# Conservative or Surgical Treatment of Acromioclavicular Dislocation

## A Prospective, Controlled, Randomized Study*

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ABSTRACT: **In a prospective, controlled, randomized study of acute acromioclavicular dislocations, we compared conservative and operative treatment (the Phemister procedure) with regard to the clinical results, complications, and social costs. Forty-one patients were operated on and forty-three patients were treated conservatively. Two patients who were operated on and three who were treated conservatively had to have the lateral extremity of the clavicle resected because of pain. The rehabilitation period was significantly shorter with non-operative treatment, and after thirteen months there was no difference in the clinical results. There were no serious postoperative complications, but about half of the patients who were operated on had problems with the metallic device, such as breakage or migration of the pins, or both, and six patients had a superficial infection.**

**For most patients with total acromioclavicular dislocation we recommend conservative treatment with a sling until the patient is free of pain. Operation should be considered in thin patients who have a prominent lateral end of the clavicle, in those who do heavy work, and in patients whose daily work requires that the shoulder often be held in about 90 degrees of abduction and flexion.**

More than fifty different bandaging techniques and more than thirty different operations[1-3] have been advocated for the treatment of total acromioclavicular dislocation. In 1979, the annual prevalence of this lesion was estimated as approximately 3 or 4 per 100,000 population[6], so that any one surgeon probably will not see more than a few cases, and it is not likely that controlled prospective studies comparing conservative and operative treatment would be easy to undertake. No reports of such a study could be found in our search of the literature.

In previous studies, most of them retrospective, conservative or operative treatment was recommended on the basis of a small number of patients[1-4,6,7,9,11]. The purpose of our prospective study was to evaluate the functional results, complications, and social costs of treatment in two groups of patients with total acromioclavicular dislocation who were randomized and treated either by operation or by short-term bandaging.

### Material

In our three hospitals, eighty-four patients were treated for acromioclavicular dislocation between 1979 and 1983. Forty-one patients (thirty-nine men and two women) were treated operatively (group 1) and forty-three patients (thirty-five men and eight women) had conservative treatment (group 2).

Forty-five of the dislocations were located on the right side and thirty-nine were on the left, and there was no predilection of the injury for either the dominant or the non-dominant side. In group 1 the median age of the patients at operation was thirty-six years (range, nineteen to seventy years), and in group 2 the median age at injury was thirty-six years also (range, nineteen to seventy-eight years).

All patients were treated within four days after the accident, and none were lost to follow-up.

### Method

The study was prospective. The patients were assigned to either operative or conservative treatment according to their choice of sealed envelopes containing the treatment to be used. The enclosed slip designating the treatment was marked by using Geigy's random numbers (an even number meant operation and an odd number meant conservative treatment). We included only those patients who had displacement of 75 per cent or more of the width of the clavicle. We interpreted this finding to mean rupture of both the acromioclavicular and the coracoclavicular ligament[12]. All patients who were included in the study gave their informed consent. Six patients would not participate in the study.

We also excluded any patient who was less than eighteen years old; anyone who had prior symptoms in the shoulder girdle or a serious concomitant traumatic lesion, such as a severe head injury; and any patient who would be at special risk with general anesthesia.

Radiographs were made of both acromioclavicular joints of each patient with the patient recumbent and also with the patient standing, holding an eight-kilogram weight in each hand.

A modified Phemister procedure[10] was used as the stan-

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dard operation. The intra-articular meniscus was extirpated, the acromioclavicular joint was reduced, and the bones were transfixed with two threaded two-millimeter Kirschner wires that crossed in the joint space. The ends of the acromioclavicular and coracoclavicular ligaments were then sutured, and any obvious muscle ruptures also were sutured. All operations were performed by orthopaedic surgeons on the staff of three hospitals.

The postoperative bandage for group 1 and the bandage used for conservative treatment (group 2) was the same: a sling plus a swathe binding the arm to the body. This was worn for two weeks, and then just a sling supporting the arm was used for two weeks more. In both groups, one month after the injury physiotherapy was instituted, allowing free movement of the arm but no loading of the extremity. After six weeks there was no restriction in the use of the arm. In all patients who had been operated on, the Kirschner wires were removed under local anesthesia after five to twelve weeks.

In one of the three hospitals, eight of the ten patients who were operated on had smooth instead of threaded Kirschner wires because there had been breakage of the threaded wires in the first patient who was operated on.

The patients were seen for follow-up evaluation at three weeks, six weeks, three months, and an average of thirteen months (range, twelve to fourteen months) after the injury. Radiographs of the acromioclavicular joint were made at the three-month and final follow-up evaluations.

At the final follow-up evaluation, the area of the lateral clavicular prominence, including any scar, was covered by a small bandage, so that the physician had no knowledge of the treatment used. Each patient was examined by a physician other than the one who had been responsible for the treatment.

The clinical results were evaluated according to a point system[6] (Table I) in which 11 or 12 points meant that the result was excellent; 9 or 10 points, good; 7 or 8 points, fair; and 6 points or less, poor.

TABLE I

EVALUATION SCHEME FOR THE CLINICAL RESULTS

| | 4 Points | 3 Points | 2 Points | 1 Point |
|---|---|---|---|---|
| Pain | None | Slight | Moderate | Severe |
| Decrease in motion *(degrees)* | None | 10-20 | 41-80 | >80 |
| Decrease in strength *(per cent)* | None | 10-25 | 26-50 | >50 |

The movements of the shoulder were examined without fixation of the scapula, and losses in both flexion and abduction were combined for rating purposes. Strength was examined at 90 degrees of both flexion and abduction of the shoulder. We applied a spring weight on the wrist with the elbow extended and the forearm supinated.

The circumstances of the injuries were as follows: a bicycle accident, forty-five; a traffic accident, four; a fall on stairs, thirteen; a fall on the street, six; a soccer injury, twelve; and a miscellaneous sports injury, four. Eleven patients (ten of whom had been injured in a bicycle accident) had minor excoriations on the lateral, superior, or posterior part of the acromion, but these injuries to the skin did not influence the assignment of the patient to group 1 or 2. The five patients who were reoperated on before the final follow-up (two in group 1 and three in group 2) were not included in the tabulated results.

## Results

We evaluated the differences in symptoms in the two groups after three months and at final follow-up (Table II). The initial clinical results were significantly better in group 2 than in group 1 ($p < 0.01$, chi-square test), but after thirteen months there were no significant differences between the two groups ($p = 0.935$, chi-square test).

TABLE II

RESULTS

| | Group 1: Operative Treatment | | Group 2: Conservative Treatment | |
|---|---|---|---|---|
| | 3 Mos. | 13 Mos. | 3 Mos. | 13 Mos. |
| Excellent | 14 | 36 | 21 | 37 |
| Good | 20 | 2 | 18 | 2 |
| Fair | 3 | 0 | 1 | 1 |
| Poor | 2 | 1 | 0 | 0 |
| Total | 39 | 39 | 40 | 40 |

Two patients in group 1, twenty-two and twenty-four years old, had to be reoperated on because of residual pain, the operation being resection of the lateral 1.5 centimeters of the clavicle. Three patients in group 2 also had to have a resection of the lateral end of the clavicle and transfer of the coracoacromial ligament as a substitute for the coracoclavicular ligament[15]. The causes for these three operations were skin problems due to major prominence of the clavicle (in a thin forty-nine-year-old woman), pain while driving (in a forty-year-old woman), and pain on load-bearing (in a thirty-three-year-old man, a furniture mover).

At final follow-up in the remaining seventy-nine patients, there was slight pain in eight patients in group 1 and seven in group 2. One patient in group 1 (a forty-two-year-old electrical engineer) had moderate pain accompanied by a 20 per cent decrease in force but normal shoulder movements; he had a fair result. In the fifteen patients with slight pain, the pain was usually felt in connection with carrying loads. The range of movement was restricted in three patients who had been operated on. One of them, a fifty-two-year-old man, a plumber, had the only poor result, with a 30 per cent reduction in force, abduction of 90 degrees, and flexion of 100 degrees. The second was a seventy-year-old male pensioner and the third was a forty-six-year-old disabled man, both of whom had a 20-degree reduction of abduction. There was a 1-point decrease in strength in the electrical engineer already mentioned, the plumber, and the

disabled man. Calcifications around the ligaments were seen in twenty-seven patients in group 1 and in twenty-five in group 2. The final clinical result was excellent in forty-eight of these patients, good in two, fair in one, and poor in one. There was no correlation between the final rating and either the extent or the location (coracoclavicular or acromioclavicular region, or both) of the calcification. It is noteworthy that calcifications were more common in the patients with an excellent result than in the rest of the patients in the series.

In all except two of the patients who were operated on, the correct anatomical position of the clavicle was retained. In one patient the threaded wires had broken after three weeks and were removed, and in another patient the smooth wires had migrated laterally after four weeks, so that there was an upward dislocation of the outer end of the clavicle measuring 50 to 100 per cent of the width of that bone. The final result was excellent in both of these patients. At final follow-up in group 2, all patients had a displacement of the clavicle of between 125 and 150 per cent of its width, but in only four patients did an application of load cause any increase of that displacement. This was in contrast to the initial radiographic examination, when the application of an eight-kilogram load increased the displacement in thirty-seven of the eighty-four patients. The degree of displacement in group 2 did not influence the final results.

There were no complications in group 2, whereas in group 1 there were several. Six patients had a superficial infection, due in five of them to migration of the smooth Kirschner wires. However, there were many problems related to the wires and to the operative technique. When wires broke, the site of breakage always was the acromioclavicular joint, usually close to the surface of the clavicular joint. Sixteen patients had such breakage, involving threaded wires in all but two. Errors in technique were evident in twelve (parallel wires in eight, bone fixation of one pin in four, and no bone fixation at all in one). All but two patients had an excellent result despite the complication, and in the other two the result was graded as good at the final follow-up.

The patients in group 2 had a shorter sick-leave interval than did those in group 1, but the difference was not significant: the medians were six weeks (range, zero to twelve weeks) and eight weeks (range, two to twenty-two weeks), respectively ($p = 0.067$, Mann-Whitney U-test).

In the five patients who were operated on with resection of the clavicle whose cases were not tabulated, the results at final follow-up were rated as good in one and excellent in the other four, but three of the patients had pain when sleeping on the involved shoulder.

## Discussion

Most of the operative procedures for acromioclavicular dislocation that have been reported had a high incidence of such complications as breakage or migration of the metallic device, failure of fixation, erosion of bone, or skin irritation caused by the metal. These difficulties may result in redislocation, infection, prolonged rehabilitation, or possibly a third operation. Therefore, the following questions are important: Are the seriousness and the number of complications so great, and the number of poor functional results after operation so discouraging, that no patient with dislocation should be treated operatively? Is it possible to select the patients who are best suited for operative treatment? At final follow-up in our series, the functional results in the two groups did not differ, but conservative treatment led to more rapid rehabilitation and return to work. This is in accordance with the findings in the retrospective studies of Rosenørn and Pedersen and of Powers and Bach.

Because migration of smooth wires was associated with superficial infection in five patients, we do not recommend these for fixation. We attribute the breakage of the threaded wires, which always occurred at the joint and always after the interval during which the acromioclavicular joint had been stabilized, to exercise begun about four to five weeks after operation. We do not recommend the use of threaded wires because they break too often. With the Phemister method, a smooth two-millimeter wire that is threaded only at the end would probably be best, because then the threaded end would be at a distance from the joint. The fact that in fifteen of our forty-three patients who were operated on the surgical technique was not ideal is firm evidence that the operation is not simple, and even a minor lapse often leads to a complication.

As already mentioned, neither the degree of residual dislocation nor the occurrence of calcification around the ligaments influenced the functional results. Calcification was equally distributed in both treatment groups, so it was not influenced by operative repair of the ligament. This observation is in contrast to the findings of Bjerneld et al.

Rupture and repair of the coracoclavicular ligament can occur without the development of calcification, as seen in sixteen of our patients who were operated on. Therefore, the absence of calcification cannot differentiate between a grade-2 injury (incomplete rupture of the coracoclavicular ligament) and a grade-3 dislocation (total rupture of the coracoclavicular ligament), as proposed by Urist[14] and by Bjerneld et al. In all of our patients, before treatment there was a displacement of the end of the clavicle of at least 75 per cent of its width (grade 3).

Because a decrease in strength and in range of movement occurred after the operation in three patients who were more than forty-six years old, we advocate conservative treatment for most middle-aged and elderly patients.

One advantage of the Phemister operation supposedly is the restitution of a correct anatomical relationship of the structures. If the operation does not relieve the pain, resection of the lateral end of the clavicle often will do so, and that procedure is easy to perform. The shoulder will not be impaired afterward to any great extent. The disadvantages of operative treatment are the risk of complications, the necessity of a second operation to remove the metallic device, the longer period of rehabilitation, and the lack of a guarantee of freedom from pain.

The advantages of the conservative treatment that was used in this series were the shorter period of rehabilitation; the freedom from hospitalization; and, in general, the satisfactory functional results. The disadvantages were that there is no guarantee of freedom from pain and that in the event that a reconstructive procedure is needed, it is somewhat more difficult to perform after the displacement has persisted for a longer period.

Thus, from the results of this study it seems that operation for acromioclavicular dislocation is only justified in a few situations: in thin patients with great prominence of the clavicle; in patients whose work necessitates having the shoulder in 90 degrees of flexion or abduction, or both; and perhaps in people who have to lift heavy weights at work. In our opinion, however, most other patients with a total acromioclavicular dislocation should be treated conservatively with a sling until they are free of pain. Then physiotherapy for range of motion and strengthening of the shoulder will usually produce an excellent result.

The cosmetic results were not evaluated in our study because we could not grade them in a way that was either reproducible or quantitative.

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