ARTHRODESIS OF THE SHOULDER IN RHEUMATOID ARTHRITIS

A REVIEW OF FORTY-ONE CASES

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Forty-one arthrodeses of the shoulder in thirty-nine patients suffering from rheumatoid arthritis (thirty women, nine men) have been reviewed. Using internal fixation and external splints the position of the shoulder was maintained in 55 degrees of abduction, 25 degrees of horizontal flexion and enough internal rotation to allow the patient to reach the mouth. The mean period of immobilisation in a thoracobrachial splint was nine weeks, and 90 per cent of the shoulders had solid bony fusion at review. After arthrodesis the total range of scapulothoracic movement improved by about 60 per cent, giving results rated as excellent in fifteen cases (36 per cent), as good in thirteen (32 per cent) and as fair in thirteen (32 per cent). Arthrodesis can be recommended as an easy, cheap and reliable method of treating a shoulder which has been severely destroyed by rheumatoid arthritis.

The shoulder is involved in about 47 per cent of patients with rheumatoid arthritis (Laine, Vainio and Pekanmäki 1954). In the initial stage before radiographic changes are apparent, conservative therapy may alleviate the pain and functional recovery may occur. Synovectomy or bursectomy are occasionally indicated. Gariépy added a 7 to 8 millimetre resection of the glenoid to the synovectomy and reported satisfactory results in twelve cases (Gariépy 1977).

Table I. Age of the patients and the duration of the disease

| Age of patient at operation | 17—56 | 36 |
| Age of patient at onset of rheumatoid arthritis | 9—42 | 24 |
| Overall duration of rheumatoid arthritis | 3—24 | 12 |
| Age of patient at onset of symptoms in the shoulder | 9—46 | 28 |
| Duration of involvement of the shoulder | 1—25 | 8 |
| Years since operation | 0.5—20 | 6 |

In advanced cases of destruction of the joint some surgeons (Marmor 1967; Neer 1971; Reeves, Jobbins and Flowers 1972; Lettin and Scales 1973; Macnab 1977) prefer replacement arthroplasty, considering that a fusion is seldom indicated. They base their negative attitude upon two arguments: loss of function of other joints during immobilisation and impairment of the ability to take care of the personal hygiene (Marmor 1967; Neer 1971). Long-term results of replacement arthroplasty are not known. The early results of Kraulis and Hunter (1977) were not encouraging. Good results were achieved in only two of thirty patients provided with Neer's prosthesis after fracture-dislocation of the shoulder region. Most authors consider that an intact rotator cuff is necessary for a successful arthroplasty.

By contrast, Gschwend (1968) has suggested an arthrodesis in these cases, and considers the main indication to be an adduction contracture of the painful, severely destroyed shoulder joint. However, he points out that care should be taken in the assessment before operation to ascertain that the patient can maintain personal hygiene using the other hand.

To resolve the controversy, a follow-up study was carried out.

MATERIAL

Forty-one fusions of the shoulder were performed on thirty-nine patients at the Rheumatism Foundation Hospital, Heinola, during the years 1957 to 1977. The follow-up period, age of the patients and duration of the symptoms are shown in Table I.

Twenty-seven patients were examined personally, ten by surgeons at other clinics and for the remaining two patients sufficient facts were available in the case histories (one died six years after operation, the other was lost from follow-up). Eighteen of the unilateral operations were carried out on the right side and nineteen on the left. There were thirty women and nine men. Before the arthrodesis the patients had had sixty-four operations of the arms, including eighteen synovectomies and four arthroplasties of the ipsilateral elbow.

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The patients were examined clinically and radiologically. Before the operation all patients had had a painful adduction contracture of the shoulder. All the rheumatoid joints in our series belonged to the sixth group of Standard Serial Radiographs of Larsen (1974), which means a total destruction. Fifty-six per cent of the patients had been on corticosteroid treatment and 7 per cent had received immunosuppressive drugs. The elevated sedentation rate (mean 47 millimetres in the first hour) also indicated that the patients had a severe, active rheumatoid arthritis.

OPERATIVE TECHNIQUE AND FINDINGS
A slightly curved sagittal incision was used. Remnants of the rotator cuff were removed. The cuff was totally destroyed in thirty-one cases and severely distended in the others. The under surface of the acromion and the articulating surfaces of the humeral head and the glenoid cavity were decorticated. In sixteen cases there were still remnants of cartilage on the humerus. The majority of the patients had proliferating synovitis protruding through the capsule.

After total synovectomy the bone surfaces were placed in the correct glenohumeral relationship of 55 degrees of abduction, 25 degrees of horizontal flexion and enough internal rotation to allow the hand-to-mouth movement (Baar et al. 1942). The medial border of the scapula was held in the vertical position. The proper position was maintained with corticocancellous screws, one or two from the humeral head to the glenoid and one from the acromion into the humeral head. If fixation was not satisfactory, an additional screw was placed from the coracoid process into the humeral head (Fig. 1). In one case, the head was as thin as an egg-shell making any internal fixation impossible and only external fixation was used. Osteotomy of the acromion, to allow better apposition of the bone surfaces, was performed on three occasions. Large defects in the humeral head were filled with bone chips in a few cases. Suction drainage was always used. A custom-made light thoracorbrachial splint was applied immediately after operation and was worn for an average of nine weeks (Fig. 2). For a further three weeks an axillary pillow and a bandage was commonly used. Movements of the elbow and the hand were encouraged from the very beginning.

Custom-made thoracobrachial splint of plastic reinforced with light metal and weighing only 700 grams.

Patient with bilateral arthrodesis after healing of a fracture of the right humeral neck. Independent in life.
COMPLICATIONS
There were no infections in this series. None of the patients had a disturbingly winged scapula due to excessive abduction or flexion (Davis and Cottrell 1962; Rowe 1974). In four shoulders the acromial screw unwound and had to be removed because of subcutaneous irritation one to three months after operation. One patient with bilateral shoulder fusions fell on her right arm one and a half years after operation, sustaining a fracture of the neck of the humerus. Two weeks later the severe adduction position could still be corrected and a fairly good amount of abduction was obtained (Fig. 3).

RESULTS
Radiographic findings. In eleven shoulders there was non-union between the acromion and the humeral head. However, it did not impair function when the glenohumeral joint was fused. In four shoulders there was non-union of the glenohumeral joint: in two the assessment was too early (six months), and in the other two there was a sufficient fibrous union to abolish pain. Pain. Four patients complained of occasional pain at the time of follow-up. In two of these the pain was related to the involved acromioclavicular joint. The other two were the early cases mentioned above. Movement. Figure 4 clearly shows the increase in the

![Fig. 4](image)
Histogram showing the total range of movement before and after the operation.

![Fig. 5](image)
Example of a "good" result.
total range of scapulothoracic movement resulting from the operation: this consisted of the sum of active abduction and sagittal flexion. Before the operation it averaged 100 degrees (ranging from 20 to 195) and after the operation 160 (75 to 220).

The functional capacity of the patient was estimated by his ability to carry out three simple tasks: reach the mouth, bring the hand behind the neck and place the hand on the midline of the low back. All these tasks were possible in fifteen, two in thirteen and only one in thirteen instances; these corresponded to the groups rated excellent, good and fair according to the score of May (1962). However, all patients were able to use the affected arm for eating and for combing the hair, at least with a long-handled comb, and were also able to take care of their personal hygiene (Fig. 5).

At follow-up, thirty-seven patients (95 per cent) were satisfied with the result of the operation.

DISCUSSION

An external splint was required on average for only nine weeks. This is somewhat less than the time for fusion in osteoarthritic shoulders (Charnley and Houston 1964). Because the type of abduction splint used by us allows movement of all joints except the shoulder, the operation was not followed by the stiffening of the distal joints found by Marmor (1967) and Neer (1971). Our series clearly showed that movements of the scapula could compensate surprisingly well for the deficiency in scapulohumeral movement. The relief of pain was highly appreciated by the patients.

For both patients with bilateral arthrodeses, maintenance of personal hygiene was not a problem and they were independent in their daily living.

This investigation has shown that arthrodesis is a technically easy, cheap and reliable method for treatment of severely destroyed rheumatoid shoulders.

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REFERENCES


