization with or without a Bankart repair. A copy of this document can be found at [www.asset-usa.org](http://www.asset-usa.org). **IMPORTANCE:** This appears to be the first consensus rehabilitation guideline for arthroscopic instability repair of the shoulder and as such it serves as a benchmark and basis of comparison for other rehabilitation programs.

## PERSISTENT SUBLUXATION: A NEW TREATMENT APPROACH

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**PURPOSE:** Patients with persistent subluxation as a result of abnormal muscle patterning are a complex management problem. Research indicates that there are key sub groups of muscle patterning instability and, rehabilitation programmes should reflect the differences between these sub groups. Clinical findings in this patient group indicate alterations in cortical representation of the affected limb. Patients present with key clinical findings including dysynchiria, allodynia and evidence of body schema disruption. Hand laterality recognition and mirror visual feedback have been reported in the treatment of Complex Regional Pain Syndrome, Phantom Limb Pain and CVA and aim to remap the somatosensory cortex. Our objective was to assess the effectiveness of this treatment approach in patients with persistent subluxation. **METHODS:** 12 patients with persistent subluxation referred to a Tertiary Referral Unit were included. All patients were female and had an average age of 17 (Range 14- 23). All patients had failed previous rehabilitation intervention. The average duration of symptomology was 2 years (Range 1-4). Patients underwent a Graded Motor Imagery Programme including hand laterality recognition and mirror visual feedback. Patients were assessed with the Oxford Instability score, Hospital Anxiety and Depression Scale and a body schema tool. The duration of treatment was determined by the rate of progression. **RESULTS:** In 11 out of 12 patients persistent subluxation resolved at an average of 8 months (Range 5-18). Patients reported improvement in instability and resolution of allodynia at an average of 16 weeks (Range 10-20). At 1 year 8 patients had returned to full functional activity without instability. 11 patients demonstrated a statistically significant improvement in all scores at 1 year. **CONCLUSION:** Our findings provide further evidence that there are key subgroups of Muscle Patterning Instability necessitating a specific rehabilitation approach. A Graded Motor Imagery Programme aimed at restoring normal cortical representation and activation patterns is successful in this patient group.

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## DO MAXIMAL ISOMETRIC CONTRACTIONS ISOLATE ACTIVITY IN SHOULDER MUSCLES?

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**PURPOSE:** To investigate: 1) the specificity of shoulder muscle activation during maximal voluntary tests 2) the relationship between activity levels in i) muscles producing torque at the shoulder ii) rotator cuff muscles iii) muscles positioning the scapula, during maximal voluntary contractions. **SUBJECTS:** The dominant shoulder of 15 normal subjects between the ages of 18 and 50 years was examined. Subjects were considered to be normal if they had not experienced shoulder pain in the previous 2 years, had never sought treatment for shoulder pain and did not experience pain during maximal isometric rotation testing. **MATERIALS/METHODS:** EMG activity was recorded from 12 shoulder muscles sites using a combination of surface and intramuscular electrodes, during isometric contractions in 15 shoulder positions. **RESULTS:** Maximum voluntary isometric contractions generate significant activity in many shoulder muscles and 4 isometric test positions are adequate to reliably generate maximum activity in the 12 muscle sites examined ( $p < 0.05$ ). Whilst the activation level of the supraspinatus muscle was high in both the "empty can" and "full can" test positions, there was no significant difference in the level of activity in supraspinatus from that of upper, middle and lower trapezius, serratus anterior, anterior and middle deltoid and subscapularis muscles

in both these tests. The relative level of activation in the rotator cuff, scapulothoracic and axio/scapulohumeral muscles during the 15 isometric tests demonstrated very high correlation e.g. supraspinatus and infraspinatus ( $R^2=0.68$ ), supraspinatus and upper trapezius ( $R^2=0.74$ ), and supraspinatus and middle deltoid ( $R^2=0.65$ ). **CONCLUSIONS:** Maximal voluntary contractions at the shoulder result in high levels of activity in many shoulder muscles. The high linear relationship between rotator cuff, scapulothoracic and axio/scapulohumeral muscles reflects the crucial dynamic stabilizer role of rotator cuff and scapulothoracic muscles, particularly during maximal effort tasks. **Clinical Relevance:** The use of maximal voluntary contractions as clinical tests to identify specific shoulder muscle pathology is not valid. Exercises that require the production of high torque at the shoulder joint will require high activity in both the muscles providing shoulder joint stability and appropriate scapular positioning, as well as the muscles producing the torque.

## DYNAMIC ANTERO-POSTERIOR STABILITY AT THE SHOULDER JOINT – WHAT IS THE ROLE OF THE ROTATOR CUFF MUSCLES?

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**PURPOSE:** To investigate the role of the rotator cuff (RC) muscles in maintaining anteroposterior stability at the shoulder. **SUBJECTS:** The dominant shoulder of 15 normal subjects was tested. Subjects were considered to be normal if they had not experienced shoulder pain in the previous 2 years, had never sought treatment for shoulder pain and did not experience pain during maximal isometric rotation testing. **MATERIALS/METHODS:** Electromyographic (EMG) activity was recorded from supraspinatus, infraspinatus and subscapularis using indwelling electrodes. Maximal voluntary isometric contractions into shoulder flexion, extension, internal and external rotation were performed in random order. The maximum EMG activity for each muscle in each test position for all subjects was calculated. **RESULTS:** Activity levels in subscapularis during the extension test were similar to levels recorded during the internal rotation tests. Infraspinatus and supraspinatus were activated at similarly high levels during flexion and external rotation tests. **CONCLUSION:** The high activity in RC muscles during flexion and extension tasks, suggests that these muscles have a major role to prevent sagittal plane torque producers from destabilizing the shoulder joint in the antero-posterior direction during active movement. Posterior RC muscles function to prevent anterior translation at the shoulder joint and anterior RC muscles prevent posterior translation. **Clinical implications:** High load shoulder flexion/extension tasks require RC activity levels similar to high load rotation tasks and may be more appropriate to rehabilitate the dynamic stabilizing function of the RC muscles. Abnormal RC activity patterns are likely to be a major factor in shoulder antero-posterior instability.

## TIME TAKEN TO RETURN TO FUNCTIONAL ACTIVITIES FOLLOWING SUB ACROMIAL DECOMPRESSION SURGERY

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**PURPOSE.** To observe and present the time taken to return to functional activities following sub acromial decompression, furthermore to explore any correlation between return to functional tasks, gender and dominance. **Subjects.** A sample of convenience from patients attending post operative clinics after a routine sub acromial decompression at the Nottingham Shoulder & Elbow Unit. **METHOD.** A self administered questionnaire was devised, enquiring how long it took to return to various functional activities following surgery. Data was collected from patients attending clinics at six weeks, three months or six months post surgery. Responses were entered into a database and analysed. Basic demographics were examined. The median survival times were calculated from Kaplan-Meier plots, separated by gender and dominance. **RESULTS.** 30 patients with a mean age of 51.50 years ( $\pm 11.43$ ) were included. 14 were male and 16 female. Median time in days (with 95% CI) taken to return to the following activities was: lying on operated side, 42 days (34.84, 49.16), washing under both arms, 11 days (6.33, 15.67), brushing hair with operated arm, 14 days (11.57, 16.43), dressing in-

dependently, 4 days (0.61, 7.39), hanging clothes in a wardrobe with operated arm, 14 (6.94, 21.06), using a knife and fork simultaneously, 3 days (0.46, 5.54), doing household shopping independently, 25 days (19.25, 30.75) and driving a car, 14 days (12.35, 15.65). The results also demonstrated activities where dominance or gender may influence time taken to return to a specific functional task. **CONCLUSIONS.** Although the median time taken to return to functional activities post surgery varies from 3 to 42 days; the majority of activities are achieved at around two weeks. Dominance appears to influence return to washing under both arms, non dominant arm taking a median of 14 days whilst dominant took 5. For shopping non dominant arm had returned to function after a median of 18 days compared to 25 for dominant arm. Gender appeared relevant for hanging clothes in the wardrobe with men returning to this activity twice as quickly as women. In cases of dominant arm surgery men returned to washing their hair in one month, women a fortnight. **CLINICAL RELEVANCE.** We are unaware of any literature describing the timeframe taken to achieve functional milestones post surgery. The information from this study is valuable as it can help inform patient education and influence expectation regarding objective setting, assist with informed consent and decision making regarding indications for surgery. This study data also provide a baseline for assessing progress after a sub acromial decompression.

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## SPINAL ACCESSORY NERVE PALSY: ASSOCIATED SIGNS AND SYMPTOMS

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**BACKGROUND:** Spinal accessory nerve palsy (SANP) is common following neck dissection surgery and can occur with lateral neck blunt or penetrating trauma, and cervical stretch injuries. Early detection of SANP remains a clinical challenge and is often delayed or misdiagnosed.

**PURPOSE:** The purpose of this study is to describe the associated history, signs and symptoms related to SANP and increase awareness of the scapular flip sign as a clinical sign associated with SANP. **CASE SERIES DESCRIPTION:** 20 subjects (13 male, seven female) presented with pain and decreased shoulder function following head and neck surgery or post trauma. All patients were thoroughly examined and the scapular flip sign was assessed. All patients presented with a cluster of signs and symptoms including trapezius atrophy, shoulder girdle depression, limited active abduction to 90 degrees or less, shoulder pain and weakness. A positive scapular flip sign was found in all cases. Middle and lower trapezius muscle testing revealed 0/5 muscle grade. **Discussion:** A typical history and consistent signs and symptoms were found related to SANP. A strong relationship appeared between the presence of the scapular flip sign and SANP. The suspected mechanism for the scapular flip sign is the unopposed pull of the humeral external rotators by the inactive middle and lower trapezius. Early identification of SANP can assist with the prognosis, explain persistent impairments and functional deficits, initiate appropriate interventions and diagnostic testing, and maximize outcome. Further research to establish a clinical prediction rule and validate the scapular flip sign should be performed.

## POSTERIOR INSTABILITY: PATHOGENESIS, EXAMINATION AND INTERVENTIONS

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**PURPOSE:** To review the pathogenesis, current examination and intervention techniques related to patients with posterior instability. **DESCRIPTION:** Posterior shoulder instability is reported to have low incidence in the population; however, diagnostic criteria are variable, possibly resulting in misdiagnosis. Posterior shoulder instability can be a significant challenge for the clinician to treat depending upon the etiology and associated factors. This discussion will review the current pathogenesis and classification of posterior shoulder instability. Assessment and diagnosis will be reviewed and inconsistency of assessment criteria discussed. Surgical indications, intervention and outcomes will be discussed. Conservative interventions will be demonstrated, problematic exercise techniques identified and outcomes discussed. **SUMMARY OF USE:** Participants will be able to recognize subtle signs

of posterior instability and develop a comprehensive intervention program to achieve the best outcome. **IMPORTANCE:** Recognizing posterior instability in patients is important since it can often be missed. Understanding the pathology and appropriate interventions will result in improved outcomes.

## THE ACUTE EFFECTS OF SLEEPER STRETCHES ON SHOULDER RANGE OF MOTION IN COLLEGIATE BASEBALL PLAYERS

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**PURPOSE:** To determine the acute effects of "sleeper stretches" for increasing shoulder range of motion (ROM). **SUBJECTS:** Sixty-six college-aged students participated in this study. Subjects consisted of 33 NCAA Division I baseball players (15 pitchers and 18 position players) who served as the experimental group and 33 college-aged students, with no history of overhead activities, who served as the control group. Both groups had no recent history (past 2 years) of upper extremity pathology and no previous upper extremity surgery. **MATERIALS/METHODS:** All subjects had shoulder internal and external rotation and posterior motion measured of their dominant arm using a digital inclinometer. Internal and external rotation were measured while in a supine position with the shoulder and elbow in 90° of abduction and flexion, respectively. Posterior shoulder motion was measured by assessing glenohumeral horizontal adduction in a supine position. The methods used to determine internal and external rotation ROM and posterior shoulder motion were previously determined by the investigators to have standard error of measurement values of 2°, 3°, and 1.6° respectively. The baseball group had these measurements taken both before and after completion of 3 sets of 30 second sleeper stretches. The sleeper stretches were performed while side lying on the dominant side with both the shoulder and elbow in approximately 90° of flexion. A passive stretch of the dominant shoulder was then administered by an investigator by applying pressure to the distal forearm in an internal rotation direction. The control group did not perform any stretch or movement in between measurements. Separate repeated measures ANOVAs were used to test for statistical significance in shoulder ROM within both groups ( $P < .05$ ). **RESULTS:** The baseball players' average data for posterior shoulder tightness and internal and external rotation ROM prior to the stretch intervention were  $-3.5^\circ \pm 7.7^\circ$ ,  $43.8^\circ \pm 9.5^\circ$ , and  $118.6^\circ \pm 10.9^\circ$  respectively and  $-1.2^\circ \pm 8.8^\circ$ ,  $46.9^\circ \pm 9.8^\circ$ ,  $119.2^\circ \pm 11.0^\circ$  following the application of stretches. These data resulted in statistically significant increases of 2.3° in posterior shoulder motion ( $P = .01$ ) and 3.2° in internal shoulder rotation ( $P = .003$ ) after application of the stretches. No statistically significant differences were found among the baseball players for external shoulder rotation after application of the stretches ( $P = .17$ ) or for the control group with any of the pre and post measurements ( $P > .62$ ). **CONCLUSIONS:** Based on the results of this study, sleeper stretches are an effective technique for the acute increases in glenohumeral internal rotation and horizontal adduction ROM. **Clinical Relevance:** Sleeper stretches should be used to lengthen the posterior soft tissue shoulder structures for both the prevention and treatment of throwing related shoulder disorders.

## MEASURING HEALTH STATUS IN PATIENTS WITH SHOULDER DISORDERS

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**PURPOSE:** One purpose of this report was to compare the responsiveness of the SF-36, SF-12 and Overall Health Status Measure (OHSM) in patients with shoulder disorders. The OHSM is a 24-item questionnaire with 21 items from the SF-36 and 3 additional items related to upper extremity function. A second purpose was to determine how well these general health measures compare with shoulder specific questionnaires in patients with shoulder disorders. **SUBJECTS:** 19 males and 21 females (mean age = 46.8 years) receiving physical therapy for a shoulder disorder. **MATERIALS/METHODS:** Patients completed questionnaires at the initial evaluation and at discharge. The patient's report of change in status

and the therapist's assessment of whether the patient achieved their goals served as the criterion for change. Pearson correlation coefficients were used to assess correlation between the surveys. Effect size was calculated to assess responsiveness of the surveys.

**RESULTS:** The Penn Shoulder Score (PSS) was the only survey to demonstrate an acceptable effect size above 0.80 (1.25). The PSS and American Shoulder and Elbow Surgeons (ASES) scores demonstrated acceptable coefficients ( $r = 0.55$  &  $0.75$ ) and demonstrated fair correlations with the general health status measures at initial evaluation ( $r = 0.37-0.44$ ). The general health status measures correlated well with each other at initial evaluation and discharge. The OHSM discharge score demonstrated a moderate correlation (0.66) with the discharge PSS score. The OHSM demonstrated a smaller effect size than both the SF-36 and SF-12.

**CONCLUSION:** The findings of this preliminary report suggest that the PSS was the most responsive to change. The OHSM did not demonstrate improved responsiveness over the SF-36 and SF-12 PF and PCS scores in patients with shoulder disorders.

## EXAMINATION AND REHABILITATION OF ROTATOR CUFF DYSFUNCTION

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**PURPOSE:** The purpose of this educational presentation is to provide differences in the presentation and rehabilitation of rotator cuff impingement/tenosynovitis, as well as partial, small/medium, and large or massive rotator cuff tears.

**DESCRIPTION:** The range of motion, strength, and functional presentation of the spectrum of rotator cuff disease will be presented. The nuances of rehabilitating rotator cuff impingement and tears will also be discussed.

**SUMMARY OF USE:** Clinicians will be able to utilize this information to better understand the clinical presentation of various aspects of rotator cuff disease. This information will be helpful in clinical decision making and the implementation of the appropriate interventions.

**IMPORTANCE:** Rotator cuff disease is the most common shoulder condition causing individuals to seek both surgical and non-operative intervention.

## IMPAIRMENTS AND FUNCTION IN PATIENTS WITH FROZEN SHOULDER COMPARED TO PATIENTS WITH VARIOUS SHOULDER DISORDERS

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**PURPOSE:** To determine whether there is a difference in impairments and function among patients presenting to physical therapy with a frozen shoulder versus patients with various other shoulder disorders.

**Subjects:** 381 patients (mean age 51.3 years) with various nonoperative and postoperative shoulder pathologies and thirty-nine patients (mean age 53.1 years) with frozen shoulder.

**MATERIALS/METHODS:** Patients referred to an outpatient physical therapy clinic with a unilateral shoulder disorder underwent clinical examination and the findings were entered into a central database. The following variables were examined: demographic data; time since onset; Penn Shoulder Score, active range of motion (AROM) of forward elevation (FE), external rotation (ER) at 0° and 90° of abduction, functional internal rotation (IR) by reaching the highest vertebral level behind the back; isometric muscle strength, tested with a hand-held dynamometer, for ER and IR at 0° of abduction and FE at 45° of elevation. Two-tailed t-tests examined the differences between the impairment measures and outcome scores for subjects with a diagnosis of frozen shoulder versus other shoulder disorders. In addition, ratio differences for isometric strength between the uninvolved and involved sides were compared for the groups. Correlation coefficients were performed to correlate the impairment measures with functional measures in pa-

tients with frozen shoulder. Regression analysis was used to predict the level of impairment associated with individual function items.

**RESULTS:** Significant differences did exist between groups for all AROM measures. The frozen shoulder group showed a decrease in FE, ER at 0° and 90°, and IR ( $P<0.01$ ). The frozen shoulder group displayed significantly lower scores in each of the Penn Shoulder Score subscales as well as the overall score ( $P<0.5$ ). A lower score in the pain subsection reflects higher pain levels. No significant differences were found between the groups for any isometric strength measure (ER, IR, and FE:  $P>0.05$ ). Ratio differences between involved versus uninvolved sides was not significant between groups in FE or ER strength ( $P>0.2$ ). The frozen shoulder group demonstrated a significantly greater ratio difference in IR strength between the involved and uninvolved shoulders compared to the non frozen shoulder group ( $P=0.02$ ).

**CONCLUSIONS:** Differences do exist in impairments (pain and range of motion) and function between patients with frozen shoulder and patients with other shoulder disorders. Subjects with frozen shoulder did exhibit similar strength deficits to subjects with other shoulder pathologies. The ratio of strength difference between involved and uninvolved sides was similar for both groups for ER and FE. Patients with frozen shoulders exhibited greater internal rotation weakness compared to their uninvolved side than patients with other pathologies.

**CLINICAL RELEVANCE:** Not surprisingly, patients with frozen shoulder have greater AROM deficits than patients with other shoulder diagnoses. Clinicians should recognize that frozen shoulder patients have strength deficits equal to or greater than patients with various shoulder disorders. Identifying these deficits can be used to focus interventions and maximize the treatment of these patients.

## PATIENT SATISFACTION TEN YEARS OR MORE AFTER SHOULDER REPLACEMENT

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A cohort of patients operated on by a single surgeon (DHS) and undergoing post-operative rehabilitation by the same therapist (MW) between 1989 and 1997 was contacted by mail and telephone. A detailed questionnaire was used to assess patient satisfaction and the maintenance of function. Questions asked included the A.D.L. questions of the ASES assessment. The series was closed when 100 replies were received. These represented 294 consecutive cases, some of whom had died, some who had demented, and some who had simply disappeared. While some deterioration of function occurred with time, particularly in rheumatoid patients, patient satisfaction remained high, and the rate of revision surgery was low, confirming the value of shoulder replacement followed by systematic post-operative rehabilitation.

## COMPARISON OF TWO PATIENT-BASED OUTCOME MEASURES FOR SHOULDER INSTABILITY: RESPONSIVENESS AND MINIMAL CLINICALLY IMPORTANT DIFFERENCES AFTER NON OPERATIVE TREATMENT.

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**PURPOSE:** To compare the Oxford Instability Shoulder Score (OISS) and Shoulder Rating Questionnaire (SRQ) for conservatively managed patients with shoulder instability, regarding responsiveness to change (effect size, minimal detectable change MDC) and minimal clinically important difference (MCID).

**SUBJECTS:** 93 consecutive patients referred from a Shoulder Clinic to physiotherapy in a specialist orthopaedic hospital setting. 7 patients had bilateral symptoms, giving a total of 100 shoulders. Inclusion criteria: Clinic diagnosis of shoulder instability. Exclusion criteria: Baseline physiotherapy assessment finding no subjective complaint of instability together with negative clinical instability tests ( $n=14$  shoulders); surgery within the follow-up period ( $n=3$  shoulders). **METHODS:** Patients were requested to complete OISS and SRQ questionnaires at first attendance, and one and nine months subsequently. Scores were transformed

to allow comparison. A 5-point Likert scale subjective rating of change was obtained; response categories were "much better", "slightly better", "no change", "slightly worse", and "much worse". **DATA ANALYSIS:** Intraclass correlation coefficients to evaluate test-retest scores (at one month on those who reported no change), effect sizes and MDC90. Receiver Operating Characteristic (ROC) curves determined cut off scores for those who reported improvement against all others. **RESULTS:** Response rate = 64%. Mean age 24yrs (SD 8.9). Sample included 46 shoulders with traumatic instability. Both questionnaires were able to detect change (effect sizes 1.16 OISS and 0.99 SRQ). The minimal detectable change (MDC90) scores were 16% (7 points) for the OISS and 17% (8 unweighted points) for the SRQ. The minimal clinically important difference (MCID) was 9%, 4.5 points (for "slightly better" and "much better" Likert response categories) and 13.5%, 6.5 points ("much better" category) for the OISS, dependent on the subjective descriptors used, and was 11% (4 unweighted points) for SRQ. Rest retest ICCs ( $n=18$ ) were 0.90 (95% C.I. 0.74, 0.96) for OISS and 0.84 (95% C.I. 0.58, 0.94) for the SRQ. **CONCLUSIONS:** Both questionnaires show good responsiveness and test-retest for this group of conservatively managed patients with shoulder instability. Overall, the OISS performed better than the SRQ as expected since it is specific for this particular diagnostic group. The SRQ performed less well in distinguishing those who reported feeling "much better", "slightly better" or "no change". In addition, the scoring system is more time-consuming. **CLINICAL RELEVANCE:** Using the OISS, a change score of 16% or more (7 points) will reflect a true and clinically relevant change for this group of conservatively managed patients. This valid, reliable, responsive measure is easy to complete and score, providing clinicians and researchers with a useful tool to measure outcomes and practice.

## SHOULDER DYSFUNCTION FOLLOWING TREATMENT FOR BREAST CANCER

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**PURPOSE:** The purpose of this presentation is to describe the shoulder impairments and functional compromise in patients who have had surgery and radiation treatment for breast cancer. **DESCRIPTION:** This presentation will include information regarding the typical restrictions in shoulder motion experienced by these patients and demonstrate how they are different from adhesive capsulitis. The complications of long thoracic nerve palsy and brachial plexopathy will be discussed and evaluation considerations will be outlined. **SUMMARY OF USE/IMPORTANCE:** Given the incidence of breast cancer and the advances in survival, the orthopedic shoulder therapist is likely to see an increasing number of patients with a history of breast cancer. Understanding patterns of dysfunction that are particular to this population is important for clinical decision-making.

## REHABILITATION MANAGEMENT OF PATIENTS WITH SPINAL ACCESSORY NERVE PALSY

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**PURPOSE:** The purpose of this presentation is to describe the clinical presentation, functional limitations and rehabilitation of patients who have sustained spinal accessory nerve palsy. **DESCRIPTION:** This presentation will include pertinent information regarding the etiology of the paralysis, the important components of the clinical examination, and a biomechanical rationale for the functional limitations that patients' experience. Intervention strategies and outcome measures for conservative management and for the post surgical patient will be described. **SUMMARY OF USE/IMPORTANCE:** Loss of trapezius function results in a significant compromise of upper extremity function, and is often a painful condition for the patient. Understanding the principles of examination and management of this difficult problem is important information for shoulder therapists. This entity is often not diagnosed early and has a prognosis that can be challenging to predict.

## "SLAP" LESION – PROTOCOL OF REHABILITATION

Elcimar Reis

**SUMMARY:** In the orthopedic and physiotherapy offices, the shoulder pain is an extremely common complaint, and this fact justifies the high number of studies related with this joint. With the development of the glenohumeral's arthroscopy many studies were made with exploring objectives. Garcia et al (1984) made studies related with the arthroscopy for recognize the most important shoulder's structures. From these studies, it was possible to recognize intra-joint lesions, which weren't detected before. One of these lesions occur in the superior labrum, in the insert of the tendon into the long part of the biceps. In 1990, Snyder, in his famous article, described the lesions of the superior and anterior labrum, introducing the SLAP lesion term, and classifying them in 4 kinds, according with the morphology of the labrum's lesion and the extension of the involvement with the long part of the biceps. They are four. First Kind - Detachment and degeneration of the superior-labral's border. Second Kind - Detachment of the labrum-bicipital junction. Third Kind - Rupture of the bucket handle from the superior labrum, and Fourth Kind - rupture of the bucket handle from the bicipital tendon. About the causes of the Slap lesions, Cooper (1992) affirmed that they occur because of the contraction force of the biceps during the phase of the deceleration motion. This hypothesis is confirmed with the study of Andrews et al (1985), they observed that the labrum moves during the electric stimulation of the biceps. Because of the diagnosis's evolution and the anatomic's and biomechanical knowledge of the evolved structures, the SLAP lesions are now detected more often, an this is the reason why the number of patients with this lesion is growing. It is observed nowadays, about the postoperative of the SLAP lesion, the existence of some rehab's protocols, although the majority that we know priorities just the combat of the pain and the improvement of the motion and the muscle strength. Since 2002, (knowing the functional needs of the joint complex of the shoulder and having experience with the protocols of glenohumeral's instabilities) we have started the development of a protocol which priorities the control of pain, the restoration of the motion, the rotator cuff, the scapula and the restoration of the neuromuscular coordination.

These programs are distributed in phases, which have clear and distinct objectives. First Phase: Protected Mobilization (0-4 weeks), Second Phase: Muscular Strength (5-8 weeks), Third Phase: Neuromuscular Control (9-12 weeks) and Fourth Phase: Activities Return (12-16 weeks). In phase IV, except the SLAP of the kind II and IV, this is liberated for sport activities after the sixth month after surgery. The mentioned protocol is utilized since them, and it's results have a perfect match with nowadays's literature. During the Conference, the first results will be exposed after one medium follow up of 44,1 months of 9 patients, all of them analyzed according with the "UCLA" scale.

## SCAPULA ALATA / WINGING SCAPULA

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**BACKGROUND:** Since 1992 physiotherapists at Viborg Hospital have worked with the development of a treatment concept for patients with the diagnosis Scapula Alata / Winging Scapula. In collaboration with shoulder surgeons and orthotists we have developed a brace. Furthermore we have developed a method for examination and analysis of the dysfunction around scapula and also a method for the physiotherapeutic rehabilitation. In a study in 2003 (Ugeskrift for laeger - 21. april 2003, nr. 17) including 64 patients we concluded that we have a highly effective treatment concept for this group of patients. Purpose: During our work with this group of patients new questions came along. We wanted to know more about dispersion of gender, side affection, dominant side, geographical dispersion, age, percentage of patients provided with at brace, length of treatment, numbers of treatment and cause of winging scapula. We made a study consisting of 147 patients suffering from winging scapula. In 94 cases an EMG/ENG measured and pointed out an affection of m.serratus anterior and/or n.thoracicus longus. **CASE DESCRIPTION:** All patients were initially diagnosed and questioned by a shoulder surgeon and a shoulder physiotherapist. Afterwards they were sent to ENG/EMG of n.thoracicus longus/m.serratus anterior. A main part of the patients were sent to orthotist to be provided with a brace made individually. An analysis of

muscle dysfunction around scapula was made and an individual rehabilitation program was put together. The patient was educated in his own situation and instructed in how to use the brace and how to follow the program. The treatment consisted mainly of exercises at home and approximately once every 3 weeks the patient had an appointment with the physiotherapist for progression in the program. A final checkup was made by shoulder surgeon and shoulder physiotherapist.

**DISCUSSION:** On the background of this study of cases (April-June 2006) it has been confirmed that our knowledge of the cause of winging scapula is far from satisfactory. Urgent questions could be: Why are there twice as many men as women in our study? Why do we see a predominance of right-sided winging scapulas (6 out of 7)? Are the spontaneous cases/attacks arisen on the background of a neurit? Are the traumatically arisen cases actually caused by a neurit but blamed on an earlier incidence? The above make demands for a more detailed data base and also a consistent collection of data in a new prospective study/project.

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## EFFECTIVE SCREENING AS A TOOL FOR INJURY PREVENTION AMONG HIGH SCHOOL SWIMMERS

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**PURPOSE:** The purpose of the study is to determine whether a structured preseason screening will provide information about the risk of shoulder injuries for varsity level high school swimmers. The goals of the study are to: 1.) Find valid tests of the shoulder and other areas of the body which affect the shoulder during swimming, 2.) To determine which athletes are at risk of shoulder injury, 3.) To implement an athlete-specific exercise program to decrease the number of swimmers who endure shoulder pain during the season. **DESCRIPTION:** 40 male and 30 female volunteer high school swim team members, 14-18 years of age, were selected to participate. Each subject's injury risk was analyzed on the basis of 5 performance tests: internal/external rotation measurement of each shoulder (Glenohumeral Internal Rotation Deficit/ GIRD) ; core/abdominal stability (Single Leg Balance Upper Extremity Overhead Posterior Medial Reach Test) ; Gluteal strength/stability (Upper Extremity Bilateral Anterior Reach Test) ; scapular mobility (Scapular Slide Test) ; shoulder strength/power (Upper Extremity Stability Test) ; a subjective questionnaire for injury rate was recorded pre and postseason. **SUMMARY OF USE:** Post season tests of performance were conducted in conjunction with subjective responses regarding injuries the subjects incurred over the season. This data was compared to data from the previous season. From this it will be determined whether there is a correlation between the screening tests performed, the exercise program designed for the athlete, and any significant reduction in the incidence of recorded shoulder injuries.

**IMPORTANCE:** We aspire to determine whether athlete specific pre-and in-season injury prevention exercises and modifications can be adopted as a method of reducing injuries for those athletes identified during testing as being at risk for acquiring shoulder injuries. We believe this to be a more effective approach than generic injury-prevention exercises.

## AGREEMENT BETWEEN THE CONSTANT- MURLEY SCORE AND THE OXFORD SHOULDER SCORE M.A.

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**CONTENT:** A prospective study on the agreement between the Constant-Murley Score (CMS) and the Oxford Shoulder Score (OSS) in a typical population of shoulder patients without instability. Patients attending the Nottingham Shoulder and Elbow Unit between 2004 and 2006 were assessed by trained assistants. Data on the CMS, OSS, age, gender, dominance and affected arm were collected anonymously. Incomplete data sets were discarded. It was suggested that 95% limits of agreement within 10 points would be acceptable clinically for the scores to be considered interchangeable. Two hundred and twenty-five

patients were included in the study. The mean age was 59.5 years, standard deviation (SD) 13.63 years. 119 were female (52.9%), 106 male (47.1%). 200 were right handed (88.9%) and 25 left handed (11.1%). 127 (56.4%) dominant arms were affected. 138 (61.3%) pre-operative and 87 post-operative (38.7%) scores were included. Mean CMS (for the affected arm) = 50.24 Mean OSS (as a percentage, with 100 as best) = 63.31 Therefore on average the OSS scores 13.07 higher than the CMS for an affected arm. For shoulder functional scoring of an individual, the SD (score differences) = 16.13 and the 95% limits of agreement are (-44.68, 18.55). The CMS for an individual may be between 45 points below and 19 points above their OSS. Log transformations did not reduce this figure. Assessment of agreement by Bland and Altman's method showed that the OSS scored on average 13 points higher than the CMS (when converted to an inverted, percentage score). The 95% limits of agreement were +/- 31.16 points. This suggests that the two scoring methods do not agree closely enough for them to be converted to each other or considered interchangeable.

## AN UNUSUAL CASE OF SHOULDER CONTRACTURE

Shaffer MA

*University of Iowa Sports Medicine*

**PURPOSE:** This presentation will highlight an unusual loss of shoulder range of motion. Because of the compensatory capabilities of her scapulothoracic articulation, this patient was originally thought to be suffering from Serratus Anterior dysfunction. **DESCRIPTION:** The patient was a 23 year old right hand dominant female. She presented with insidious onset of dominant shoulder pain and loss of range of motion. She presented with scapular winging which was initially diagnosed as Serratus Anterior dysfunction. The patient made minimal progress with a physical therapy program of scapular retraining. Discussion of the case between the referring orthopedic surgeon and physical therapist produced a new working diagnosis- selective contracture of her rotator interval and posterosuperior glenohumeral joint capsule. Passive stretching became the predominant physical therapy treatment over the next 3 months, but still yielded minimal results. The decision was made to attempt arthroscopic release of the posterior capsule and the rotator interval. Punctate bleeding, consistent with adhesive capsulitis, was observed in the posterior portion of the glenohumeral capsule as well as the rotator interval. However, there was also an unexpected finding at the time of arthroscopy, extensive thickening of the subacromial bursa. Resection of the hypertrophic bursa considerably improved the patient's intra-operative range of motion. Initial post operative physical therapy interventions focused on restoration of passive range of motion. As range of motion returned, physical therapy interventions focused on shoulder strengthening and return to function. At the time of discharge, the patient still demonstrated mild residual loss of external rotation range of motion with the arm at the side, and mild scapular winging at rest. However, she was pain free and able to resume all work duties and recreational hobbies. **SUMMARY OF USE:** This patient's progress was regularly assessed with range of motion measurements, photographic evidence of her progress, and patient self reports. Final follow occurred 14 months after surgery. **IMPORTANCE:** In retrospect, this was a case of isolated glenohumeral contracture which was initially misdiagnosed as scapulothoracic dysfunction. This contracture did not present, nor respond similarly to, typical adhesive capsulitis. In addition, arthroscopic release of a hypertrophic subacromial bursa was necessary for restoration of intra-operative range of motion. Close communication between the physical therapist and the orthopedic surgeon was vital given the unusual nature of this case.

## ADHESIVE CAPSULITIS- A CRITICAL REVIEW

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*University of Iowa Sports Medicine*

**PURPOSE:** To critically review the scientific literature with regard to the etiology, treatment, and natural history of idiopathic frozen shoulder or adhesive capsulitis. **DESCRIPTION:** Idiopathic frozen shoulder, or adhesive capsulitis, remains one of the most commonly treated, yet least understood conditions of the shoulder. There has been a revolution in general thinking as well as a re-evaluation of the standard of care for this condition. Therefore, a review of the topic is necessary. This presentation will review the epidemiology, pathophysiology, and typical presentation

to a health care provider of frozen shoulder. However, this presentation will primarily focus on the natural history of idiopathic frozen shoulder and a critical evaluation of the evidenced based medicine regarding physical therapy treatment of this condition. The current standard of care for frozen shoulder involves the early, judicious use of corticosteroid injections, appropriately timed, appropriately aggressive physical therapy, and in recalcitrant cases, targeted arthroscopic release of the glenohumeral capsule. In general, there has been a shift away from protracted use of aggressive physical therapy to more targeted medical and rehabilitative interventions. This evolution mirrors the author's clinical experience with this condition. **SUMMARY OF USE:** This presentation will critically review the literature regarding the etiology, natural history and optimal physical therapy management of primary frozen shoulder. This presentation will provide underlying rationale for the new treatment paradigm involving limited, but specifically targeted, medical and rehabilitative interventions. **Importance:** With knowledge of the information from this presentation, the clinician will be able to make treatment decisions grounded on the scientific evidence regarding the natural history and optimal physical therapy interventions for primary frozen shoulder.

## CORRELATION OF THE DEVELOPMENT OF IMPACT SYNDROME WITH ABDUCTION AND ELEVATION EXERCISES ABOVE 60° WITH ELBOWS EXTENDED.

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**PURPOSE:** To outline the current scientific evidence related to the incidence, pathology and risk factors related to abduction and elevation exercises above 60°. **DESCRIPTION:** The spread of workout exercises as a synonym of a healthy way of life induces sedentary people to start without any earlier preparation with improper exercises. The study of four cases that arrived at the clinic with Impact Syndrome allowed correlating the type of exercise and the symptom presented. **SUMMARY OF USE:** Given the incidence of patients who have developed shoulder tendonitis doing the same type of exercises, this presentation intends to present the right limitation of biologic exercises that do not injure the shoulder. **IMPORTANCE:** The relief of this kind of exercise as the source of a possible right diagnosis can reduce the length of the treatment and avoid recidivism.

## INTRAOPERATIVE ELECTROMYOGRAPHIC ANALYSIS OF SUBSCAPULAR MUSCLE DURING TOTAL SHOULDER ARTHROPLASTY: A PROSPECTIVE CONSECUTIVE STUDY

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**PURPOSE:** Progression of fatty infiltration of the subscapularis muscle subsequent to total shoulder arthroplasty is frequent and may be an underestimated problem. The approach with osteotomy of the lesser tuberosity led to consistent bone to bone healing with neither retraction nor over tensioning of the musculotendinous unit. However, in a previous study, fatty infiltration of the subscapularis muscle had progressed at least by one stage in 45% of the patients' shoulders. We hypothesized that anterior approach to the shoulder joint with release of the subscapularis muscle would lead to a direct or indirect subclinical damage of the subscapular nerve and would be an explanation for the progression of fatty infiltration of the muscle. **METHODS:** Nine Shoulders in eight consecutive patients had received a total shoulder arthroplasty using an anterior approach with osteotomy of the lesser tuberosity. The mean age at time of operation was 67 years. Patients were followed clinically including the Constant score and a detailed neurological examination, as well as radiographically with pre- and postoperative MRI's, CT's and standard radiographs at 6- and 12 months thereafter. Neurophysiological assessment was performed using a new pre- intra- and postoperative electromyographic technique for the subscapularis muscle. Fibrillation and sharp waves as spontaneous activities of the motor unit potentials (MUP) indicated direct signs of denervation. Incomplete interference patterns (IP's) indicated an incomplete innervation pattern as an indirect sign of denervation. **RESULTS:** After a one year follow up, 89% of the patients were very

satisfied or satisfied with the result. The relative Constant Score improved from an average of 50 percent preoperatively to an average of 96 percent postoperatively ( $p=0,008$ ). That corresponds to a postoperative subjective Shoulder value of 89 percent. From preoperative to 6- and 12-months postoperative, the average degree of fatty infiltration of the subscapularis muscle progressed in an almost significant extent (0.6, 1.1, and 1.6 respectively;  $p=0.056$ ). Intra- and postoperatively, there were neither fibrillations and sharp waves of the MUP's as direct signs, nor incomplete (IP's) of the motor unit of the subscapular nerve as indirect signs of denervation. **CONCLUSION:** Total Shoulder Arthroplasties performed by an anterior approach using an osteotomy of the lesser tuberosity yields good results with a high satisfaction rate. Comparable to our previous study, there are signs of progression of fatty infiltration of the subscapularis muscle within the first year subsequent to total shoulder arthroplasty. However, there were no signs of direct or indirect subclinical damage of the subscapular nerve during total shoulder arthroplasty.