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ADDENDUM TO MD THESIS:
PAINFUL STIFF SHOULDER
(FROZEN SHOULDER)
AND SOFT TISSUE
RHEUMATISM IN THE
UPPER LIMB.

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INTRODUCTION .

Clarification of some aspects of the MD thesis - "PAINFUL STIFF SHOULDER (FROZEN SHOULDER) AND SOFT TISSUE RHEUMATISM IN THE UPPER LIMB" is necessary and this will be carried out in the same order as the presentation of data in the main body of the work. References in the thesis will be used and additional ones will be listed in alphabetical order at the end of the addendum.

Further consideration will be given to the following chapters :-

Chapter 2 - Pathogenesis of rotator cuff lesions.

Chapter 11 - Immunology and HL-A typing in frozen shoulder.

Chapter 12 - Radiological aspects of the frozen shoulder.

Chapter 14 - Therapy of the frozen shoulder.

Chapter 20 - Therapy of lateral epicondylitis.

DISCUSSION OF ADDITIONAL DATA.

PATHOGENESIS OF ROTATOR CUFF LESIONS.

Chapter two of the thesis considered the theoretical basis and evidence which supported vascular insufficiency in the 'critical zone' of the rotator cuff as the likely explanation for tendon degeneration at this site. Meyer(180,181) regarded the lesions as simply due to attrition of the rotator cuff between the humeral head and the acromion. This latter view has recently found increasing acceptance, especially amongst orthopaedic surgeons, following its revival by Neer(304). He used postmortem shoulder specimens to demonstrate the variations in the shape and slope of the acromion and the presence of osteophytes on the undersurface of the anterior acromion and at the acromial attachment of the coracoacromial ligament. He regarded these anatomical variations and degenerative changes as the important factors in the attrition which affected the 'critical zone' of the supraspinatus tendon and the adjacent biceps and other rotator cuff tendons. Observations during surgical exploration of 50 patients with chronic shoulder pain confirmed the view that impingement of the cuff on the undersurface of the anterior acromion was important in the genesis or perpetuation of lesions of the rotator cuff, especially in view of the satisfactory results which followed anterior acromioplasty. Neer(305) later restated the same view, claiming that over 95% of 400 rotator cuff tears seen at surgery were due to impingement wear at this site, rather than circulatory impairment or trauma. Cofield(298), Samilson and Binder(308) and others, shared this belief, but Petersson and Gentz(306) observed that attrition could also result from distally pointing acromio-clavicular osteophytes. Furthermore, Gerber et al(301) reported variations in the size and shape of the coracoid process as a further cause of impingement in some patients. That impingement can occur against several structures may account for the poor results following anterior acromioplasty in some patients(310). Moreover, it is also feasible that the anatomical variations and osteophytes result in tendon damage by causing critical tendon ischaemia and not simply attrition. The pathogenesis of rotator cuff disease is still uncertain and may be due to a combination of factors which include tendon hypovascularity, impingement, ageing, trauma and repetitive use.

IMMUNOLOGY AND THE FROZEN SHOULDER.

An important aspect of the study of the frozen shoulder was to establish or disprove an auto-immune pathogenesis for the frozen shoulder as first proposed by Macnab(170). Unfortunately it was not possible to achieve this.

The immunological data presented in chapter 11 of the thesis directly followed the report from Cambridge which suggested that both T and B lymphocyte abnormalities occurred in frozen shoulder patients(31). The choice of tests for further study was therefore made with care and in conjunction with the clinical immunologists. The erythrocyte sedimentation rate(ESR), C-reactive protein(CRP), immune complex(IC) and complement levels are widely accepted basic non-specific investigations of immunological function and were therefore included in the study. As a lymphocyte-related abnormality was suspected(31), the lymphocyte numbers and sub-sets were clearly relevant. Furthermore, lymphocyte transformation studies were indicated to assess their function. The choice of mitogens for the transformation studies and the reasons for this choice, which were valid at the time of planning the study, are given in the main text (69,131). Rheumatoid and antinuclear factor assessment was important to exclude other unsuspected immune-related diseases which could have influenced the results. Finally, the antithyroid antibodies were of interest in view of the reported association between frozen shoulder and thyroid disease.

Great care was also taken in the analysis of the data and the appropriate statistical method for the analysis of each test was made by the medical statistician of the Department of Community Medicine of Cambridge University. The validity of the methodology used was scrutinised by independent assessors before acceptance for publication by the editorial board of the Journal of Rheumatology(296).

The present study showed a rise in the ESR, CRP and IC levels and a reduction in lymphocyte reactivity to mitogens which predominantly stimulate T cells in some frozen shoulder patients at presentation, when compared to normal controls. These abnormalities showed improvement with time. While these changes are in keeping with a mild cell mediated abnormality as proposed by Macnab (170), they could also occur as epiphenomena secondary to the inflammatory lesion in the shoulder. It was therefore considered important to document the findings, but without making excessive claims as to their pathogenetic significance in the frozen shoulder.

The investigation into the pathogenesis of the frozen shoulder has been hampered by a lack of tissue for study in the early stage. Another approach, as provided by immunology, is therefore especially important. The rapid advance in the technology and understanding of immunological mechanisms offer new possibilities for research in this field.

In summary therefore, it has not been possible to prove or discount an immunological basis for the frozen shoulder and further study is necessary to evaluate the significance of the abnormalities presented in the thesis.

HL -A TISSUE TYPING AND FROZEN SHOULDER

The HLA B27 antigen was first shown to be of greatly increased frequency in patients with sero-negative spondarthropathies (295, 309) and this suggested a genetic predisposition. Bulgen et al (30) also reported some increase in the same antigen in frozen shoulder patients and questioned a genetic susceptibility in this disease. Other HLA-related antigens have also been associated with a variety of disease states (294), but never with the same frequency as B27 in the spondarthropathies. As frozen shoulder and other soft tissue lesions seem to affect some

individuals in increased incidence, this study attempted to verify the B27 association with frozen shoulder suggested by Bulgen et al (30) and also extend the assessment to include other HLA -A and -B loci antigens.

No increase in B27 or indeed any other antigen was found in the frozen shoulder patients when compared to the normal controls or British blood donors(197). These results are in keeping with other reports(139,206, 234,243) which also failed to identify any genetic predisposing factors in frozen shoulder patients.

RADIOLOGICAL ASPECTS OF THE FROZEN SHOULDER.

The primary reason for performing plain x-rays of the shoulder in the frozen shoulder patients, as discussed in chapter 12 of the thesis, was to exclude other lesions such as osteoarthritis which can affect the glenohumeral joint and present as a painful stiff shoulder. No radiology was performed in the 'Control' group as this was not considered to be necessary or ethically justified. The data presented was therefore uncontrolled and warranted only limited analysis.

The radiological features found in association with rotator cuff lesions have been extensively documented in the existing literature (52,95,208,292,300,302,303,307,311) and there is broad agreement on the x-ray changes and their significance. The aim of this study was therefore to ascertain if the presence of radiological abnormalities influenced the outcome.

For the study, the classical description by Golding(95) was adopted. He defined "minor degenerative changes" as roughening, sclerosis and cystic change affecting the tuberosities and anatomical neck of the humerus. Atrophy of the tuberosities sometimes followed in long-standing cases. The distance between the humeral head and the acromion was found to vary from 7 - 13 mm, with a reduction in distance being found in association with complete tears of the rotator cuff. A distance of 6 mm or less was considered abnormal in this study and like previous reports(52,300,302,303,307,311) confirmed rotator cuff rupture in those cases who also had arthrography.

THERAPY AND THE FROZEN SHOULDER.

The treatment of the frozen shoulder, as discussed in chapter 14 of the thesis, is empirical and many approaches have been advocated without adequate study. The therapy chosen for assessment in the Major Study was that in most wide usage in Cambridge at the time of starting the study. The therapeutic modalities were also selected to maximise the possible differences in outcome between those measures expected to be useful (mobilisation physiotherapy and steroid injections) and those of doubtful value (ice-therapy and home pendular exercise). A comparison of several therapeutic measures of similar efficacy would have complicated the analysis, as in these circumstances it can be difficult to decide if the results are equally good or bad.

Ice-therapy was widely used in the physiotherapy departments in Cambridge and elsewhere, despite a lack of scientific basis or published reports of its efficacy. No value was shown in this study and its use has declined. Maitland's mobilisation(171) and other exercise regimes are still widely used in treating the frozen shoulder, but was associated with the least favourable outcome in the Major Study, especially on prolonged follow-up. The number of patients studied was small, but caution is necessary in advocating even more aggressive regimes in management without adequate long-term study. This concern is heightened by the observations that the dominantly affected arm and the lesion in manual labourers also showed a worse outcome.

Local steroid injection therapy was associated with the most rapid relief of pain, but no advantage in the recovery in the range of movement. The local injections were painful and often transiently exacerbated the symptoms. Furthermore, difficulty was experienced in the placement of the steroid into the glenohumeral joint in those patients with severe capsular restriction. Oral steroids, which had been reported to be useful in the treatment of the frozen shoulder (19,78,139) were therefore considered worthy of further study,

although only in low dosage for a short period. The oral steroids were well tolerated with far less morbidity than manipulation under anaesthesia(176,231,241) and other aggressive regimes. Oral steroids may have a place in the treatment of the early stage of the frozen shoulder, when night pain is severe and not controlled by other measures. The role of pendular exercise needs further evaluation.

The suggestion that the study of a combination of measures would have been more fruitful is inherently unsound, as it would have significantly increased the difficulties in the analysis of the therapeutic and other data obtained from the studies. The individual modalities need to be evaluated in isolation before a rational approach to combination therapy is possible.

Caution was shown in making direct comparisons between the treatment groups in the two studies, as the entrance criteria differed slightly and cross-study comparisons have been shown to magnify the errors inherent in each study. Furthermore, care was also taken to avoid a detailed analysis of those parameters in which patients from the different treatment groups were unevenly spread, as it was recognised that this could have influenced the results.

Finally, non-steroidal anti-inflammatory agents (NSAID'S) were stopped at entry to both studies - only 2 patients insisting on their continuation. NSAID'S could not therefore have influenced the outcome. Of interest, the retrospective review of the 51 patients who had been given NSAID'S before referral, showed that only 10% considered them to be of any value. Further evaluation of this therapy in placebo-controlled studies is clearly indicated.

THERAPY OF LATERAL EPICONDYLITIS.

Immobilisation of the elbow with plaster of paris(178,213), splints (50,109,143,178,213) and orthoses(37,205) have for long been advocated in the management of chronic tennis elbow lesions, but without study. Froimson(299) described a forearm band and Chen(297) a similar support to permit continuation of sport or other activities by patients with chronic tennis elbow lesions.

A forearm band as described by Froimson(299) was evaluated in 6 patients in whom toolwork, housework or sport proved difficult due to chronic tennis elbow lesions. Three of the patients reported some benefit in terms of continuation of specific activities, but none showed healing on objective examination when the orthosis was not worn. Plaster of Paris immobilisation of the elbow for 4 - 6 weeks in a further 4 cases also failed to heal the lesions. As the data was uncontrolled and involved so few patients, it was not included in the thesis. This therapeutic approach needs further assessment.

DISCUSSION OF ADDITIONAL DATA.

The pathogenesis of rotator cuff lesions remains uncertain, but the thesis did not study this particular aspect. Most the available evidence supports vascular insufficiency in the 'critical zone' of the rotator cuff, but impingement of the cuff between the humeral head and a variety of structures, has recently received increasing attention.

The relationship between tendon degeneration and the development of a frozen shoulder was considered. A mild cell-mediated immunological abnormality was found at presentation with a frozen shoulder, but the changes were not severe or consistent enough to be certain of their pathogenetic significance. The changes could merely have reflected the inflammatory lesion in the shoulder. The HLA tissue typing studies also failed to show any genetic predisposing factor to account for the observed increased frequency of soft tissue lesions in some individuals.

The plain x-ray changes in the frozen shoulder patients agreed with the published reports and the classical description by Golding(95) was adopted as a basis for the analysis of data in the study.

The therapeutic studies in the frozen shoulder confirmed that ice-therapy was of no value and that steroids by injection or orally improved the pain, but did not influence the recovery in the range of movement. The poor outcome with physiotherapy cautions against more aggressive regimes without adequate study. The role of home-pendular exercise and NSAID'S needs further evaluation. Emphasis has been given to the importance of assessing single rather than complex regimes and including 'minimal' or placebo treatments in the studies. A detailed approach to the prospective assessment of shoulder and other soft tissue lesions has been outlined.

A great deal of work is still required to improve the understanding of soft tissue rheumatism and this thesis has tried to form a basis for the further study of these conditions.

ADDITIONAL REFERENCES INCLUDED IN THE ADDENDUM.

294. Braun W.E. HLA and disease. A comprehensive review.
CRC Press Inc., Florida, 1979.
295. Brewerton D.A., Caffrey M., Hart F.D., James D.C.O., Nicholls A.,
Sturrock R.D. Ankylosing spondylitis and HL-A 27.
Lancet. 1973; i: 904 - 7.
296. Bulgen D.Y., Binder A.I., Hazleman B.L., Park J.R. Immunological
studies in frozen shoulder.
J. Rheumatol. 1982; 9: 893 - 8.
297. Chen S.C. A tennis elbow support (letter).
Br. Med. J. 1977; ii: 894.
298. Cofield R.H. Rotator cuff disease of the shoulder.
J. Bone Jt. Surg. 1985; 67A: 974 - 9.
299. Froimson A.I. Treatment of tennis elbow with a forearm support band.
J. Bone Jt. Surg. 1971; 53A: 183 - 4.
300. Godsil R.D., Linscheid R.L. Intratendinous defects of the rotator
cuff.
Clin. Orthop. 1970; 69: 181 - 8.
301. Gerber C., Terrier F., Ganz R. The role of the coracoid process
in the chronic impingement syndrome.
J. Bone Jt. Surg. 1985; 67B: 703 - 8.
302. Harrison S.H. The painful shoulder. Significance of radiological
changes in the upper end of the humerus.
J. Bone Jt. Surg. 1949; 31B: 418 - 22.
303. Kotzen L.M. Roentgen diagnosis of rotator cuff tears. Report of
48 surgically proven cases.
Am. J. Roentgen Radium Ther. Nucl. Med. 1971; 112: 507 - 11.
304. Neer C.S. 2nd. Anterior acromioplasty for the chronic impingement
syndrome of the shoulder : preliminary report.
J. Bone Jt. Surg. 1972; 54A: 41 - 50.

305. Neer C.S. 2nd. Impingement lesions.
Clin. Orthop. 1983; 173: 70 - 7.
306. Petersson C.J., Gentz C.F. Ruptures of the supraspinatus tendon.
The significance of distally pointing acromioclavicular
osteophytes.
Clin. Orthop. 1983; 174: 143 - 8.
307. Petersson C.J., Redlund-Johnell I. The subacromial space in normal
shoulder radiographs.
Acta Orthop. Scand. 1984; 55: 57 -8.
308. Samilson R.L., Binder W.F. Symptomatic full thickness tears of
the rotator cuff in 292 shoulders.
Orthop. Clin. North Am. 1975; 6: 449 - 66.
309. Schlosstein L., Terasaki P.I., Bluestone R., Pearson C.M. High
association of an HL-A antigen, W27, with ankylosing
spondylitis.
New Engl. J. Med. 1973; 288: 704 - 6.
310. Thorling J., Bjerneld H., Hallin G., Hovelius L., Hagg O.
Acromioplasty for impingement syndrome.
Acta Orthop. Scand. 1985; 56: 147 - 8.
311. Weiner D.S., Macnab I. Superior migration of the humeral head.
A radiological aid in the diagnosis of tears of the rotator cuff.
J. Bone Jt. Surg. 1970; 52B: 524 - 7.
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