

First Scandinavian-Japanese Shoulder Meeting

Helsinki, Finland, June 26–29, 1989

Editor: Martti Vastamäki

Elotie 1 A 2,
SF-20780 Kaarina, Finland

Topographic and imaging anatomy of the shoulder

Jan Nowak and Wolfgang Rauschnig

Department of Orthopedics, University Hospital,
S-751 85 Uppsala, Sweden

New surgical concepts and techniques have been developed in shoulder surgery during recent years. This coincides with the introduction of sectional imaging modalities, such as CT, MR, ultrasonography, and arthrotomography. Diagnostic accuracy calls for familiarity with both normal and pathologic topographic anatomy of the shoulder.

Material and methods: The shoulder joint is stabilized predominantly by soft tissues. Cadaveric shoulder specimens were frozen *in situ* to preserve the undistorted soft tissue-bone anatomic relationships. CT scans of the embedded specimens were done in clinically relevant planes; the specimens were then cryosectioned with a precision cryoplaning technique. To facilitate accurate correlations, a reference marker system was both imaged and sectioned. This allows to size, orient, and superimpose scans and anatomic images.

Results: Images were obtained at 1-mm intervals in different planes. Apart from overview images displaying the overall topographic relationships, close-up photographs with magnifications up to 10× allowed resolution of small anatomic structures.

Conclusion: Cryoplaning facilitates assessment of the topographic anatomy and of surgical approaches. It also renders unequivocal correlation with diagnostic CT and MR scans.

A morphologic and histologic study of the long head of the biceps brachii in the torn rotator cuff shoulder

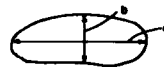
Yoshiyuki Nakagawa, Jiro Ozaki, Goro Sakurai and Susumu Tamai

Department of Orthopedics, Nara Medical University,
Kashihara, Nara, Japan

The purpose of this paper is to clarify the morphologic and histologic changes in the long head of the biceps in relation to aging or deterioration of the rotator cuff.

Material and methods: This study comprised 100 shoulder joints in 50 cadavers (35 males, 15 females), which were investigated at two levels: the intraarticular and intertubercular portions.

coefficient of flatness of bicipital long tendon = $\frac{\text{long axis (a)}}{\text{short axis (b)}}$



| | intra-articular portion | intertubercular portion |
|--|----------------------------|-------------------------|
| no tear (34 I) | 2.93±0.584 (average±SD) | 2.86±0.283 |
| incomplete tear (28 I) | * 3.82±1.462 | 2.57±0.471 |
| complete tear (18 I) (total or near-total tear 6 I, missing tear 12 I) | ** 4.34±2.057 | *** 3.99±1.188 |

* : p<0.05, ** : p<0.01, *** : p<0.001

Figure 1.

Results: The morphologic study showed that the changes of the long head of the biceps started in the intraarticular portion, and in cases of advanced cuff tears included dislocation, adhesions, or disappearance of the tendon (Figure 1). Histologically, abnormal tissue from the intraarticular and intertubercular portions of the tendon with cuff tears showed inflammation in the synovial mem-

brane on the side of the humeral head, inflammation in the synovial membrane on the side of the rotator cuff, hypertrophy of the peritendineum internum and decrease of the tendon fiber bundles. These changes were more frequently found in specimens with cuff tear (Figure 2).

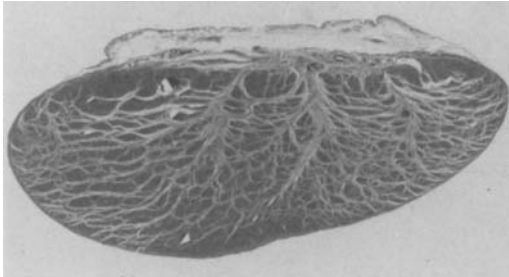


Figure 2.

Conclusion: From morphologic and histologic data, it is concluded that with deterioration of the rotator cuff the bicipital long head is forced to assume a greater role in the support of the extremity and is subjected to greater attritional forces than when the rotator cuff is intact.

Arthroscopy for the diagnosis of shoulder pain

Lars Adolfsson and Jack Lysholm

Department of Hand and Plastic Surgery, Linköping University Hospital, Linköping, and Department of Orthopedics, Boden Central Hospital, Boden, Sweden

Material: A consecutive series of 152 patients with shoulder problems were examined between 1984 and 1988. A clinical diagnosis based on history and clinical examination including stability testing was compared with the findings at arthroscopy and stability testing under anesthesia. Fifty-eight patients were found to have instability-related disorders, and 1 patient had hemiarthrosis due to villonodular synovitis. The remaining 93 patients—47 women and 46 men (average age 40 years)—suffered from pain on exercise, and the results of this group of patients are included in the present study.

Arthroscopy was performed with standard posterior approach, and all the findings were recorded on a specially designed protocol.

Results.

Clinical diagnosis:

- | | |
|--------------------------------|--------------------------------|
| 1. Rotator Cuff Syndrome (RCS) | 26 patients (14 women, 12 men) |
| 2. No diagnosis | 59 patients (29 women, 30 men) |
| 3. Biceps tendinitis | 2 patients (1 woman, |

- | | |
|------------------------------|----------------------|
| | 1 man) |
| 4. Rupture of glenoid labrum | 2 patients (2 men) |
| 5. Frozen shoulder | 4 patients (4 women) |

Arthroscopic diagnosis (compared with clinical diagnosis):

1. Findings typical for RCS were seen in all 26 patients.
2. Eight patients had findings typical for anterior instability, of these 6 were considered unstable during stability testing under anesthesia. Totally, 36 patients were diagnosed as RCS. Three patients had degenerative labral tears, but no other pathology. Three patients had arthrosis. The remaining 9 patients had no pathologic findings.
3. Both patients had pathology typical for RCS.
4. Both patients had labral flap tears.
5. Adhesive capsulitis was seen in all 4 patients.

Compared with the diagnosis after arthroscopy, the clinical diagnosis was inaccurate in 25 percent. In Group 2, the clinical diagnosis was wrong in 39 percent.

Conclusion. Arthroscopy and stability testing under anesthesia was of great value for the correct evaluation of shoulder pain, especially for patients where the clinical diagnosis was unclear.

Degenerative tendinopathies of the rotator cuff

H. K. Uthoff, K. Sarkar, S. Ogata and J. Löhr

Division of Orthopedics, University of Ottawa at the Ottawa General Hospital, Ottawa, Canada

Tendinopathies are often believed to result from changes in surrounding structures or from systemic disease. We, however, believe that most tendinopathies are degenerative in nature and that they start inside the tendon. Secondary involvement of the surrounding structures often occurs.

This study is based on macroscopic, radiologic, and microscopic observations of 306 shoulders removed at autopsy. It is supplemented by observations made in 100 patients operated on for rotator cuff tears.

The part of the tendon closer to the joint has a poorer blood supply than the more superficial part.

Tears usually occur at or close to the site of tendon insertion into bone. Plain radiographs can help in their detection, pertinent changes occurring at three distinct sites. The first site is at the sulcus, situated between articular cartilage and tendon insertion. A widening of the sulcus, its irregularity and increase in density indicate the presence of rim rents. The second site is found at the insertion. Stippled calcification, increase in density and irregular outline indicated degeneration, microtears and macrotears. The third site is lateral to the insertion, at the greater tuberosity, mostly indicating impingement often secondary to full substance tears.

Changes observed in the components of the coracoacromial arch are usually secondary to tendinopathies, the exception being developmental changes in shape of acromion and coracoid process.

Clinical diagnosis of rotator cuff tears

Akira Kawashima and Mikasa Motohiko¹

Hamamatsu Red Cross Hospital, Hamamatsu, Japan, and Metropolitan Otsuka Hospital¹, Tokyo, Japan

No literature has been found so far to determine the reliability of each symptomatology in making diagnosis of rotator cuff tears. This study reports the incidences of rotator cuff tears in relation to various symptoms (Table 1).

Material and methods. Totally, 353 cases were examined from May 1984 through September 1987. They were over 40 years of age complaining of shoulder pain or disturbance of elevation. Arthrography was performed in 210 cases.

Results. In 210 cases, rotator cuff tears were found in 105 cases (50 percent) and periarthritis humeroscapularis in 105 cases (50 percent), effusion sign was noticed in 27 cases, of which 25 (93 percent) showed rotator cuff tears.

Table 1. Incidence of rotator cuff tears in relation to various symptoms

| Symptoms | Percentages |
|------------------------------|-------------|
| Effusion sign | 93 |
| Narrowed AHI | 73 |
| History of trauma | 69 |
| Creptus | 64 |
| Atrophy of ISP | 62 |
| Muscle weakness on abduction | 51 |
| Motion pain | 49 |
| Disturbance of elevation | 27 |

Conclusion: The triad of symptomatology for rotator cuff tears have been considered to be pain, creptus, and muscle weakness. However, the reverse is not always true. Based on our studies, the most specific symptoms and signs of rotator cuff tears were 1) effusion sign, 2) narrowed acromiohumeral interval on radiographs (< 7 mm), 3) history of trauma, 4) creptus, 5) atrophy of infraspinatus, etc., in screening.

A 5-year follow-up study of sutured and nonsutured rotator cuff tears

Claes Petersson

Lund University Department of Orthopedics at Malmö General Hospital, S-214 01 Malmö, Sweden

The aim of the present investigation was to compare sutured and nonsutured rotator cuff tears in a long-term follow-up study after subacromial decompression.

Material. Fifty shoulder sin 47 patients—on an average 60 years old—were operated on due to disabling subacromial pain. All the patients had arthrographically verified ruptures of the rotator cuff. All the shoulders were subacromially decompressed with resection of the lateral end of the clavicle and anterior acromioplasty. During the operation the cuff tears were classified according to size. There were seven small ruptures (< 15 mm), 15 medium-sized ruptures (< 20 mm), and 28 large ruptures (> 20 mm). Six small, 15 medium-sized, and 7 large ruptures could be sutured side to side without tension at the operation, whereas one small and 21 large ruptures were left nonsutured.

Results. Forty-one patients with 43 operated on shoulders—25 sutured and 18 nonsutured—were reevaluated on an average 5 years postoperatively. Ten patients in the unsutured group had no or slight shoulder pain as compared with 22 of the patients in the sutured group. Fourteen patients complained of more or less pronounced shoulder weakness—10 patients in the unsutured group and 4 patients in the sutured group. Twenty-one patients with sutured cuff tears and 10 patients with unsutured tears had normal shoulder flexion and abduction.

Conclusion. The results of the present study after leaving large cuff tears unsutured in subacromially decompressed shoulders seem to be comparable to those presented by some authors after complicated tendon reconstructions.

Autotractor stress radiography of the glenohumeral joint: A method for demonstration of chronic subluxation and multidirectional instability

Pekka Jalovaara, Markku Päivänsalo and Valteri Myllylä

Department of Surgery and Radiology, University of Oulu, Oulu, Finland

The radiographic methods for the diagnosis of glenohumeral instability image the secondary lesions caused by dislocations. The demonstration of the subluxation or dislocation itself is laborious, requiring anesthesia and assistance to provoke the movement between the scapula and the humerus. A method is described in which the patient himself stretches this shoulder into the anteroinferior direction, demonstrating translation of the humeral head from the glenoid cavity when the instability is associated with a loose joint capsule or marked damage of the glenoid labrum.

Material and methods: The stress is brought about so that the patient grasps his knee with both hands and stretches his shoulders by extending the flexed hip. A

modified axillary view is taken when the patient is placed in a decubitus position on the uninvolved shoulder and the anteroposterior view with the patient sitting. The anterior and inferior shifts of the humeral head in relation to the glenoid fossa were measured after defining the center of the humeral head and perpendicular lines bisecting the lines connecting the superior and inferior margins, as well as the anterior and posterior margins of the glenoid. This method was employed in 14 recurrent anterior dislocation, 10 recurrent anterior subluxations, 8 multidirectional instabilities, and 20 stable control shoulders.

Results: The controls displayed a mean of 3 mm anterior and 6 mm inferior displacements. The shoulders with recurrent anterior dislocation showed somewhat greater displacement, but not enough, however, to differentiate them from the controls. The recurrent anterior dislocations and multidirectional instabilities showed 4- to 6-fold translations in both directions when compared with the controls, and recurrent anterior dislocations.

Conclusion: Autotractor stress radiography reveals recurrent anterior subluxations and multidirectional instabilities that are problematic as regards the treatment.

Results of 50 consecutive total shoulder replacements in patients with rheumatoid arthritis

Veijo Vahvanen and Mauno Ylikoski

Orthopedic Hospital of the Invalid Foundation, Helsinki, Finland

The results of 50 shoulder replacements (Neer II; eight bilateral) were evaluated after an average follow-up time of 2.5 (0.5–6) years. The age at the time of surgery was 55 (26–73) years. The mean duration of the RA and the shoulder symptoms was 15.7 and 5.6 years, respectively. Synovectomy of three shoulder joints was previously performed.

Minor or major rotator cuff defects were found in 14 shoulders. Small tears were sutured, but no attempt was made to repair massive tears. The long head of the biceps tendon was frayed in all the cases. Acromioplasty was performed in 5 cases and osteotomy of the coracoid process in 2 patients. Four humeral components were inserted without bone cement. Active and passive exercises were started immediately after the operation, except for external rotation, which was allowed 3 weeks after the operation.

Results: Pain relief was good as 34 shoulders were painless. Occasional slight or moderate pain during activities was present in 16 cases. Mobility increased slightly in all the patients. The mean preoperative-postoperative degrees of the active movements were as follows: flexion 64–99, abduction 46–92, extension 28–44, external rotation 14–40, internal rotation 61–75. Active abduction or flexion of more than 100° was recorded in 16 shoulders,

from 80° to 100° in 25 cases, and less than 80° in 9 cases. In 37 cases the elevation strength of the arm against resistance was good or moderate, and in 13 cases was managed only against gravity. There were no vascular or neurologic complications, and no infections. No shoulder has as yet required a revision operation. Radiographically, the shoulder joint was fully concentric or subluxated superiorly less than 10 percent of the glenoid height in 34 cases preoperatively, and in 25 cases at the latest postoperative check-up. One of those cases subluxated inferiorly. Severe subluxation of 50–60 percent was found in 2 cases preoperatively and postoperatively.

Despite restricted mobility, the patients expressed satisfaction, because ability to perform daily activities was increased in all the patients.

Treatment of acute complete acromioclavicular dislocation using acromioclavicular transfixation and ligament reconstruction or simple ligament repair

Pekka Jalovaara, Susanna Yli-Luukko, Markku Päivänsalo and Seppo Lähde

Departments of Surgery and Radiology, University of Oulu, Oulu, Finland

Acute acromioclavicular dislocation can be treated with satisfactory results by conservative means, but there are many surgeons that advocate surgical treatment. If surgery is decided upon, there are numerous procedures to choose from. We have analyzed 55 of the successive 85 operations performed between 1973 and 1984 using Knowles' screw fixation and either ligament reconstruction or simple ligament repair.

Material and methods: The median age of the patients was 34 (16–64) years, and the median follow-up time was 6.5 (2–13) years. Ligament repair by suturing alone was performed in 24 shoulders and ligament reconstruction by transfer of the coracoid end of the coracoclavicular ligament to the clavicle to reinforce the superior acromioclavicular ligament in 31 shoulders. The fixation was brought about by acromioclavicular transfixation with Knowles's screw in all the cases. The operations were performed within 14 days from the accident. The follow-up examination included a careful physical examination and radiographic analysis.

Results: There were no major complications. Two patients had a superficial wound infection and 1 had a frozen shoulder. Five patients had a repeat operation with the same method because of unsatisfactory reduction or backing out of the screw. The results were excellent in 22, good in 23, fair in 5, and poor in 5 cases. A significantly better outcome was observed in the group with ligament repair only when compared with the group with reconstruction of the superior acromioclavicular ligament, although recon-

struction maintained the reduction better. Two patients had a late, distal resection of the clavicle for persisting pain. The findings of frequent postoperative subluxations/dislocations, deformity of the distal end of the clavicle, soft-tissue calcification and arthrosis had no bearings with the results.

Conclusion: The operations used here gave results comparable with the results of other operative methods that include an overall 5–10 percent frequency of poor results. No benefit was obtained from the reconstruction of the superior acromioclavicular ligament with coracoacromial ligament transfer. The numerous pathologic radiographic findings had no relation with the results.

Degenerative involvement of articular cartilage in association with rotator cuff tears

Jun Kumagai¹, Toshitake Aizawa¹, Eiji Itoi¹, Minoru Sakurai¹, Ichiro Hirose², Katsumi Sato² and Nobuhiro Ohira²

Department of Orthopedics, Tohoku University School of Medicine¹, and Division of Orthopedics², Tohoku Rosai Hospital, Sendai, Japan

Arthrotic changes associated with rotator cuff tears have not been fully described. We tried to elucidate intraarticular involvement of shoulders with them.

Materials and methods: 1) Clinical study: Arthroscopic investigation was carried out on 47 shoulders with cuff tears in patients aged 33–72 years. Pathologic articular changes were classified into four grades. Clinical features were also analyzed. 2) Anatomic study: Ninety-six shoulders of cadavers aged 42–98 years without cuff tears were examined. With an Indian ink staining method, degenerative articular changes were classified into five grades according to Meacham's classification, and the extent of grade was analyzed in each age group.

Results. 1) The grade of degenerative changes was 0.9 on an average in incomplete tears, 1.4 in small tears, and 2.6 in large tears. Advanced changes were found in males over aged 50 years with symptoms regardless of trauma. 2) The score of the most advanced grade ranged from 2.3 to 3.1 on humeral heads, and from 2.3 to 3.0 on glenoid cavities. No statistical difference was found between age groups.

Conclusions: The degenerative changes of articular cartilage in the shoulder is not severe in aging, whereas they easily occur following large cuff tears after aged 50 years.

Diagnosis on thoracic outlet syndrome, especially concerning loose shoulder and electrodiagnosis

Tetsuro Sadahiro et al.

Department of Orthopedics, Kochi Medical School, Nankoku, Japan

A newly developed electrodiagnosis with spinal evoked potential (S.E.P) in thoracic outlet syndrome (TOS) is presented.

Materials and methods: Sixteen arms of 15 cases diagnosed by traditional physical examinations were employed. All the arms but one were treated surgically after electrodiagnosis. According to electrodiagnosis, S.E.P. was recorded in the epidural spaces and stimulated on the peripheral nerves at 1.5 times the passive threshold. The examinations were performed while arm positions were changed passively; that is, the arms at the side of the trunk in sitting position followed by arm elevation for 20 minutes and down again.

Results: Amplitude of the waves attenuated according to the arm elevation in nine arms while six arms showed augmentation and one no change. Loading of finger motion according to Roos caused attenuation more clearly on late series.

Conclusion: The waves of S.E. P. are much more clear and stable than those of somatosensory-evoked potentials and F-waves. They make a reliable and objective TOS examination possible and give a differential diagnosis from the other shoulder disorder complex.

Displaced proximal humeral fractures: Results of conservative treatment

Sten Rasmussen, Inge Hvass, Jesper Dalsgaard, Berit Schiøtzz Christensen and Erik Holstad

Department of Orthopedics, Aalborg Hospital, Aalborg, Denmark

The clinical and radiographic results of 42 patients with displaced proximal humeral fractures treated by conservative means were reviewed. Thirty-four were female and the median age 77 years. Follow-up evaluation included physical and radiographic examination median 2 years after the trauma. The system advocated by Neer was used to classify the fractures. Sixteen patients had two-part fractures, 17 3-part fractures, and 9 four-part fractures. Twenty-eight fractures were treated with a sling and 14 with a hanging cast. No difference was found between the results in relation to treatment. Five patients developed arthrosis, 2 avascular necrosis of the humeral head, and 5 nonunion. The clinical results were assessed using Neer's protocol. The patients with two- and four-part fractures had failure

results (less than 70 units) and patients with three-part fractures unsatisfactory results (70–79 units). The patients were asked their opinion of the result, and generally found it satisfactory.

The results of conservative treatment of displaced proximal humeral fractures were poor. This supports the idea of treatment with plate fixation or prosthetic replacement. The patient response to conservative treatment was satisfactory; therefore, the indications for surgery should be carefully considered.

Late results after undislocated fractures of the proximal humerus

Anders Nordqvist, Claes Petersson and Inga Redlund-Johnell

Lund University Departments of Orthopedics and Diagnostic Radiology at Malmö General Hospital, Malmö, Sweden

Few reports on long-term follow-up studies of undislocated fractures of the proximal humerus have been presented. The general assumptions seem to be that these are benign lesions with favorable outcome. The purpose of our study was to evaluate shoulder pain and function in a group of patients on an average 20 years after an undisplaced fracture of the proximal humerus.

Material and methods: The radiographs of 46 shoulders with undisplaced fractures of the proximal humerus were identified. There were 22 shoulders with undislocated surgical neck fracture and 24 patients with undisplaced fracture of the greater tuberosity, 4 of whom had originally sustained an anterior shoulder dislocation. The patients were reevaluated on an average 20 years after the trauma with an interview, clinical, and radiographic examination.

Results: At the follow-up examination, 14 patients reported persisting shoulder disability. According to a clinical rating, 25 patients had an excellent result, 11 good, 10 fair, while no poor result was seen. The radiographic examination disclosed degenerative lesions in eight shoulders, five of which had clinical symptoms.

Conclusions: Our results indicate that the natural course of undislocated fractures of the proximal end of the humerus is generally favorable. However, one fourth of the patients had some shoulder disability 20 years after the injury.

Results of surgical treatment of axillary nerve palsy in the quadrilateral space

Masao Eto, Nobuyuki Ito and Katsuro Iwasaki

Department of Orthopedics, Nagasaki University School of Medicine, Nagasaki, Japan

The axillary nerve palsy in the quadrilateral space is relatively rare. The commonest type of palsy occurs following shoulder dislocation or humeral fracture, and sometimes the palsy occurs after blunt trauma to the shoulder region without associated fracture or dislocation.

Between 1981 and 1988, we operated on 8 patients diagnosed as posttraumatic axillary nerve palsy. The average age of these patients was 37 (19–55) years. In all the patients the tender spot was found posteriorly in the quadrilateral space. One case showed quadrilateral space syndrome as reported by Bateman. Four patients without the combined injury had a normal range of motion of the shoulder. Electromyographic findings showed fibrillation potentials and positive sharp wave in the deltoid muscle at rest in 2 patients and no motor unit potentials at voluntary contraction in all of them.

Neurolysis of the axillary nerve was carried out about 3 months after injury. The recovery of the injured nerve was fast as shown by electromyographic display. Good results were obtained in 6 patients. Restriction of elevation of the arm remained in only 2 patients whose cases were complicated by rotator cuff injury and frozen shoulder.

Humeral head fractures treated with the Neer mark II prosthesis

Jens Ole Søjbjerg, Lars Henrik Frich and Otto Sneppen

Orthopedic Hospital, University of Århus, Århus, Denmark

Patients and methods: Thirty-two proximal humeral fractures in 32 patients were studied a mean of 25 months postoperatively. All the fractures were classified according to Neer. Eight patients, mean age 73 (36–84) years, were treated acutely (< 3 weeks postfracture). Five had a hemialloplasty and 3 had a total shoulder replacement. Twenty-four patients, mean age 65 (40–78) years, were treated after a median postfracture delay of 14 (4–72) months. The primary lesions were a four-fragment fracture (10 patients), three-fragment fracture (8 patients), and two-fragment fracture (6 patients). Twelve patients had primarily been treated operatively and 12 patients were treated nonoperatively. The final treatment in 21 patients was a total joint replacement and 3 had a hemialloplasty.

Results: In the acute group, 6 patients were classified excellent as compared with four excellent results in the chronic group. Eight patients with four-fragment fractures in the acute group had a higher score ($P < 0.05$) than 10

patients with four-fragment fractures in the chronic group. In 12 patients primarily treated nonoperatively, the end result did not differ ($P > 0.05$) from the result obtained in 12 patients primarily treated operatively.

Arthroplasty of the shoulder joint using a prosthetic humeral head and an artificial rotator cuff ("Teflon felt cuff plasty")

Jiro Ozaki, Yoshiyuki Nakagawa, Goro Sakurai and Susumu Tamai

Department of Orthopedics, Nara Medical University, Kashihara, Nara, 634, Japan

It has been considered that the articular surface prosthesis of the humeral head is contraindicated in shoulders with a large cuff defect. We have used 3-mm-thick Teflon felt successfully for the repairing of chronic massive cuff tears ("Teflon Felt Cuff Plasty"). This paper describes a shoulder arthroplasty combining a humeral head prosthesis with "Teflon Felt Cuff Plasty."

Patients and methods: From 1982 to 1986, seven shoulders in 7 patients with a damaged humeral head and large cuff defects were operated on with this procedure. The diagnosis was arthrosis, posttraumatic arthritis, tumor, or rheumatoid arthritis. The average age of 6 women and 1 man was 56 years. The follow-up period was 4 (2-6) years. The patients were evaluated in terms of pain, range of motion, and muscle strength.

Results: There were no complications. Six of the patients were completely free from pain, while 1 patient had some pain during shoulder motion. No patients manifested glenohumeral instability. Active motion and muscle strength were less improved in 5 patients; however, no patients showed reduction of mobility. This may be the results of preoperative prolonged disuse of the muscles.

Conclusion: Our study indicated that the glenohumeral reconstruction using a prosthetic humeral head and "Teflon Felt Cuff Plasty" has proved to be a valuable procedure for shoulders where both articular surfaces of the humeral head and rotator cuff are damaged.

Calcifying tendinitis

H. K. Uthoff and K. Sarkar

Division of Orthopedics, University of Ottawa at the Ottawa General Hospital, Ottawa, Canada

Contrary to the commonly held opinion, calcifying tendinitis is not a degenerative disease, but a reactive one.

Consequently, the process of calcification is not dystrophic, but reactive; calcium deposition into a living tissue is followed by a phagocytic resorption; tendon reconstitution will be the last phase of this self-healing disease.

Material: Totally, 127 operated on patients, average age 44 years for males and 43 years for females. Peak incidence 5th decade. Incidence of bilateral involvement increased with increasing length of follow-up.

A clear distinction between the phase of formation and the phase of resorption is possible on clinical and radiographic grounds. Our material permitted correlation of clinical, intraoperative, and histologic observations.

The clear recognition between a phase of formation and a phase of resorption is important for the clinical management. During the phase of formation, a conservative approach should be attempted first. If symptoms interfering with work or activities of daily living persist, then, surgery is indicated. Corticosteroid injections are always contraindicated.

During the phase of resorption, on the other hand, surgery is never indicated. In order to relieve symptoms, the intratendinous pressure should be reduced through needling. The calcium deposit, now of a cream-like consistency, can be washed out. Occasionally, one intrabursal corticosteroid injection may become necessary to alleviate symptoms. It could, however, delay the process of natural phagocytic resorption.

Fracture of the coracoid process

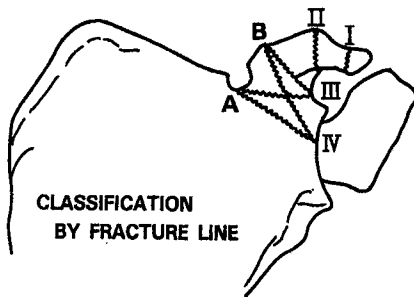
Kiyohisa Ogawa¹, Suguru Inokuchi¹, Kenro Matsui²

Department of Orthopedics¹, Keio University, Tokyo, and Department of Orthopedics², Saitama Medical School, Saitama, Japan

Thirty-seven cases with fractures of the coracoid process were assessed regarding general characteristics, causes of injury, regions of contused wound, fracture types, and complications. From the results of the assessment, the fractures were roughly divided into five: type I, apical; type II, middle; type III, basal; type IV, intraarticular (including upper 1/3-1/4 of the glenoid cavity); and type V, others. Subtypes A and B were present in types III and IV (see figure). From the specifics of the contusions and complicated osseous-articular injuries around the shoulder, the mechanisms of injury in each type were presumed to be types I and II, tractive force of attached muscular tendons; types II and IV, shearing force acting between the scapula shifting inward owing to a blow from the lateral aspect of the shoulder and the clavicle countering this movement; and type V, unspecified. There were some fractures inflicted by a direct blow in the types III and IV cases. The main cause of fractures of the superior scapular margin was considered to be the tractive force of the superior transverse

scapular ligament, because almost all cases of subtype A were complicated with them.

For clinical use, they should be classified into two groups: group I without loss of connection between scapula and clavicle (mainly types I and II), and group II, with loss of the same (majority of types III and IV):



CLASSIFICATION
BY FRACTURE LINE

Arthroscopic subacromial decompression

Anders Hareide, Arne Nilsen, Tom Ludviksen and Ove J. Fasting

Departments of Orthopedics, Aker Hospital, Oslo, Norway

In selected cases of impingement syndrome, the efficacy of open anterior acromioplasty has been well documented. The purpose of the present paper was to document the results of decompressing the subacromial space utilizing arthroscopic techniques.

Method: After arthroscopic evaluation of the humeroscapular joint, the scope was introduced in the subacromial bursa. With a motorized shaver, a partial bursectomy was performed; and with a motorized burr, > 6 mm of the under surface of the anterior lateral acromion was resected; then, with a punch forceps, the coracoacromial ligament was released from the acromion and about 5 mm removed.

Patients: Thirty-seven consecutive cases with Stages II and III minor rotator cuff tear have been operated on. All had failed to respond to conservative treatments and had their symptoms for more than 2 years. The average age was 50 years; 23 were females. Thirty-five shoulders (two lost) were followed for 12 (2–17) months. The results were graded on the UCLA Shoulder Rating Scale before and at follow-up.

Results: The overall results were 30 satisfactory cases, 3 fair, and 2 poor. The average UCLA pain score improved from 1.7 preoperatively to 8.1 at follow-up. The functional score increased from 4.3 preoperatively to 9.2. Strength and forward flexion increased from 3.7 to 4.8 and 4 to 4.8, respectively. There was only one minor complication: viz., transient neuropraxia.

Conclusion: When practiced by experienced arthroscopists, the method is safe with few complications and minimal morbidity. The results are as good as the results obtained by the open method.

Boytchev's procedure in anterior shoulder instability

Kari Saikku, Esa K. Partio, Hannu Pätäilä and Erkki Laasonen

Department of Orthopedics and Traumatology, University Central Hospital, Helsinki, Finland

In 1951, Boytchev described his method of operative treatment in anterior shoulder instability: the conjoint tendons attached to the tip of the coracoid process are re-routed posterior to the tendon of the subscapularis muscle and reinserted at their original position.

Patients and methods: Totally, 106 patients with anterior instability of the shoulder were treated by a slightly modified Boytchev procedure. Eighty-two patients were reexamined 2–7 years after the operation and radiographic findings were analyzed. There were 55 males and 27 females. The mean age was 32 years.

Results: The clinical result was excellent in 59 cases and good in 10 cases according to the scale of Rowe. Twenty-one of these patients participated in sports, where overhead activity of the dominant, operated on hand is used. There were poor result sin 10 cases—all of them re-dislocations. Five of them were traumatic.

Conclusion: The Boytchev procedure is a relatively simple and safe method for the anterior shoulder dislocation. No major complications occurred. The operation is not recommended for patients with multidirectional instability of the shoulder or a large Hill-Sachs defect or epilepsy.

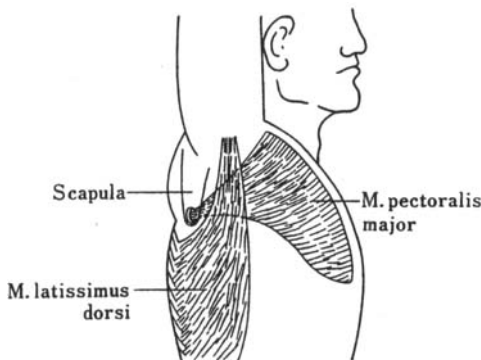
Shoulder joint instability and pectoralis major transfer

Ryohei Suzuki and Nobuyuki Ito

Department of Orthopedics, Nagasaki University School of Medicine, Nagasaki, Japan

Among the patients complaining of shoulder and/or arm pain, especially at the time of carrying heavy objects, or of pain during motion, unstable shoulder joints are sometimes found. The patients occasionally have episodes of involuntary recurrent or voluntary anterior dislocation, and some of them have multidirectional instability. The instability of the shoulder joint is easily detected by inferior subluxation, caused by downward traction of the arm, and disappears or is alleviated by holding the scapula in the abducted position. Voluntary anterior dislocation also becomes impossible by this procedure.

Therefore, pectoralis major muscle transfer to the inferior angle of the scapula (see Figure) is one of the suitable



methods for stabilization of the shoulder joint, because the scapula is maintained in the abducted position. Further, the dislocating force of this muscle is removed. Since 1975, we have performed this operation for 43 unstable shoulder joints. Anterior capsulorrhaphy was combined for the cases with strong anterior instability, and posterior glenoplasty and lengthening of the latissimus dorsi muscle were added to the pectoralis muscle transfer for multidirectional instability.

In conclusion, the results obtained were satisfactory.

A new surgical method for positional instability of the shoulder

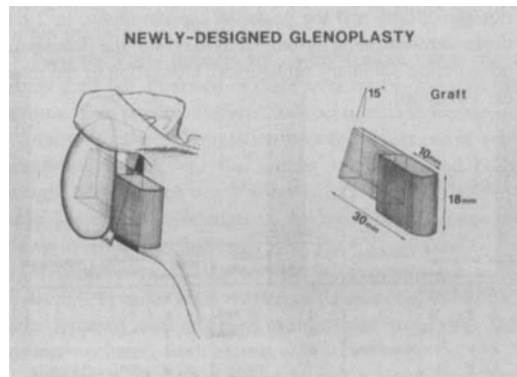
Shigehito Kuroda, Tetsuyuki Sumiyoshi, Masanori Sai, Johji Moriishi and Zhong-Xun Li

Matsudo Orthopedic Hospital, Matsudo, Chiba, 271 Japan

Positional instability in which atraumatic and involuntary subluxation or dislocation occurs in a certain position of the shoulder is connected with remarkable joint laxity and surgical treatment is difficult.

Patients: From April 1985 to March 1989, 14 shoulders in 12 cases were diagnosed as positional instability. Seven of these were treated operatively.

Method: We have performed Nobuhara's glenoid osteotomy in the first 3 cases; but recurrence was recognized in 2 cases. Since November 1987, we have performed a newly designed glenoplasty. Osteotomy of the scapular neck was performed from the anterior or posterior side depending on the direction of dislocation and a newly designed bone graft, with which raising up and anterior or posterior elongation of the glenoid is performed at the same time, is driven into the scapular neck (see figure). This two-directional glenoplasty was performed in 3 cases of posterior subluxation occurring in a 100° anterior ele-



vated position and in 1 case of anterior dislocation occurring in the pivotal position.

Result: The average follow-up period of the two-directional glenoplasty was 10 months, and the results were excellent. In all the cases the downward and posterior or anterior instabilities disappeared after surgery, and there were no recurrences.

Conclusion: For positional instability of the shoulder, one-directional reinforcement is not enough. Two-directional reinforcement is necessary.

Treatment of recurrent posterior subluxation (instability) of the shoulder joint

Nobuyuki Ito, Ryohei Suzuki, Masao Eto,
Tadashi Tomonaga and Toshiaki Haza

Department of Orthopedics, University Hospital, Nagasaki City, Japan

Atraumatic recurrent posterior subluxation is an uncommon condition. This paper presents the physical findings and operative results.

Patients: Fourteen patients with this disease were operated on. Habitual and or voluntary posterior subluxations were included.

Physical findings: The diagnosis was made by clinical observations, and radiographic and electromyographic examinations. When the humeral head was stressed posteriorly, a click with pain was produced. The subluxated head was confirmed by the radiograph.

In the habitual type, the head was subluxated posteriorly on shoulder flexion.

In the voluntary type, all the patients could subluxate the head posteriorly at the shoulder flexion, and 2 of them could subluxate in the resting position. Electromyograms showed marked activities in the latissimus dorsi and deltoid during subluxation.

Operative methods: The procedures included the posterior glenoplasty and the posterior capsulorrhaphy. In 2 patients demonstrating strong activities in the latissimus dorsi during voluntary subluxation, elongation of the muscle was added.

The vascular pattern of the rotator cuff tendon

J. F. Lohr, H. K. Uthoff, N. Gschwend and U. Harms

University of Ottawa, Ottawa, Canada, and University of Zürich, Zürich, Switzerland

The vascular supply to the rotator cuff tendon has been identified as a crucial factor in the development of degenerative rotator cuff tears.

In this study, 36 cadaver specimens were injected with a silicone compound and the vascular bed at the supraspinatus insertion and the adjacent cuff intervals was examined. The distribution of the different vessels was measured in histologic sections.

The deeper, more collagenous layer of the supraspinatus was found to contain much fewer blood vessels than the more superficial layer.

These findings were correlated with 29 clinical specimens undergoing repair for a full-thickness cuff tear. From the excised material, histologic sections were obtained. It is evident that the vascular pattern seen in the cadaver specimens is in keeping with the clinical material, with vessels present in the cuff edge. Most of these vessels originate in the subbursal layer. Thus, 1) there is no area of avascularity at the cuff edge, and 2) the subbursal layer of the cuff tendon supplies most of the vessels for a successful cuff repair, and it should be preserved.

Table. Patients' data

| Case | Sex | Age at Underlying Surg. (yrs.) Disease | Bef. Surg. | | Aft. Surg. | | |
|------|-----|--|---------------------|----------------------|-------------------------------|----------------------|------------|
| | | | Type of Subluxation | Inferior Instability | Follow-up Period (yrs., mos.) | Inferior Instability | Recurrence |
| 1. | F | 14 | | (-) | 9. 8 | (-) | |
| 2. | F | 16 | | H (+) 30% | 8. 2 | (-) | |
| 3. | M | 17 | | H (+) 35% | 7. 2 | (-) | |
| 4. | F | 26 | Cerebral Palsy | H (-) | 6. 6 | (-) | (+) H |
| 5. | F | 14 | | (-) | 3. 0 | (-) | |
| 6. | F | 6 | Birth Palsy | H (+) 20% | 2. 7 | (+) 20% | (+) H |
| 7. | M | 21 | | V & H (-) | 4. 6 | (-) | |
| 8.* | M | 12 | | V & H (+) 25% | 4. 3 | (-) | |
| 9.* | F | 16 | Joint Laxity | V (+) 70% | 3. 3 | (+) 50% | |
| 10. | M | 17 | | V (-) | 2. 6 | (-) | |
| 11. | F | 14 | | V & H (+) 30% | 1. 10 | (-) | |
| 12. | M | 27 | | V & H (-) | 1. 2 | (-) | |
| 13. | M | 16 | | (-) | 10 | (-) | |
| 14. | M | 16 | | V (+) 30% | 10 | (-) | |

H : Habitual Subluxation
V : Voluntary Subluxation
* : Elongation of lat. Dorsi

Results and conclusion (see table): Eleven patients reported no pain and no further episode of the instability. In 3 patients with an underlying disease, the instability recurred.

These operative procedures are recommended for the treatment of atraumatic posterior subluxation.