



## The treatment of acromioclavicular joint dislocation Tossy grade III with a clavicle hook plate

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**In a retrospective study, 12 patients with acute acromioclavicular dislocation Tossy stage III were reviewed after operative treatment with a clavicle hook plate. Mean follow-up time was 20 months. Clinical and radiographic results were reviewed. Clinical outcome was superior to the radiographic results. Some questions about this technique remain open.**

### INTRODUCTION

Acromioclavicular (AC) joint dislocations are graded according to the extent of displacement of the clavicle in relation to the acromion. Tossy proposed three stages. In stage I lesions, the AC ligament is stretched or partially ruptured and no gross deformity is visible on radiographs. In stage II lesions, the AC ligament is ruptured, the coracoclavicular ligament is elongated and on stress radiographs, the AC joint is displaced over half of the AC joint depth. A rupture of the AC and coracoclavicular ligament is present in stage III, and on standard radiographs the AC joint is displaced over one half of the AC joint depth (fig 1).

In general, stage III AC dislocations are considered for operative treatment (7), although some authors propose conservative treatment (2, 5).

Some operative procedures are technically difficult (4) or have a high rate of complications (1).

In this study, we retrospectively examined 12 patients with a Tossy III AC dislocation treated with a clavicle hook plate.

### MATERIAL AND METHODS

Since July 2000, 13 patients in our department were treated with a clavicle hook plate (AO, Mathys, Bettlach, Switzerland) for a Tossy III AC dislocation. One of them was lost to follow-up. Their mean age was 33 years (ranging from 19 to 42 years). There were 11 men and 1 woman. Sports injuries (bicycle accidents included) were the most frequent (7 cases), 2 patients fell at home and 1 at work; two patients had a road traffic accident. Both of these had other lesions (one patient had rib fractures, a haemothorax and head injury, the other a tibial fracture and a metacarpal fracture on the non-dominant side).

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*Fig. 1.* — Tossy stage III AC dislocation

### Surgical technique

Surgery was performed under general anaesthesia with the patient in beach-chair position. A five-centimetre sagittal incision was made one fingerbreadth medial to the AC joint. A transverse incision of the muscular fascia was made to expose the AC joint and the lateral portion of the clavicle. Sutures were placed in the AC ligament and capsule. If a meniscus was present, it was removed. The clavicle hook plate was inserted after the correct offset (15 or 18 mm) was selected. Before application of the plate, the AC ligament and capsule were pulled underneath. Subcutaneous release was sometimes required to close the wound. Mean hospital stay was 3 days. Postoperatively, gentle mobilisation of the shoulder was encouraged. Plate removal was performed in all but one patient after a mean time interval of three months. Intensive mobilisation was started after hardware removal.

At review, subjective criteria (pain and ability to perform activities of daily living) and objective criteria (active range of motion and strength) were recorded on both sides using the Constant score (3). We noted local joint tenderness on palpation and on the cross-over test. Local deformity was recorded.

Standard bilateral AC joint radiographs were obtained and repeated after stress-loading with 5 kg. AC joint line asymmetry, arthrotic changes on the lateral clavicle, AC ligament ossification, bone resorption under the hook and the distance between clavicle and coracoid process

under stressed (5 kg) and unstressed conditions were recorded.

The average follow-up was 20 months (range 9 to 36 months).

### RESULTS

The mean Constant score on the operated side was 91.3 (79-99) compared to 93.9 (85-100) on the uninvolved side. No patient had local joint tenderness or a positive cross-over test.

Seven patients had an equal or better Constant score on the operated side. In those cases it concerned the dominant side.

Two patients had a difference of less than 5 points between both shoulders in favour of the non-operated shoulder. In one of them, the strength assessment was the only difference. In the other patient, the difference was made by the fact that he did not resume his sports activities.

Three patients had more than 5 points difference (8, 9 and 14 points difference respectively). One was a drug-addict who did not regain his preoperative sports level and even had pain at night. He also had a minor strength difference but the operated side was the non-dominant side. The second also had a strength difference in the operated non-dominant side and did not resume his recreational activity (body-building). The last patient complained of moderate pain and did not resume his sports activities (football).

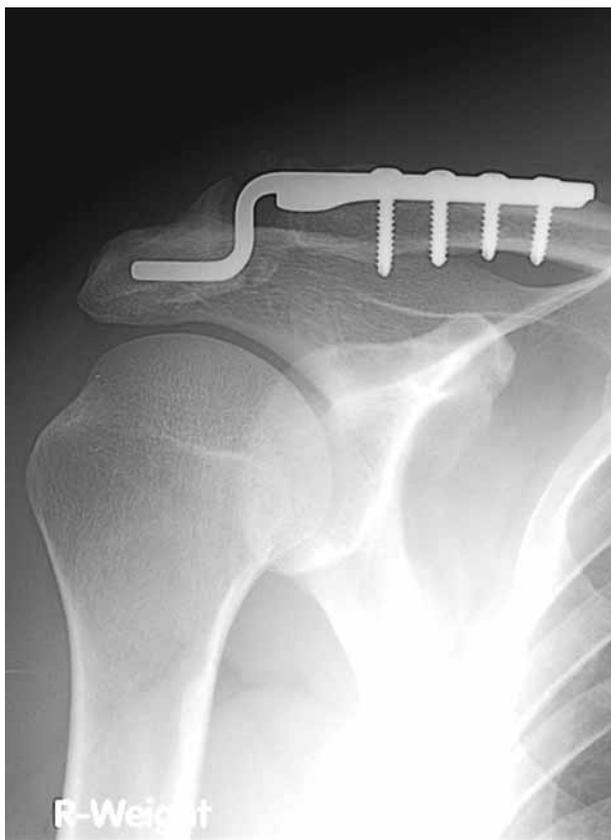
Two patients noted hypoaesthesia and one noted a more hairy skin around the scar. Three patients had a hump on the AC joint.

### Complications

Three superficial wound infections were successfully treated with oral antibiotics and local wound care. No other complications were observed.

### Radiographic assessment

AC joint line asymmetry was seen in all but one patient. Degenerative changes in the AC joint were present in all 12 patients. Two patients had major



*Fig. 2.* — AC ligament ossification



*Fig. 3.* — Absence of demonstrable bone resorption after 2 years of presence of the AC hook plate.

AC ligament ossification (fig 2). No patient had bone resorption due to the plate (fig 3).

Eight patients showed an increased distance between clavicle and coracoid on the operated side compared to the contralateral side (fig 4). Only 3 patients had a difference in this distance in stressed and unstressed situation compared to the contralateral side.

### DISCUSSION

Nine of 12 patients with a Tossy III AC dislocation had excellent clinical results, 3 had good results. There were no major complications. On the other hand, radiographic assessment showed important changes on the injured side in all patients.

We can conclude that the clavicle hook plate is a convenient device for operative treatment of

Tossy grade III AC dislocations, giving good short-term clinical results and at a very low complication rate compared to other operative procedures (1, 4, 9, 10, 11).

Several questions remain open :

1. In the operative technique, the sagittal incision was sometimes difficult to close and needed subcutaneous release. A longitudinal incision over the lateral part of the clavicle and crossing the AC joint may be preferable to avoid closure under traction and superficial wound infection.
2. The hook plate is supposed to be removed after 3 months, when the ligaments are healed. Some consider that the plate could restrict the mobility or create some bone resorption of the acromion. In one patient the plate was left in place. Nevertheless he had a perfect clinical result (fig 5) and no bone resorption on radiographs.



**Fig. 4a and b.** — Increased distance between the clavicle and coracoid on the operated left side (a) compared to the unaffected right side (b).

The Constant score of 99/100 on the operated dominant side compared well to the 97/100 score of the contralateral side. Maybe removal of the plate can be avoided and a more rapid, intensive mobilisation can be accepted without problems, which was the case in the patient mentioned above. This can indicate that the plate does not restrain rotation between clavicle and acromion, which is supported by one study (8).

3. The discrepancy between clinical and radiographic results makes one wonder if the good early clinical results will not deteriorate over time. It would be interesting to review these patients after a longer period of time, to confirm that the early good clinical results remain unchanged, as in some of the non-operatively treated patients.
4. Finally we wonder if simultaneous reconstruction or repair of the coracoclavicular ligaments would not be advisable in view of the radiographic data.



**Fig. 5.** — Full range of movement of the operated right shoulder, with the hardware still in place.

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