CONSERVATIVE OPEN ACROMIOPLASTY

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Chronic rotator-cuff syndrome with impingement is satisfactorily treated by acromioplasty by both open and arthroscopic techniques, but the Neer operation with deltoid detachment requires a prolonged rehabilitation. Arthroscopic acromioplasty reduces recovery time but is a difficult procedure.

McShane, Leinberry and Fenlin (1987) described a conservative open anterior technique with good results and shortened rehabilitation.

A similar technique has been used in 25 patients with an average age of 46 years. After a mean follow-up of 24 months, 80% were very satisfied and none was dissatisfied. The average recovery times were 2.7 weeks for activities of daily living, 1.9 months for return to work and 3.7 months for all activities including overhead manual labour.

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Chronic subacromial bursitis, impingement syndrome and rotator-cuff tendinitis are synonymous terms describing a clinical condition affecting from 2% to 18% of the adult population (Herberts et al 1981). The usual complaint is of shoulder pain, particularly on elevation, and this results in loss of motion and function. Codman (1934) was the first to describe intrinsic disease of the rotator cuff and Neer (1972) published the landmark paper which identified the anterolateral inferior portion of the acromion and the coracohumeral ligament as the principal sites of rotator-cuff impingement. The Neer acromioplasty became the standard procedure for pain relief and functional improvement (Hawkins et al 1988), but the morbidity and the duration of rehabilitation were considerable, partly due to deltoid release and reinsertion (Bjorkenheim et al 1990; Stuart, Azevedo and Cofield 1990).

Arthroscopic acromioplasty has been reported to compare favourably with the Neer technique, giving consider-ably less postoperative morbidity (Norlin 1989; Van Holsbeeck et al 1992), but it is a technically difficult procedure (Gartman 1990). In 1987, McShane, Leinbern and Fenlin reported good results with a "conservative open anterior acromioplasty" which limited dissection of the deltoid (without takedown) and had a more rapid recovery time than the Neer acromioplasty.

A consecutive series is now reported using a surgical approach patterned after that described by McShane et al.

PATIENTS AND METHODS

Twenty-five consecutive patients were enrolled into this prospective cohort study, 13 women and 12 men. Their mean age was 46 years (30 to 64) and the mean follow-up was 24 months (12 to 41), none being lost to follow-up. All the patients had a history of shoulder pain exacerbated by elevation and the lateral and anterior impingement signs described by Neer (1972) and Hawkins and Kennedy (1980). Symptoms had persisted for at least six months despite intensive non-operative treatment consisting of activity restriction, non-steroidal anti-inflammatory medication and physiotherapy including ultrasound, phonophoresis and electrostimulation. Each patient completed a questionnaire based on the rating scale of the American Shoulder and Elbow Surgeons (ASES) (Barrett et al 1987) (Table I).

All patients had an acromial outlet radiograph of the shoulder, with either shoulder arthrography or MRI or both to identify complete rotator-cuff tears, subacromial or acromioclavicular joint impingement of the cuff, and glenoid labral pathology. Patients who required a rotator-cuff repair or any glenohumeral procedure were excluded from the study. All patients had a diagnostic/therapeutic subacromial injection of bupivacaine 0.5% and dexamethasone during the six months before operation.

The possible benefits and potential risks of the procedure were explained to each patient and a written operative consent was obtained. All 25 patients were recalled specifically for this study for examination and a recalculation of their ASES rating. These were performed by independent physiotherapists, who also assessed the range of shoulder motion, the times to recovery of shoulder function and the patients' satisfaction.

Operative technique. The patient is in a supine position under general anaesthesia. A towel pack is placed beneath the scapula on the affected side, the thorax is elevated 30°, and an accessory board placed to support the arm in

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adduction.

A 3 to 4 cm slightly oblique skin incision is made from the lateral point of the acromion towards the coracoid process (along Neer's incisional line). Full-thickness skin flaps are developed to expose the anterior deltoid fascia, and this is incised 1 cm lateral to the acromioclavicular joint. The deltoid is then split for 3 cm parallel to its fibres and the clavipectoral fascia is incised using a needle-tip cutting diathermy. The coracoacromial ligament is then excised and the acromial branch of the thoracoacromial artery is carefully coagulated.

With traction on the arm in adduction to prevent injury to the brachial plexus, the subacromial space is opened sufficiently to see, palpate and debride the acromion. Acromioplasty begins at the anterior edge and inferior surface of the bone, using curved and straight curettes, a rongeur and a rasp (Fig. 1). The acromioclavicular joint is palpated and its underside trimmed of any excrescences.

On completion of decompression, the surgeon uses his finger to assess the thoroughness of the procedure; it should fit within the subacromial space. Partial subdeltoid bursectomy is performed and the rotator cuff is inspected for tears. Bupivacaine 0.5% with epinephrine is placed in the wound to help haemostasis and provide postoperative analgesia. The deltoid and its fascia are reapproximated, and the subcutaneous tissues are closed, with a subcuticular suture for the skin. No drain is used. A sterile dressing is applied and the arm placed in a sling and swathe.

The first few patients in the series remained in hospital for two or three nights, but the reduced analgesic requirement of the limited approach allowed the remainder to be treated on an outpatient basis.

Patients were instructed to use a sling for two to three days, then remove it temporarily for hygiene and pendulum exercises. Formal physiotherapy began at the end of the first week with active and passive forward flexion and rotation in adduction. Abduction was initiated after flexion had been achieved, and from the second week patients used a home pulley unit on a daily basis.

**Statistical analysis.** Standard t-tests were used to compare...
Table II. Results in the whole series and in various subgroups by mean (sd) (see text)

<table>
<thead>
<tr>
<th></th>
<th>Time in weeks</th>
<th>ASES score</th>
<th>Range of motion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Daily activities</td>
<td>Return to work*</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>2.25 (1.03)</td>
<td>1.51 (1.44)</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>3.08 (1.38)</td>
<td>2.25 (1.20)</td>
</tr>
<tr>
<td>Workers’ compensation (Y)†</td>
<td>9</td>
<td>2.89 (1.27)</td>
<td>4.00</td>
</tr>
<tr>
<td>Workers’ compensation (N)‡</td>
<td>16</td>
<td>2.56 (1.30)</td>
<td>1.72 (1.26)</td>
</tr>
<tr>
<td>Cervical radiculitis</td>
<td>4</td>
<td>2.75 (0.96)</td>
<td>1.50</td>
</tr>
<tr>
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<td>2</td>
<td>2.67 (1.34)</td>
<td>1.88 (1.38)</td>
</tr>
<tr>
<td>Calcific tendinitis</td>
<td>3</td>
<td>4.67 (1.15)</td>
<td>3.00 (1.00)</td>
</tr>
<tr>
<td>Calcific tendinitis</td>
<td>22</td>
<td>2.41 (1.04)</td>
<td>1.61 (1.30)</td>
</tr>
<tr>
<td>All</td>
<td>25</td>
<td>2.68 (1.27)</td>
<td>1.86 (1.34)</td>
</tr>
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</table>

* in those employed before operation
† yes
‡ no

Table III. p values of standard t-tests

<table>
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<tr>
<th></th>
<th>Daily activities</th>
<th>Return to work</th>
<th>All activities</th>
<th>ASES score</th>
<th>Range of motion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preop</td>
<td>Postop</td>
<td>Flex</td>
<td>Abd</td>
<td></td>
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<tr>
<td>Gender</td>
<td>0.106</td>
<td>0.267</td>
<td>0.344</td>
<td>0.007</td>
<td>0.212</td>
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<tr>
<td>Workers’ compensation</td>
<td>0.550</td>
<td>0.101</td>
<td>0.996</td>
<td>0.632</td>
<td>0.089</td>
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<tr>
<td>Cervical radiculitis</td>
<td>0.908</td>
<td>0.795</td>
<td>0.670</td>
<td>0.671</td>
<td>0.079</td>
</tr>
<tr>
<td>Calcific tendinitis</td>
<td>0.002</td>
<td>0.105</td>
<td>0.173</td>
<td>0.516</td>
<td>0.910</td>
</tr>
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</table>

RESULTS

Details of the results are given in Tables II and III. All the patients were improved by the acromioplasty; the average ASES score improved from 22 to 61. Twenty of the 25 patients (80%) were very satisfied, five (20%) were fairly satisfied and none was dissatisfied. Lack of complete satisfaction was due to residual pain, the chief preoperative complaint, rather than to loss of shoulder motion or function.

The time required to return to activities of daily living averaged 2.7 weeks, to return to work 1.9 months, and to return to all activities 3.7 months. Patients with calcific tendinitis required significantly more time to recover activities of daily living than patients without this (4.7 weeks v 2.4 weeks; p < 0.01). There was a trend for patients with cervical radiculitis or on workers’ compensation to have lower postoperative ASES scores, but these comparisons were not statistically significant. All the patients employed before surgery returned to work, including two who performed overhead manual labour. Previously unemployed patients remained out of work because of factors unrelated to their operated shoulder, including unresolved workers’ compensation claims. Even those with coexisting neck and shoulder disease experienced significant improvement from the acromioplasty and did not cite continuing shoulder pain as the explanation for their unemployment. The range of postoperative motion averaged 177° flexion and 174° abduction. There were no infections or serious complications.

DISCUSSION

Chronic rotator-cuff tendinitis is a common clinical problem for which surgery is recommended in refractory cases. Neer (1972) defined the impingement syndrome and recommended an anterior exposure more limited than his predecessors, Codman (1934) and McLaughlin (1944). The outcome of the Neer surgical procedure sets the gold standard for acromioplasty but the approach includes detachment of part of the deltoid origin. This means that active motion of the affected shoulder is not initiated for six weeks and the total rehabilitation time is protracted (Hughes and Neer 1975; Daluga and Dobizi 1989).

The recent trend has been to limit deltoid dissection and reduce perioperative morbidity (Ellman 1987; McShane et al 1987). Arthroscopic techniques have given good out-
comes and total recovery times of two to four months, but, like other endoscopic techniques, shoulder arthroscopy is
difficult (Seitz, Froimson and Shapiro 1989; Altchek et al
1990). Many orthopaedic surgeons therefore continue to
prefer open acromioplasty with the modification of Neer’s
original procedure to split the deltoid rather than release it.
This modification is popular but there have been few
published reports of its outcome (McShane et al 1987).

My results with a deltoid-splitting approach indicate that
the subjective and objective outcome of conservative open
acromioplasty compares favourably with that of the classic
The recovery time and postoperative morbidity are also
significantly reduced. The outcome, the outpatient setting
and the speed of recovery are comparable with those for
arthroscopic decompression (Norlin 1989; Altchek et al
1990). Although it is not included in current shoulder rating
scales, time to recovery is important in terms of patient
satisfaction, time off work and cost.

Five patients (20%) were improved but less than ‘very
satisfied’ with their results. All five were investigated by
postoperative MRI and diagnostic arthroscopy. None
showed evidence of residual subacromial impingement or
glenohumeral pathology, but all had unhealed partial-thick-
ness tears of the rotator cuff. Advocates of arthroscopic
surgery suggest that the combination of diagnostic arthro-
scopy of the glenohumeral joint with arthroscopic acro-
mioplasty will improve the diagnostic yield and result in fewer
surgical failures. Despite this a recent comparison by Haw-
kins et al (1994) failed to demonstrate the superiority of the
arthroscopic approach.

In his extensive review of the literature, Iannotti (1991)
identified a subset of patients in each major published
series of acromioplasty, both open and arthroscopic, whose
results were less than satisfactory. These ‘failures’ have
been attributed to imprecise diagnosis or incomplete
decompression, but the true aetiology remains unknown
(Hawkins et al 1989; Ogilvie-Harris, Wiley and Sattarian
1990). It is of interest that the ‘failure’ rate of 5% to 50%
for open and arthroscopic techniques was much the same.

Conclusions. The results of conservative open acromio-
plasty are satisfactory in relation to the classic Neer opera-
tion and to arthroscopic techniques. It is an easier
operation, provides an equivalent exposure of the sub-
cromial space and does not need expensive equipment. It
also offers reduced pain and faster recovery. Conservative
open anterior acromioplasty is a valid and valuable surgical
option for the treatment of chronic rotator-cuff impinge-
ment syndrome.

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