CORACOCLAVICULAR SCREW FIXATION FOR UNSTABLE FRACTURES OF THE DISTAL CLAVICLE

A REPORT OF FIVE CASES

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Five consecutive unstable fractures of the distal third of the clavicle were treated by indirect open reduction and internal fixation using a temporary Bosworth-type screw. Coracoclavicular fixation provided and maintained reduction of the fracture. Healing occurred uneventfully within nine weeks in all cases. The screw was removed under local anaesthesia after healing of the fracture and there were no surgical complications. Shoulder function was restored to the pre-injury level.

Temporary coracoclavicular screw fixation appears to be a valuable alternative for the treatment of type II fractures of the distal third of the clavicle.

The distal third of the clavicle is involved in approximately 15% of all clavicular fractures (Albrecht and Bamert 1981; Neer 1984). Neer classified these lateral fractures into three types: type I is a stable fracture with no damage to the ligaments between the coracoid and the proximal fragment, type II is an unstable fracture with loss of ligamentous connection between the coracoid and the proximal fragment, and type III is an intra-articular fracture (Fig. 1).

The unstable type II fracture allows drooping of the upper limb with respect to the proximal clavicular fragment. The incidence of delayed and nonunion is high (Neer 1984; Neviaser 1987). Most authors recommend open reduction and internal fixation for the prevention of these complications. Various techniques are recommended (Müller, Allgöwer and Willenegger 1977; Albrecht and Bamert 1981; Dittmer, Jauch and Wening 1984; Neer 1984; Eskola et al 1987; Neviaser 1987) but none of these reports is based on a series of patients treated by a particular method. The senior author (CG) has treated five consecutive patients with a simple indirect technique of open reduction and internal fixation.

The operations were performed under general anaesthesia using a sabre-cut incision over the coracoid process with the patient in a semi-sitting posture. If not already torn, the fascia joining the deltoid to the trapezius was divided at right angles to the skin incision. The clavicle was exposed subperiosteally at the level of the coracoid and the base of the coracoid was exposed between two small retractors. A 3.5 mm hole was drilled through the clavicle at the predetermined position (Fig. 2). An AO malleolar screw 40 to 45 mm long was placed through the drill hole, and screwed into the base of the coracoid process. According to the principle of indirect reduction of fractures (Mast, Jakob and Ganz 1989), the screw was tightened until the fracture, which was not exposed, was felt by palpation to be reduced (Fig. 3). The coracoclavicular ligaments were sutured in two cases and left unrepaired in three. The fascia between deltoid and trapezius was meticulously repaired; the wound was closed over a suction drain.

Following operation, the arm was placed in a sling for two weeks. After radiological consolidation of the fracture (six to nine weeks postoperatively), the screw was removed under local anaesthesia. Active flexion and abduction were restricted to 60° until the screw was removed.

All patients were reviewed clinically and radiologically by FTB after an average interval of 12 months (8 to 21). All had returned to their pre-injury levels of work and sports activities for at least four months. In addition to standard radiographs, anteroposterior views of both shoulders were obtained with a weight of 7 kg applied to each wrist to reveal any inferior displacement of the scapula (Fig. 4).

RESULTS

The fractures all consolidated clinically and radiologically within six to nine weeks and without complication.

Subjective assessment. Four patients had no complaints and felt that their shoulders had returned to normal, but
one complained of mild pain when lying on the affected shoulder. All five patients thought that their shoulders were freely mobile with normal strength, and that the appearance was satisfactory.

**Objective assessment.** There was no postoperative infection and no implant loosening or failure. The scars were narrow in four cases and slightly widened in one. There was no tenderness of the clavicle. Active and passive ranges of flexion, abduction, external and internal rotation were all full and pain free. The strength of the shoulder muscles was assessed manually and was graded as normal for flexion, abduction, external and internal rotation. Radiologically the fractures had healed with minimal deformity of the clavicle.

![Fig. 4a](image1) ![Fig. 4b](image2)

Final result of the fracture shown in Figure 3 compared with the normal contralateral side. Both views were taken with 7 kg loading of the arm.

The distance between the inferior border of the clavicle and the superior border of the coracoid process measured 0.9 to 1.5 cm (uninjured contralateral side 0.7 to 1.1 cm); this distance was not changed by the application of a 7 kg weight to the wrist in four patients and increased by 4 mm in one. Suture of the coracoclavicular ligaments had not been possible in this case. Three patients showed some ossification between the clavicle and the coracoid. In one of these the ligaments had been sutured. All five acromioclavicular joints were clinically and radiologically normal.

**DISCUSSION**

Most authors agree with Neer (1984) and Neviaser (1987) that type II lateral clavicle fracture is an indication for operative treatment. The rarity of the fracture and the lack of documentation of the results of various possible techniques account for the fact that no single method has become generally accepted (Müller et al 1977; Albrecht and Bamert 1981; Dittmer et al 1984; Neer 1984; Eskola et al 1987; Neviaser 1987). Many of the proposed techniques have potential or proven disadvantages.

Pinning with K-wires has been associated with migration resulting in complications including death (Fueter-Tóndury 1976). Although migration is not frequent, and a lethal outcome is exceptional, we feel that a method with such complications is hardly justified if alternatives are available. Extra-articular tension band fixation using K-wires and a cerclage wire (Albrecht and Bamert 1981) does not fully protect from pin migration. The method is technically demanding, and general anaesthesia is usually required for removal of the implants.

Internal fixation using plates (Eskola et al 1987) requires wide exposure and may devascularise the clavicle. It is associated with stress-shielding and the potential for refracture after implant removal, which again has to be carried out under general anaesthesia. The Balslev plate (Dittmer et al 1984), which was originally designed for the treatment of acromioclavicular dislocat-
reported to our knowledge. These fractures are extra-articular, and as the joint is not transgressed at operation, a one-year follow-up to full radiological healing and full return of function seems to be adequate.

We consider that temporary coracoclavicular screw fixation is a relatively easy and safe technique of indirect open reduction and internal fixation of the clavicle, providing a valuable alternative treatment.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES


