Therapeutic results of acromioclavicular joint dislocation complicated by rotator cuff tear

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ABSTRACT

Purpose. To evaluate the operative findings and postoperative results of one-stage repair on patients with acromioclavicular joint dislocation complicated by rotator cuff tear.

Methods. Between 1992 and 1999, one-stage repair was performed on 5 patients with acromioclavicular joint dislocation complicated by rotator cuff tears. Modified Cadenat procedure for acromioclavicular joint dislocation, and McLaughlin procedure for rotator cuff tear, were performed on these patients. Postoperative results at the final examination were assessed according to the criteria for therapeutic effects on shoulder joint disorders of the Japanese Orthopaedic Association.

Results. There was partial-thickness cuff tear in one patient, and full-thickness cuff tear in the remaining 4 patients. In all patients, tears were located only in the supraspinatus tendon, and were medium or small ones with maximal diameter of 3 cm or less. After a mean follow-up period of 56 months (range, 36–79 months), all patients were assessed to have excellent results. No patient showed a good reduction of the acromioclavicular joint.

Conclusion. For patients successfully treated by one-stage repair, satisfactory results were obtained without pain or disturbance in activities of daily living.

Key words: acromioclavicular joint dislocation; modified Cadenat procedure; rotator cuff tear

INTRODUCTION

Surgical treatment for traumatic acromioclavicular joint dislocation (Rockwood classification, type V) has produced satisfactory results irrespective of the operative technique. Since 1992, we have been performing a modified Cadenat procedure for this type of dislocation irrespective of age, sex, occupation, and the culpable sports activity. However, in 5 patients aged 40 years or above, rotator cuff tear was observed
during the surgical procedure. We performed one-stage repair on these patients with acromioclavicular joint dislocation complicated by rotator cuff tear.

To our knowledge, there have been few reports of patients with both injuries and no report of one-stage operation in these patients. We evaluated the operative findings and postoperative results in these 5 patients.

MATERIALS AND METHODS

In 1917, Cadenat reported a technique using the coracoacromial ligament as a reconstruction ligament for acromioclavicular joint dislocation. On the basis of this procedure, we employed the following modified surgical technique. Initially, the coracoacromial ligament at the acromial site of ligament attachment, along with a small bone tip, was detached. The dislocated acromioclavicular joint was fixed using a Wolter clavicular plate after reduction, preserving the intra-articular disc as much as possible, and the torn capsule and acromioclavicular ligament were sequentially repaired. Finally, the detached coracoacromial ligament with the bone tip was fixed to the clavicle using a screw in a position that allowed sufficient tension to be obtained. By incising the

subacromial bursa when the ligament was detached, the condition of the rotator cuff and subacromial

![Image](https://via.placeholder.com/150)

**Figure 1** The modified Cadenat procedure: the coracoacromial ligament at the acromial site of ligament attachment, along with a small bone tip, was detached. The dislocated acromioclavicular joint was fixed using a Kirshner wire or a Wolter clavicular plate after reduction, and the intra-articular disc was preserved as much as possible. The torn capsule and acromioclavicular ligament were sequentially repaired. Finally, the detached coracoacromial ligament with the bone tip was fixed to the clavicle using a screw in a position that allows sufficient tension to be obtained.

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age (years)/sex</th>
<th>Affected side</th>
<th>Occupation</th>
<th>Cause of injury</th>
<th>Follow-up period (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>43/M</td>
<td>Right</td>
<td>Construction worker</td>
<td>Traffic accident</td>
<td>72</td>
</tr>
<tr>
<td>2</td>
<td>44/M</td>
<td>Right</td>
<td>Construction worker</td>
<td>Fall on a motorbike</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>51/M</td>
<td>Right</td>
<td>Construction worker</td>
<td>Traffic accident</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>56/M</td>
<td>Left</td>
<td>Construction worker</td>
<td>Wedge between machines</td>
<td>79</td>
</tr>
<tr>
<td>5</td>
<td>76/M</td>
<td>Right</td>
<td>None</td>
<td>Fall on a motorbike</td>
<td>36</td>
</tr>
</tbody>
</table>

**Table 1** Five cases of acromioclavicular joint dislocation complicated by rotator cuff tear

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Rotator cuff tear</th>
<th>Fixation of the dislocated acromioclavicular joint</th>
<th>Postoperative JOA* score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bursal-side partial thickness</td>
<td>Wolter clavicular plate</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Full thickness</td>
<td>Wolter clavicular plate</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Full thickness</td>
<td>Wolter clavicular plate</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Full thickness</td>
<td>Wolter clavicular plate</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Full thickness</td>
<td>Kirshner wire</td>
<td>92</td>
</tr>
</tbody>
</table>

**Table 2** Findings obtained during surgery

* Japanese Orthopaedic Association
lesions could be macroscopically observed. During operation, bursal-side partial-thickness tear of the supraspinatus was observed in one patient, while full-thickness tear of the supraspinatus was observed in the remaining 4 patients. The rotator cuff tear was repaired in 4 patients by using the McLaughlin technique (Fig. 1).2 However, a 76-year-old patient with rotator cuff tear underwent Kirshner-wire (K-wire) fixation instead of plate fixation because of the fragility of the acromion.

Ultra-sling immobilisation (forward flexion 30°; abduction 20°; internal rotation 60°) was initiated immediately after operation. Passive exercise in the immobilisation sling was initiated one week postoperatively, and continued until 5 weeks. Active exercise in the supine position was concurrently performed postoperatively at 5 weeks or after, and the sling was discontinued after 6 weeks. Postoperative functional rotator cuff exercises and strengthening were started at 6 weeks and 12 weeks, respectively.

RESULTS

Of the 5 male patients with acromioclavicular joint dislocation (Rockwood type V) accompanied by rotator cuff tear (Table 1), 2 (No. 2 and 3) had been conservatively treated in another hospital before being transferred to our hospital. For the other 3 patients, the interval from injury to operation was within 10 days. In all patients, tears were located only in the supraspinatus tendon, and were medium or small ones not exceeding 3 cm in diameter (Table 2).

Postoperative results at the final examination were assessed according to the criteria of Japanese Orthopaedic Association3 (JOA) score for therapeutic effects on shoulder joint disorders (Table 3). All 5 patients were graded as “excellent” (total score of 90 points or more). The mean scores for each parameter were evaluated as 30 for pain, 8.8 for total function, 9.2 for activities of daily living, 30 for range of motion, 4.6 for radiographic findings, and 15 for joint stability. The mean postoperative follow-up period was 56 months (range, 36–79 months). Postoperative radiographic examination showed a good reduction of the acromioclavicular joint and neither dislocation nor subluxation was observed. However, in all 4 patients in whom a Wolter clavicular plate was used, the holes at the tip of the hook in the acromion were enlarged.

CASE EXAMPLE

Patient No. 4 was a 56-year-old male construction worker. He had dislocation of the left acromioclavicular joint when his left arm was wedged between machines while at work (Fig. 2a). Operation was performed 10 days after injury (Fig. 2b). Because a full-thickness tear of the supraspinatus tendon and hypertrophy of the subacromial bursa were observed during surgery (Fig. 2c), the modified Cadenat procedure, McLaughlin procedure, and bursectomy were performed (Fig. 2d). Full range of motion was achieved 4 months postoperatively, and the patient returned to work 6 months after operation (Fig. 2e).
after surgery. Four years after operation, the patient had a JOA score of 100. However, a large hole in the hook of the Wolter clavicular plate persisted in the acromion.

**DISCUSSION**

The traumatic mechanisms of acromioclavicular joint dislocation and that of rotator cuff tear have many
factors in common. Therefore, rotator cuff tear may occur at the same time of acromioclavicular joint dislocation. In particular, many authors have shown that rotator cuff injury tends to occur in patients aged 40 years or above with traumatic disorders of the shoulder. However, there have been few reports of patients with acromioclavicular joint dislocation complicated by rotator cuff tears, and no report of one-stage surgical treatment in patients with these rare injuries.

The complication rate of rotator cuff tears in acromioclavicular dislocation cannot be comprehensively assessed, because there have been no reports of a substantial number of such cases, difficulty in collecting the statistics of this type of dislocation as injury prior to rotator cuff tears, and the presence of asymptomatic rotator cuff tears. We evaluated the incidence of this complication at our department. Of the 25 patients aged over 40 years with acromioclavicular dislocation (Rockwood classification, type III or V) on whom we performed a surgical procedure, 5 (20%) patients had rotator cuff tears. However, for those patients younger than 40 years with acromioclavicular dislocation on whom we have performed a surgical procedure, none had rotator cuff tear.

There are many surgical procedures for such injuries available, such as fixation of the acromioclavicular joint, repair of the acromioclavicular ligament, repair of the coracoclavicular ligament, muscle transfer, resection of the lateral end of the clavicle, and a combination of the procedures described above. Since 1992, we have been performing reconstruction of the coracoclavicular ligament using the coracoacromial ligament (the modified Cadenat procedure) and have achieved satisfactory results. When only acromioclavicular joint dislocation was present, we used K-wire as the material for internal fixation of the acromioclavicular joint. However, in patients with acromioclavicular joint dislocation complicated by rotator cuff tear, we performed the internal fixation with a Wolter clavicular plate which preserves the motion of acromioclavicular joint. In these cases, it was necessary to consider case-specific postoperative management such as adoption of special arm position to reduce the tension on the repaired rotator cuff. We used K-wire on one patient, aged 76 years, instead of plate fixation because of the fragility of the acromion. All the 5 patients treated by this procedure showed excellent results at least 3 years after operation.

There have been few reports of patients with persistent shoulder joint pain or limitations in the range of motion after conservative therapy of acromioclavicular dislocation. On detailed examination, all our patients showed the presence of rotator cuff tears which required subsequent surgical procedures. Results of other studies show that the success rate of conservative therapy for rotator cuff tears varies, ranging from 50% to 90%. This marked difference is noteworthy, and it may be associated with factors such as the cause of the disorder, tear size, duration of symptoms, limitations in the range of motion, and the state of employment. There were also asymptomatic tears. Because no histopathological examination of the subacromial bursa or torn rotator cuff was performed, we cannot tell whether rotator cuff tears occurred simultaneously with acromioclavicular dislocation in our patients. Opinions are divided concerning the necessity for one-stage repair for rotator cuff tears. However, more than 90% of the results of surgery for rotator cuff tears are good, which is even better than those of conservative therapy. Therefore, when a rotator cuff tear is confirmed during operation, accurate one-stage repair may further improve the postoperative results. Neither pain nor difficulties in the activities of daily living were observed in our patients who have been followed up for a minimum of 36 months.

CONCLUSION

One-stage surgical treatment was performed in 5 patients with traumatic acromioclavicular joint dislocation complicated by rotator cuff tears. Satisfactory postoperative results such as no pain nor disturbance in activities of daily living were obtained.

REFERENCES