

## The evaluation and results of the surgery in the acromioclavicular joint dislocations

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**Abstract.** The aim of this study is to evaluate the results of patients with acromioclavicular joint (AC) dislocation treated surgically in terms of current literature. *Material and Method.* 26 patients with acute AC joint dislocation that were treated surgically were evaluated. Four of the patients were female and twenty two were male. Treatment method for 16 patients were coracoclavicular screw fixation and for 10 patients acromioclavicular kirschner wire (k-wire) fixation. *Results.* Patients were evaluated with radiological findings and clinic scorings (VAS, Quick DASH, Constant Score). Mean VAS score was 1.58 (distribution 0-4), mean Quick DASH score of the patients was 8.13 (distribution 0-36.36) and mean constant functional shoulder score was 90.61 (distribution 66-100). Radiologically, one of the patients (3.8%) had major coracoclavicular calcification and ankylosis of coracoclavicular and acromioclavicular joint. *Conclusion.* We recommend transfixation with k-wire or coracoclavicular screw fixation for patients with type 3 AC joint dislocation likewise type 4 and type 5 AC dislocation patients.

**Key words:** acromioclavicular joint, dislocation, coracoclavicular ligament.

### Introduction

Acromioclavicular (AC) joint is a diarthrodial joint which is placed between lateral aspect of clavicle and acromion. It is stabilized by acromioclavicular, coracoclavicular and coracoacromial ligaments statically and also deltoid and trapezius muscles dynamically. Along with the increasing age, a rapid degeneration occurs and after fourth decade it loses functionality (1-3).

Acromioclavicular dislocations accounts for 12% of all dislocations around shoulder joint (4). AC joint injuries occurs in young and active individuals usually as sport injuries, particularly while falling during bicycling or playing ball games (4-9).

The aim of this study is to evaluate the results of patients with acromioclavicular joint (AC) dislocation treated surgically in terms of current literature.

### Material and Method

26 patients who had acute AC joint dislocation between December 2011-January 2014 treated surgically and had follow ups were included in the study. Twenty two of 26 patients were male and

remaining 4 were female. In acute settings shoulder x-ray obtained for all patients. For occult cases, bilateral comparing x-rays and stress x-rays with 5 kg weight were obtained.

Affected side was right in 14 patients (53.8%) and left in 12 patients (46.2). Dominant side injury was 14 of 26 (53.8%). Mean age of patients was 43.5. Mean age for females was 46.5 (distribution 35-59) and for males 42.95 (distribution 24-70). The most observed age range was 21-30 (27%). For male patient the most observed range of age was 21-30 (31.8%) and for female patients, it was 41-50 (50%).

According to Rockwood classification, 23 of the patients had type 3, 2 of them had type 5 and 1 of them had type 4 AC joint dislocation.

Reasons of dislocation were as follows; 12 (46.15%) of them were as a result of traffic accident, 12 (46.15%) of them were occurred as falling of and 2 (7.7%) of them were as a result of pounding.

Also we evaluated the patients for additional injuries and we found that 1 patient had contralateral supracondylar femur fracture,

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contralateral lateral malleolus fracture and bilateral ramus pubis superior-inferior fracture. 1 patient had ipsilateral scapular fissuring. These additional injuries were treated with appropriate surgical and conservative settings.

Treatment method for 16 patients were coracoclavicular screw fixation (fig. 1) and for 10 patients acromioclavicular kirschner wire (k-wire) fixation (figure 2). Coracoclavicular ligament repairment was performed in 7 patients (27%).

Mean hospitalization of our patients was 2.42 (distribution 1-4) days.

Shoulder sling was removed at the postoperative 3th week and patients encouraged for pendular shoulder exercises. Recommendations for the patient were; not to perform forceful shoulder movement for 8 weeks, not to lift heavy weights and not to abduct more than 90 degrees until the k-wires or screw removal.



**Figure 1.** Acromioclavicular joint dislocations treated with coracoclavicular screw fixation



**Figure 2.** Acromioclavicular joint dislocations treated with kirschner wire (k-wire) fixation

## Results

The patients were assessed with radiological findings and clinic scorings (VAS, Quick DASH, Constant Score). Mean follow up of our patients was 37.35 (7-95) months. Mean VAS score of our patients was 1.58 (distribution 0-4). According to VAS, our 8 patients (30.8%) described no pain, 16 patients (61.5%) described mild pain and 2 patients (7.7%) described moderate pain. Constant functional shoulder score was found as 90.61 (distribution 66-100). According to constant score, 20 cases (77%) resulted excellent, 5 cases (19.2%) resulted good and 1 case (3.8%) resulted poor. Mean Quick DASH score of the patients was 8.13 (distribution 0-36.36). According to Quick DASH score, 23 cases (88.5%) resulted excellent and 3 cases (11.5%) resulted good.

In the radiological assessment, coracoclavicular (CC) distance was measured. Mean CC distance of operated side of our patient was found as 1.18 cm (0.8-1.5 cm) and other side mean CC distance was found as 0.93 cm (0.8-1.1 cm). The CC distance of 14 patients (53.8%) was increased more than 2 mm in contrast to other side. Data of patients pointed out that moderate reduction loss was observed in 6 patients (23%) and mild reduction loss in 8 patients (30.8%).

Radiologically, one of the patients (3.8%) had major CC calcification and ankylosis of coracoclavicular and acromioclavicular joint.

15 patients (57.7%) had CC calcification and 14 of them (53.9%) were minor calcification. However, none of the patient who had CC calcification showed joint movement or function impairment. Three of the patients (75%) who had revision surgery developed CC calcification. These patients also showed no joint movement or function impairment. Mean implant extraction time was 14 weeks (8-32 weeks).

Only 3 of our patients (11.5%) attended physical therapy center and other 23 patients (88.5%) did their exercises by themselves. Our implant failure rate was 23% (4 screw failure and 3 k-wire migration). Mean time for returning back to work was 3.1 months (distribution 0.5-12 months).

## Discussion

Purpose of surgical treatment of AC joint dislocations is acceptable reduction of the joint by repairing capsuloligamentous stabilizers along with securing reduction state during rehabilitation period. In the same time, it is aimed to recover the

injured extremity to obtain pain free range of motion and to have completely functional state (10).

Bektaşer et al. (11) found out that 34 patients treated with Bosworth screw had a mean constant score of 93 (46-96) postoperatively. They stated 24 patients (70.6%) had excellent, 7 patients (20.6%) had good and 3 patients (8.8%) had poor results. Liedel et al. (12) stated that mean constant score of short term follow up (1-2 years) was 88, in middle term follow up (3-5 years) was 89 and in long term follow up (6-10 years) was 86.

Sirveaux et al. (13) found out that mean constant score was 92 in 29 patient who undergone surgical treatment with k-wire transfixation for type 3 AC joint dislocation. Verdano et al. (14) stated that their constant score was 92.7 and DASH score was 3.2.

In our study, constant functional shoulder score was 90.61 (distribution 66-100). According to constant score, 20 cases (77%) resulted excellent, 5 cases (19.2%) resulted good and 1 case (3.8%) resulted poor. Mean Quick DASH score of the patients was 8.13 (distribution 0-36.36). According to Quick DASH score, 23 cases (88.5%) resulted excellent and 3 cases (11.5%) resulted good. Mean VAS score of our patients was found as 1.58. In terms of indicating wellness of the patients, there was compatibility between constant shoulder score, quick DASH score and VAS score.

Taft, Lazcano et al. (15,16) stated in their study consist of 56 cases who undergone surgical treatment due to type 3 AC joint dislocation, 26 of them were treated with k-wire fixation and remaining of them were treated with coracoclavicular screw, that posttraumatic arthrosis rate was 27% and mean follow up time was 10.8 years. Sirveaux et al. (13) declared that posttraumatic arthrosis rate was 72% and in the study of Bektaşer et al. (11) this rate was 3%. Esenyel et al. (17) found out that none of the patients developed AC joint arthrosis. Also it was stated that if anatomic reduction could not preserved arthrosis rate increases, however, clinical results and patient satisfaction does not affected from anatomic restoration (15). Although, it was also stated that anatomic reduction does not prevent arthrosis (16). In our study, we detected 6 patients (23%) who developed AC arthrosis and 3 of them had k-wire fixation and 3 of them had of

them had k-wire fixation and 3 of them had coracoclavicular screw fixation.

Lancaster et al. (18) stated that in spite of much more minor complication was observed in acromioclavicular k-wire fixation group, major complications such as failure and recurrence rate was higher in group of coracoclavicular screw fixation. As for redislocation rates, Bektaser et al. (11) declared 8.8% and Esenyel et al (17) declared 6.3%. They also stated that reason of redislocation was related to fixation with cortical screw instead of spongy screw. Our implant failure rate was 23% (4 screw failure and 3 k-wire migration). The patients with screw failure undergone surgical operation again due to redislocation while patients with k-wire migration were not indicated for a surgical intervention owing to late migrations of k-wires.

Disadvantage of Bosworth technique that k-wires left inside is need of a second intervention to take out implants. Balance between early extraction of screw for prevention of break off and risk of deformity occurrence should be well established, otherwise recurrence of deformity may arise and it was reported up to 35% in the literature. Generally, it is recommended that k-wires should be removed at 6-8<sup>th</sup> week and screws at 8<sup>th</sup> week (5). In the study of Larsen et al. (19) k-wire extraction time was reported as 5-12<sup>th</sup> week and Esenyel, Bektaser et al. (17,11) reported of screw extraction at 8-10<sup>th</sup> week. Liedel et al. (12) reported seconder AC joint dislocation after k-wire extraction in 6 patients (11%). Lazcano et al. (15) stated reduction loss in 4 pateints (57%) after screw extraction but it had not an effect on results. In our study, mean implant extraction time was 14 weeks (8-32 weeks). We did not observed any implant failure or reduction loss. This extraction delay was due to both work load and patient related reasons.

In a study with 86 patients, Eskola et al. (20) performed open reduction without ligamentous repair following k-wire or cortical screw fixation. In 8 out of 25 patients (32%) who underwent screw fixation and 5 out of 61 patients (8.2%) who underwent k-wire fixation had osteolysis. In our study, 7 osteolysis (26.9%) were detected and 3 of them (30%) were k-wire fixation and 4 of them (25%) were coracoclavicular screw fixation. Bjerneld et al. (21) stated in their study that coracoclavicular calcification had an negative effect on functional results, general opinion in the literature is radiologic findings such as

coracoclavicular calcification have no relation on functional outcomes and does not need treatment (5,6,16,22-25). Bektaser et al. (11) reported that 12 patients (35.3%) had CC calcification and Larsen et al. (19) stated 27 out of 41 patients (66%) had CC calcification. According to the results of both study calcification had no effect on patient results.

In our study, 15 of the patients (57.7%) had CC calcification and 12 of them (75%) were coracoclavicular screw fixation patients and 3 of them (30%) were k-wire fixation patients. With these findings, we concluded that coracoclavicular fixation with screw increases CC calcification rate.

It is found out that there were no significant consistency between radiologically measured bilateral CC distance difference, CC calcification, AC joint degeneration and clinically obtained VAS score, constant shoulder score and quick DASH score. Also these radiological findings did not effected functional results.

Limitations of our study is short follow up time and patient population was not large enough to perform a statistically significant study.

### Conclusion

We concluded that transfixation with k-wire or coracoclavicular screw fixation for patients with type 3 AC joint dislocation likewise type 4 and type 5 AC dislocation patients is a sufficient treatment modality.

### References

1. DePalma AF (1959). The role of the disks of the sternoclavicular and the acromioclavicular Joints. *Clin Orthop*; 13: 222-233.
2. Petersson CJ (1983). Degeneration of the acromioclavicular joint. *Acta Orthop Scand*; 54:434-438.
3. Salter EG, Nasca RJ, Shelley BS (1987). Anatomical observations on the acromioclavicular joint and supporting ligaments. *Am J Sports Med*;15:199-206.
4. Monig SP, Burger C, Helling HJ, Prokop A, Rehm KE (1999). Treatment of complete acromioclavicular dislocation: present indications and surgical technique with biodegradable cords. *Int J Sports Med*; 20: 560-2.
5. Bannister GC, Wallace WA, Stableforth PG, Hutson MA (1989). The management of acute acromioclavicular dislocation. A randomised prospective controlled trial. *J Bone Joint Surg [Br]*; 71: 848-850.

6. Dias JJ, Steingold RF, Richardson RA, Tesfayohannes B, Gregg PJ (1987). The conservative treatment of acromioclavicular dislocation. Review after five years. *J Bone Joint Surg [Br]*; 69: 719-722.
7. Pfahler M, Krodel A, Refior HJ (1994). Surgical treatment of acromioclavicular dislocation. *Arch Orthop Trauma Surg*; 113: 308-311.
8. Rawes ML, Dias JJ (1996). Long-term results of conservative treatment for acromioclavicular dislocation. *J Bone Joint Surg [Br]*; 78:410-412.
9. Fremerey RW, Lobenhoffer P, Ramacker K, Gerich T, Skutek M, Bosch U (2001). Acute acromioclavicular joint dislocation operative or conservative therapy? *Unfallchirurg*; 104: 294-299.
10. Rockwood CA Jr (1984). Subluxations and dislocations about the shoulder. Injuries of the acromioclavicular joint. In: Rockwood CA Jr, Green DP, eds. *Fractures in Adults*. Philadelphia, PA: JB Lippincott; pp860-910
11. Bektaşer B, Bozkurt M, Öçgüder A, Solak Ş, Oğuz T (2004). Surgical treatment of type III acromioclavicular joint dislocations by a modified Bosworth technique. *Ulus Travma Acil Cerrahi Derg*; 10(4): 245-9.
12. Leidel BA, Braunstein V, Kirchhoff C, Pilotto S, Mutschler W, Biberthaler P (2009). Consistency of long-term outcome of acute Rockwood grade III acromioclavicular joint separations after K-wire transfixation. *The Journal of Trauma*; 66(6):1666-1671.
13. Sirveaux F, Traversari R, Roche O, Mole D (2001). Outcome more than ten years after surgical treatment of acromioclavicular disjunction. *J Bone Joint Surg Br*; 83:36.
14. Verdano MA, Pellegrini A, Zanelli M, Paterlini M, Ceccarelli F (2012). Modified Phemister procedure for the surgical treatment of Rockwood types III, IV, V acute acromioclavicular joint dislocation. *Musculoskelet Surg*; 96(3): 213-22.
15. Lazcano MA, Anzel SH and Kelly PJ (1961). Complete dislocation and subluxation of the acromioclavicular joint. End result in seventy-three cases. *J Bone Joint Surg* ; 43(3): 379-391.
16. Taft TN, Wilson FC, Oglesby JW (1987). Dislocation of the acromioclavicular joint. An end-result study. *J Bone Joint Surg Am*; 69(7): 1045-1051.
17. Esenyel CZ, Öztürk K, Bülbül M, Ayanoğlu S, Ceylan HH (2010) Coracoclavicular ligament repair and screw fixation in acromioclavicular dislocations. *Acta Orthop Traumatol Turc*: 44(3): 194-198.
18. Lancaster S, Horowitz M, Alonso J (1987). Complete acromioclavicular separations. A comparison of operative methods. *Clin Orthop Relat Res*; 216: 80-88.
19. Larsen E, Bjerg-Nielsen A, Christensen P. (1986). Conservative or surgical treatment of acromioclavicular dislocation. A prospective, controlled, randomized study. *J Bone Joint Surg Am*; 68(4): 552-555.
20. Eskola A, Vainionpää S, Korkkala O, et al. (1987) Acute complete acromioclavicular dislocation. A prospective randomized trial of fixation with smooth or threaded Kirschner wires or cortical screw. *Ann Chir Gynaecol*; 76: 323-326.
21. Bjerneld H, Hovelius L, Thorling J (1983). Acromioclavicular separations treated conservatively. A 5-year follow-up study. *Acta Orthop Scand*; 54: 743-745.
22. Imatani RJ, Hanlon JJ, Cady GW (1975). Acute, complete acromioclavicular separation. *J Bone Joint Surg Am*; 57: 328-332.
23. Stam L, Dawson I (1991). Complete acromioclavicular dislocations: treatment with a Dacron ligament. *Injury*; 22: 173-176.
24. Colosimo AJ, Hummer CD 3rd, Heidt RS Jr (1996). Aseptic foreign body reaction to Dacron graft material used for coracoclavicular ligament reconstruction after type III acromioclavicular dislocation. *Am J Sports Med*; 24: 561-563.
25. Dumontier C, Sautet A, Man M, et al (1995). Acromioclavicular dislocations: treatment by coracoacromial ligament ooplasty. *J Shoulder Elbow Surg* ; 4: 130-134.

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