FRACTURES OF THE CORACOID PROCESS

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We reviewed 67 consecutive patients with fractures of the coracoid process, classifying them by the relationship between the fracture site and the coracoclavicular ligament. The 53 type-I fractures were behind the attachment of this ligament, and the 11 type-II fractures were anterior to it. The relationship of three fractures was uncertain. Type-I fractures were associated with a wide variety of shoulder injuries and consequent dissociation between the scapula and the clavicle. Treatment was usually by open reduction and fixation for type-I fractures and conservative methods for type-II.

At follow-up of the 45 available patients, 87% had excellent results, with no significant differences between the operative and non-operative groups or between the type-I and type-II fractures. We consider that operative treatment should be reserved for patients with multiple shoulder injuries with severe disruption of the scapuloclavicular connection.

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Coracoid fractures have been described as uncommon injuries,¹⁻³ but more recently there has been an increasing number of reports of their occurrence.⁴⁻⁶ The incidence has been assessed at between 3% and 13% of all scapular fractures; these constitute 1% of all fractures and 5% of those of the shoulder.⁷

We have reviewed 67 consecutive coracoid fractures, excluding those with comminution of the scapula, and propose a simple clinical classification.

PATIENTS AND METHODS

We treated a total of 67 patients with coracoid fractures between 1974 and 1994. Their mean age was 37.1 years (14

to 72). There were 55 men and 12 women; the right:left ratio was 35:32 and none was an open injury. We included only patients with at least one year of follow-up and full records of range of movement and subjective complaints. When accurate documentation was not available, the patients were interviewed and examined.

RESULTS

Thirty-five of the fractures had been sustained in traffic accidents, 23 in falls and three in other accidents. Two were due to direct blows, one to muscle violence and three to unknown mechanisms. Three patients were known to have renal osteodystrophy before their fracture.

We divided the fractures into two types of anatomical location in relation to the attachment of the coracoclavicular ligaments: type-I fractures were located behind these ligaments and type-II were in front of them (Fig. 1). There were 53 type-I fractures, 11 type-II fractures, and the remaining three were unclassified. Of the type-I fractures, 36 were at the base of the process and 17 involved the upper quarter or third of the glenoid. The type-II fractures were at the tip of the process or at the insertion of the tendon of pectoralis minor.

Acromioclavicular dislocation was the most common associated lesion, seen in 60 of the 67 patients (Table I). Lacerations or abrasions over the posterolateral or lateral deltoid were seen in 15 patients. Fourteen had clavicular fractures, 12 of which were of the lateral end. All those patients had type-II coracoid fractures. Shoulder disloca-

Fig. 1

The proposed anatomical classification of glenoid fractures into type I and type II (C-CL is the attachment of the coracoclavicular ligament).

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Fig. 2a

Fig. 2b

Fig. 2c

Radiographs of a 37-year-old woman with a displaced type-I coracoid fracture and an unstable acromial fracture (a) with postoperative radiographs (b,c). After fixation of the coracoid fracture with a malleolar screw and washer, the unstable acromial fracture required fixation with two Kirschner wires and tension band wiring.

Table I. Associated injuries in 67 patients with fractures of the coracoid process

	Number
Acromioclavicular dislocation	39
Fracture of the superior scapular margin	24
Laceration or abrasion over deltoid	15
Clavicular fracture	14
Lateral end	12
Shaft	1
Segmental	1
Acromial fracture	13
Fracture of the scapular spine	5
Rotator-cuff tear	3
Anterior shoulder dislocation	3
Glenoid rim fracture	2
Proximal humeral fracture	2
Traumatic tendonitis	1

tions (3) and rotator-cuff tears were associated only with type-I fractures.

Unstable coracoid fractures which were part of multiple shoulder injuries were usually treated by operation; the relatively stable type-II coracoid fractures were usually managed conservatively. In all 31 type-I fractures, three type-II fractures and one uncertain fracture had operative reduction and fixation (Fig. 2). The most common procedure was open reduction and internal fixation with a malleolar screw for the coracoid fracture and percutaneous pin fixation for either an acromioclavicular dislocation or a fracture of the clavicle.

Twenty-two patients were lost to follow-up; the other 45 were reviewed at a mean of 37 months (12 to 117). On the rating system described by McGinnis and Denton,⁷ the results were excellent in 39 patients (87%), and fair in the other six. Of these six, two had complete tears of the rotator

cuff but refused operative treatment. One had rheumatoid arthritis and one also had a comminuted fracture of the surgical neck of the humerus making early movement impossible. Excluding these four patients, we found no statistical difference in the results between the operative and non-operative groups or between the type-I and type-II fractures.

DISCUSSION

Coracoid fracture was rarely diagnosed before radiography became available,¹ but several recent reports have included more than ten patients.^{5,6,8}

The fracture sites reported in adults have been at the base of the process, including the upper region of the glenoid⁹ (the type-3 glenoid fracture of Ideberg,¹⁰) the base itself,² the middle portion,¹ and the tip.^{3,11} We originally classified our coracoid fractures into the five anatomical types as discussed in our previous report,¹² and similar to the classification of Eyres et al.⁶ From the clinical and functional points of view, however, we now believe that they should be classified into two types according to their relationship to the coracoclavicular ligaments. A type-II fracture anterior to the attachment of these ligaments does not disturb the scapuloclavicular connection, but a type-I fracture behind this site may destroy the latter. The common associated injuries such as acromioclavicular dislocation, fracture of the scapular spine or the acromion or fracture of the lateral end of the clavicle complete the destabilisation of both the coracoid fracture and the scapuloclavicular connection.

Many methods of treatment of coracoid fractures have been described, although recent reports have recommended conservative treatment.^{4,13} We consider that operative treatment is not necessary for type-II fractures, since most of our patients had excellent results with a simple sling and

early physiotherapy. Type-I fractures, however, do require operation whenever multiple shoulder injuries have destroyed the scapuloclavicular connection. The aim of the operation is to reconstruct a firm link between the clavicle and scapula to allow early physiotherapy. This is best achieved by stabilisation of the coracoid fracture, unless the associated injury is only a acromioclavicular subluxation or dislocation. In such cases, treatment should be the same as that for an isolated acromioclavicular dislocation.

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