CORACOID TRANSPOSITION FOR RECURRENT ANTERIOR INSTABILITY OF THE SHOULDER

A 20-YEAR FOLLOW-UP STUDY

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We report the 20-year results of Bonnin's modification of the Bristow-Latarjet procedure in 14 patients operated on by one surgeon. All but one patient had had traumatic dislocations.

At review, the Rowe scores were excellent in five, good in eight and fair in one. The functional outcome was satisfactory, with a mean Constant-Murley score of 80 points (68 to 95), but 12 patients had restriction of external rotation (86%). There were radiological degenerative changes in ten shoulders (71%): six in Samilson grade I, one in grade II, and three in grade III. Isometric power was considerably reduced in patients with grade-III degenerative change.

This operation provides good long-term shoulder stability, but the high incidence of radiological degenerative change is a cause for concern.

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Transfer of the tip of the coracoid process to the anterior margin of the glenoid was first described by Latarjet (1954) for treatment of recurrent dislocation of the shoulder. The coracoid was introduced through a horizontal split in the subscapularis, and screwed to the anterior glenoid, being orientated so that the tip was in line with the fibres of the conjoined tendons of coracobrachialis and biceps. Helfet (1958) described a similar procedure, but used sutures to hold the coracoid tip to the subscapularis. He named this procedure after his mentor, Rowley Bristow.

May (1970) described a modification whereby the coracoid tip was secured by its cut cancellous surface to the anterior glenoid using a screw also placed through a split in the subscapularis muscle. He emphasised the importance of the tether created by the lower half of the subscapularis which acted to reinforce the deficient inferior glenohumeral ligament.

Bonnin (1973) described a further modification because he believed that the tethering of the lower half of the subscapularis caused excessive restriction of external rotation. He therefore divided the subscapularis muscle vertically before transfer, and repaired it without shortening. This also allowed a thorough inspection of the gleno-humeral joint and more accurate placement of the screw. The conjoined tendon of biceps and coracobrachialis was considered to act as a dynamic sling, preventing forward and downward movement of the humeral head when the arm was abducted. He reported excellent short- and medium-term results in 25 patients undergoing 27 procedures.

There are several other reports of the short- and medium-term results of modified Bristow-Latarjet procedures (Lombardo et al 1976; Hill et al 1981; Carol et al 1985; Ferlic and DiGiovine 1988). We have reviewed the long-term clinical and radiological results of Bonnin's modification.

PATIENTS AND METHODS

We studied part of Bonnin's personal series of 25 cases, using operating-theatre records. We excluded eight patients with less than 20 years' follow-up. Of the 17 patients remaining, we were unable to trace three, leaving 14 for review after a mean follow-up of 20.5 years (20 to 22.5).

The mean age of the patients at operation was 25 years (18 to 36); there were eight men and six women. Thirteen patients had recurrent traumatic dislocations, only one had recurrent atraumatic displacement. Nine were right-sided and all were unilateral. Of the nine patients with right shoulder problems, eight were right-handed. Of the five patients with left shoulder problems, two were left-handed.

All 14 patients had an interview and a clinical examination. Power was assessed by an Isobex device (Cursar AG, Bern, Switzerland), measuring mean muscle force over three seconds by a standard method, in lateral elevation, internal rotation, and external rotation, and comparing the operated with the non-operated side. Function was assessed using the Constant-Murley score (Constant and Murley...
1987) and the Rowe score (Rowe, Patel and Southmayd 1978). The latter gives an indication of the overall success of the stabilising procedure, since half of the total points is given for stability. The Constant-Murley score assesses shoulder function more generally, including pain, activity level, range of movement and power.

Anteroposterior (AP) and axial radiographs of the operated shoulder were graded for arthropathy using the system of Samilson and Prieto (1983). Mild arthropathy was recorded if the AP radiograph showed an inferior glenoid or humeral osteophytes less than 3 mm in height, moderate arthropathy if osteophytes were between 3 mm and 7 mm in height or if there was slight irregularity of the glenohumeral joint, and severe arthropathy was recorded if there was narrowing and sclerosis of the glenohumeral joint or if the osteophytes were more than 7 mm in height.

RESULTS

There had been no recurrence of dislocation, but one patient reported a single episode of subluxation nine years after the original operation. Reduction had been spontaneous and the shoulder had since remained stable. The Rowe scoring gave five excellent, eight good and one fair result; the latter was in the patient with an episode of instability, whose previous history indicated recurrent dislocation of an atraumatic type. The radiographs of this patient showed an unusually high placement of the coracoid tip, above the equator of the glenoid.

There was no radiological evidence of loosening, migration or fracture of the coracoid screws, and no resorption of the coracoid tip. All 14 patients were examined for impingement of the transposed coracoid as described by Gerber, Terrier and Ganz (1985); there was no evidence of this.

The mean Constant-Murley score was 80 points (68 to 95), with good scores for pain and activities of daily living. Three patients had poor scores for power (5, 7 and 4 points out of 25), and all these had radiological evidence of arthropathy, one in Samilson grade III and two in grade I.

External rotation was restricted in 12 patients (86%), with a mean range in zero abduction of 52° (10 to 75). This is shown in Figure 1 for both the operated and non-operated shoulders, with the three shoulders showing grade-III arthropathy indicated by dashed lines. The mean external rotation in these three was 19°, as compared with 59° in the other patients.

There was radiological evidence of arthropathy in ten patients (71%): six were in Samilson grade I, one in grade II and three in grade III (Fig. 2).

The results for power are shown in Figure 3. Lateral elevation showed little difference between operated (mean 5.7 kg ± SD 1.7 kg) and non-operated (6.6 ± 1.8 kg) arms, but the three patients with grade-III arthropathy had marked weakness (3.5 ± 1.9 kg). The mean power of internal rotation in the operated arms was 9.6 ± 2.6 kg as against 10.5 ± 2.8 kg in the contralateral arms, but patients with grade-III arthropathy had marked weakness (4.8 ± 2.1 kg). There was a similar trend for external rotation (operated

\[ \text{Fig. 1} \]

Angles of maximum external rotation in zero abduction, comparing operated (O) with non-operated shoulders (N). Patients with grade-III arthropathy are shown in dashed lines.

\[ \text{Fig. 2a} \]

Typical examples of Samilson grades of arthropathy, showing (a) grade I, (b) grade II and (c) grade III.
arm 7.2 ± 2.0 kg; non-operated arm 8.0 ± 2.1 kg; grade-III arthropathy group 4.2 ± 1.8 kg).

DISCUSSION

We believe that the mean follow-up of 20.5 years is the longest for a clinical and radiological review of a modified Bristow-Latarjet procedure. May (1990) reviewed a similar procedure with a mean follow-up of 21 years, but reported no radiological results. Hovelius has reviewed a large series at ten years (personal communication, 1993).

All the patients whom we report have long-term stability. The only single recurrence of instability was in a patient with recurrent atraumatic dislocation, with the coracoid tip placed above the equator of the glenoïd, which may have contributed to the failure (Hovelius et al 1983a). We saw no complications relating to the coracoid screw or coracoid process. In contrast, Hovelius et al (1983a,b) reported a 16% incidence of screw migration, a 14% incidence of fracture at surgery of the coracoid tip and a 28% incidence of fibrous union of the transplanted coracoid. The discrepancy between the two series may be due to the more meticulous radiological examination undertaken by Hovelius, which included a subcoracoid view to assess the union between the coracoid tip and the anterior glenoïd margin. We used only an axial view of the shoulder, as in our routine clinical practice.

The functional outcome was generally satisfactory but our series included few professional sportsmen or women, although one fast bowler at cricket was able to return to his sport. External rotation was restricted in 12 of our 14 cases, with a similar loss (20°) as that (19°) reported by Hovelius et al (1983b).

A major cause for concern is the high incidence of degenerative disease. Several factors require consideration. First, we found an association between grade-III arthropathy and restriction of external rotation. It is reported that arthropathy is likely to develop after an excessively tight Putti-Platt repair, particularly if there is fixed internal rotation (Hawkins and Angelo 1990). None of our series showed this degree of restriction and we consider that the restriction of external rotation may be secondary to the development of arthropathy, rather than the reverse relationship.

Secondly, the effect of the transposed coracoid tip as a bone block should be considered. After the Eden-Hybbinette procedure the reported incidence of arthropathy ranged from 76% (Hindmarsh and Lindberg 1967) to 79% (Wildner, Terreri and Reichelt 1993). These are similar to our findings after similar follow-up periods.

Thirdly, the damage caused by the original dislocations must be considered. ‘Dislocation arthropathy’ has been described by Samilson and Prieto (1983). In 70 patients with recurrent dislocation, at from 1 to 50 years’ follow-up, they found a 59% incidence of arthropathy, but were unable to correlate the number of dislocations with the development or the severity of arthropathy. Posterior dislocations were more likely to lead to arthropathy than anterior dislocations, probably because of known delays in diagnosis and reduction after posterior dislocation.

The incidence of arthropathy, however, in shoulders that have not been stabilised approaches that in our series, and it therefore appears that successful stabilisation does not prevent the eventual development of arthropathy. This must be taken into account when interpreting the high incidence of arthropathy after anterior capsulorrhaphy procedures (Lusardi et al 1993), and in particular the Putti-Platt procedure (Hawkins and Angelo 1990). Overtightening of
the subscapularis may cause increased wear on the posterior articular surface of the glenoid (Flatow et al 1991). It seems that glenohumeral damage occurs during the first dislocation; degenerative changes are therefore likely to develop despite any form of treatment.

We conclude that coracoid transposition provides good long-term stability of the glenohumeral joint, but that the high incidence of radiological arthropathy remains a cause for concern.

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REFERENCES


