

# Comparison of Surgical Treatment and Conservative Approach for Type III Acromioclavicular Dislocations

## Tip III Akromiyoklaviküler Dislokasyonlar İçin Cerrahi Tedavi ile Konservatif Yaklaşımın Karşılaştırılması

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**ABSTRACT Objective:** In this study, we aimed to compare the effectiveness and the results of surgical (modified Weaver-Dunn) and conservative treatment techniques for Rockwood type III acromioclavicular dislocation. **Material and Methods:** Thirty four patients with acromioclavicular dislocation were included in this study. The mean age was  $43.6 \pm 10.2$  years (range 21-60). Modified Weaver-Dunn technique was performed on 17 patients. The mean operation time after the trauma was  $12 \pm 6.9$  days (range 3-24 days). The remaining 17 patients were treated conservatively with an acromioclavicular bandage. The range of motion and strengthening of the shoulder muscles started during the sixth week of treatment in both groups. The mean follow up period of both groups was  $32.8 \pm 12.1$  months (range 12-72). **Results:** No complication occurred in either groups. According to Poigenfurst's criteria, the results were classified as good or excellent in both groups. No statistically significant difference was found between the results of the groups according to Poigenfurst's criteria ( $p > 0.05$ ). **Conclusion:** Treatment modalities of type III acromioclavicular dislocation remain controversial. Satisfactory results have been reported when Modified Weaver-Dunn techniques were performed initially to young, active, laborer and athletes with acromioclavicular dislocation of the dominant extremity. In this study, we did not find a significant difference between surgical treatment and conservative approach in terms of measurements of functional outcomes. We concluded that the treatment of stage III dislocation can be modified according to the personal characteristics and the expectations of the patient. Current data indicates that both treatment modalities can be satisfactory.

**Key Words:** Shoulder joint; dislocations; acromioclavicular joint

**ÖZET Amaç:** Bu çalışmada Rockwood tip III akromiyoklaviküler dislokasyon için cerrahi (modifiye Weaver-Dunn) ve konservatif tedavi tekniklerinin etkinliğini ve sonuçlarını karşılaştırmayı amaçladık. **Gereç ve Yöntemler:** Bu çalışmaya akromiyoklaviküler dislokasyonu olan 34 hasta alındı. Ortalama yaş  $43.6 \pm 10.2$  yıldır (21-60 yıl). Hastaların 17'sine modifiye Weaver-Dunn tekniği uygulandı. Travmadan sonraki ortalama operasyon süresi  $12 \pm 6.9$  gündü (3-24 gün). Kalan 17 hasta bir akromiyoklaviküler bandaj ile konservatif olarak tedavi edildi. Her iki grup için de hareket aralığı ve omuz kaslarının güçlendirilmesi egzersizleri tedavinin altıncı haftasında başlandı. Her iki grubun ortalama takip süresi  $32.8 \pm 12.1$  ay oldu (12-72 ay). **Bulgular:** İki grupta da komplikasyon olmadı. Poigenfurst kriterlerine göre her iki grup için sonuçlar iyi ve mükemmel şekilde sınıflandı. Poigenfurst kriterlerine göre her iki grubun sonuçları arasında anlamlı fark bulunmadı. ( $p > 0.05$ ) **Sonuç:** Tip III akromiyoklaviküler dislokasyonun tedavi modaliteleri halen tartışmalıdır. Dominant ekstremitede akromiyoklaviküler dislokasyonu olan genç, aktif, işçi ve atletlere başlangıçta Modifiye Weaver-Dunn tekniği uygulandığında tatmin edici sonuçlar bildirilmiştir. Bu çalışmada işlevsel sonuçların ölçümünde cerrahi tedavi ve konservatif yaklaşım arasında istatistiksel olarak anlamlı fark bulamadık. Biz, evre III dislokasyon tedavisinin hastanın kişisel durumu ve beklentilerine göre modifiye edilebileceği sonucunu çıkardık. Şu anki verilerle uyumlu olarak her iki tedavi modalitesi de tatmin edici olabilir.

**Anahtar Kelimeler:** Omuz eklemi; çıkıklar; akromiyoklaviküler eklem

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**A** cromioclavicular joint (ACJ) is the second most frequently dislocated joint of shoulder girdle after glenohumeral joint it is often involved in shoulder injuries due to its subcutaneous location.<sup>1-3</sup> The ACJ dislocations constitute 10% of all shoulder girdle injuries. The mechanism of injury is usually the rupture of the acromioclavicular and the coracoclavicular ligaments, which are joint stabilizers. It occurs when a direct blow hits the joint with the arm at the side of body, in an adducted position.<sup>2-5</sup> Less frequently, it occurs after a fall on an outstretched hand or flexed elbow with the force transmitted upward through humeral head to the acromion process. In this type of injury, because of the decrement in the coracoclavicular space, the injury only affects the acromioclavicular ligament. Rockwood has classified ACJ dislocations into six stages or types according to the type of injury.<sup>2</sup>

According to the current literature, stage I and II injuries are treated by conservative modalities. Stage IV, V and VI injuries are advised to undergo surgery.<sup>3,4,6</sup> Although conservative treatment is widely preferred, there is controversy about the best treatment choice for stage III injuries. Both conservative and surgical methods were reported to be for the treatment of stage III ACJ injuries.<sup>3,4,6-11</sup> There are only a few studies in the literature that compare the results of the conservative approach and the surgical treatment of stage III ACJ injuries.<sup>3,12,13</sup>

In this retrospective study, we evaluated 34 stage III ACJ dislocations. Seventeen of them were treated conservatively with acromioclavicular bandage, and the remaining were treated with surgery, the modified Weaver-Dunn technique. We have compared the results of the conservative approach and the surgical treatment of stage III ACJ dislocations according to Poigenfurst's criteria.<sup>10</sup>

## MATERIAL AND METHODS

Thirty four patients with ACJ dislocations, who were treated between 1995 and 2004 were included in this study. Twenty four of them were males and the remaining 10 were females. The mean age was  $43.6 \pm 10.2$  (21-60) months. The dislocation was on

the non-dominant side in 20 patients and in 14 of them it was on the dominant side. In terms of etiology, the cause of the injury was a traffic accident in 23 of the cases (67.6%), falling on the arm in 11 of them (26.5%) and a bicycle accident in two of the cases (5.9%). The information about the patients is shown in Table 1.

All patients had pain in the shoulder girdle, tenderness over the joint and decreased range of motion during admission to hospital. ACJ dislocations of all patients were recognized on radiograms and stress radiograms were obtained when necessary. In type III dislocation, the acromioclavicular joint capsule and coracoclavicular ligaments are completely disrupted. The coracoclavicular interspace is 25-100% larger than the normal shoulder. A total of 34 patients had stage III ACJ dislocations. Seventeen of them underwent surgery via the Modified Weaver-Dunn technique. The mean time from the trauma to the surgical treatment of the patient was 12 days (3-24 days). The modification of Weaver-Dunn technique.<sup>3,14</sup> includes; (a) using a No 5 Ethibond® (©Ethicon Excel Johnson and Johnson, Belgium) non-absorbable suture material, (b) tying this suture material through two vertical holes which are opened in the projection of the coracoid process on the clavicle and under the coracoid process for fixation of the coracoacromioclavicular ligament. After surgery, operated arms were rested in the arm sling for three weeks. On the first postoperative day, isometric exercises were started. During the first postoperative week, pendulum and active-assistive exercises were started so that by the end of the third postoperative week, 90° abduction was achieved. At the end of the sixth week, full range of shoulder motion was achieved.

The remaining seventeen patients with stage III ACJ dislocations were treated conservatively with an acromioclavicular bandage which was applied on the first day of the trauma. Isometric exercises were also started immediately in these conservatively treated patients. Active-assistive exercises were started during the third postoperative week and active exercises were started during

**TABLE 1:** Detailed data of the patients.

Patient	Sex	Age	Type of injury	Treatment	Follow-up (months)	Complication	Subjective Results	Time to Surgery (days)
1	Female (F)	42	Traffic accident	Surgery	24	No	Good	10
2	Male (M)	54	Traffic accident	Surgery	18	No	Good	8
3	M	21	Traffic accident	Surgery	72	No	Excellent	3
4	M	52	Traffic accident	Surgery	16	No	Good	6
5	M	60	Fall	Surgery	48	No	Excellent	5
6	M	25	Traffic accident	Surgery	52	No	Excellent	11
7	F	40	Traffic accident	Surgery	50	No	Good	5
8	M	57	Traffic accident	Surgery	44	No	Good	12
9	M	60	Traffic accident	Surgery	28	No	Excellent	24
10	F	58	Traffic accident	Surgery	30	No	Excellent	10
11	M	51	Traffic accident	Surgery	34	No	Good	8
12	M	46	Traffic accident	Surgery	32	No	Good	6
13	M	48	Traffic accident	Surgery	34	No	Excellent	16
14	F	52	Fall	Surgery	28	No	Good	18
15	M	44	Fall	Surgery	36	No	Excellent	21
16	F	50	Fall	Surgery	37	No	Good	24
17	M	37	Traffic accident	Surgery	31	No	Good	20
18	M	48	Traffic accident	Conservative	32	No	Excellent	
19	F	35	Fall	Conservative	34	No	Good	
20	M	24	Traffic accident	Conservative	24	No	Excellent	
21	F	47	Traffic accident	Conservative	48	No	Good	
22	M	43	Traffic accident	Conservative	44	No	Excellent	
23	M	56	Traffic accident	Conservative	36	No	Excellent	
24	M	28	Bicycle accident	Conservative	24	No	Good	
25	M	43	Traffic accident	Conservative	12	No	Excellent	
26	M	32	Bicycle accident	Conservative	16	No	Good	
27	M	44	Traffic accident	Conservative	26	No	Good	
28	M	33	Traffic accident	Conservative	18	No	Excellent	
29	F	45	Traffic accident	Conservative	28	No	Good	
30	M	38	Traffic accident	Conservative	36	No	Good	
31	F	49	Fall	Conservative	31	No	Excellent	
32	F	46	Fall	Conservative	30	No	Excellent	
33	M	37	Fall	Conservative	27	No	Good	
34	M	39	Fall	Conservative	38	No	Excellent	

the fourth week. At the end of sixth week, full range of motion of the shoulder was regained. All patients were evaluated with X-rays and Poigenfurst's criteria before and after the injury (Table 2).

Statistical analysis was performed using statistical package, SPSS for Windows (version 11.5). Fisher's exact Chi-square test was used to compare Poigenfurst's criteria. Mean period of follow up for

two groups were compared using Mann-Whitney U test. P value was set at 0.05.

## RESULTS

We did not experience any complications such as infection, neurovascular damage, re-dislocation of ACJ or pain in patients who were treated surgically. Similarly, no complications such as skin damage, neurovascular damage or re-dislocation

**TABLE 2:** Poigenfurst' criteria scoring systems for acromioclavicular joint separation.

Perfect (Excellent)
<ul style="list-style-type: none"> <li>■ Less than 10 degrees of restriction of motion compared to the other side</li> <li>■ No complaint (only tenderness with weather changes)</li> <li>■ Full healthy athletic status (no parasthesia)</li> <li>■ Radiologic findings: No dislocation nor subluxation</li> </ul>
Good
<ul style="list-style-type: none"> <li>■ 1-20 degrees of restriction of motion compared to the other side</li> <li>■ Few complaints during pressure</li> <li>■ Full healthy athletic status (minor parasthesia on lateral side of the scar tissue)</li> <li>■ Radiological findings: No dislocation or subluxation along less than half of the clavicular diameter</li> </ul>
Poor
<ul style="list-style-type: none"> <li>■ More than 20 degrees of restriction of motion compared to the other side</li> <li>■ Complaints during normal activities and rest</li> <li>■ Dramatic decrement in healthy athletic status (parasthesia on lateral side of the scar tissue)</li> <li>■ Radiological findings: Dislocation</li> </ul>

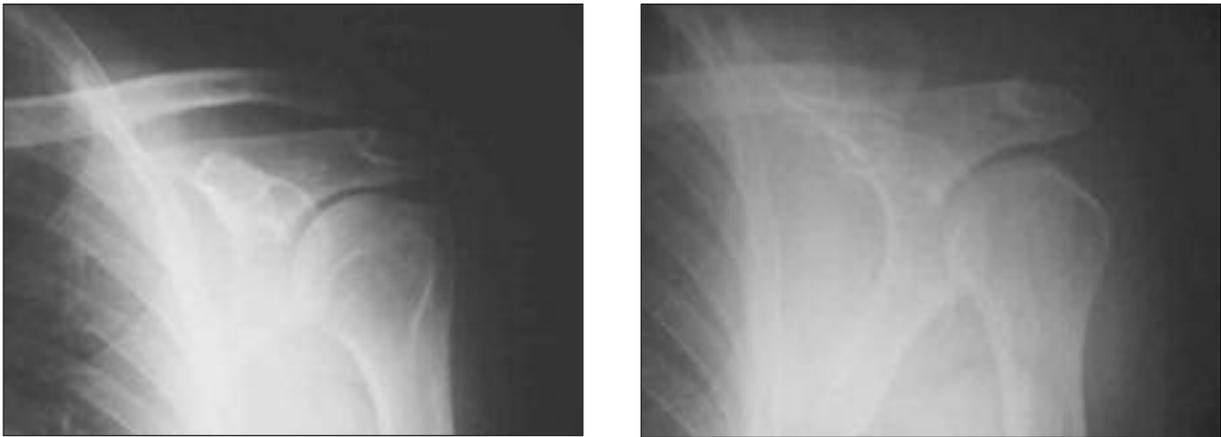
were reported in patients who were treated conservatively. In all patients treated conservatively or surgically, full range of motion on shoulder was achieved by the end of the 6<sup>th</sup> week, as demonstrated in Figure 1A-1B and 2A-2B respectively.

There was no statistically significant difference between two groups in terms of gender and the type of injury ( $p=0.156$ ). The mean time of follow up after surgery and after conservative approach was  $36.1 \pm 13.7$  (16-72) and  $29.6 \pm 9.4$  (12-48) months, respectively. There was no statis-

tically significant difference between two groups in terms of follow up period ( $p=0.170$ ).

According to Poigenfurst's criteria, seven of the patients who underwent surgery got perfect results and the remaining 10 got good results, whereas nine of the patients who were treated conservatively had perfect results and the remaining eight of them got good results. There was no statistically significant difference between conservatively treated and surgically treated patients according to Poigenfurst criteria ( $p=0.492$ ).

**A****B****FIGURE 1:** The radiographs of a patient who was treated conservatively. (A) just after injury, and (B) after six weeks of conservative treatment.



**FIGURE 2:** Pre-operative (A), and post-operative (B) radiographs of a patient treated with Modified Weaver-Dunn procedure.

## DISCUSSION

There is still controversy about the optimal choice of treatment of stage III ACJ dislocations in the literature, concerning surgery and conservative treatment. In the literature, conservatively treated patients were reported to have pain and restricted range of motion during close contact sports.<sup>2,5,15-17</sup>

Since both acromioclavicular and coracoclavicular ligaments are ruptured in stage III ACJ separations, the stability of the joint is preserved by scapular and rotator muscles. Since the stabilizing effects of ligaments are lost day by day, the muscles of the shoulder girdle get exhausted.

Instability of the joint causes pain that does not respond to NSAIDs, and in the long run, this potentiates the development of degenerative changes in the joint.<sup>2,6,8,9,14,18</sup> For functional satisfaction and comfort of the patients, it would be appropriate to re-establish the joint stability by surgical reconstruction of the acromioclavicular and corococlavicular ligaments. Modified Weaver-Dunn procedure for the surgical treatment of ACJ dislocations have advantages such as providing the joint stability, prevention of chronic shoulder pain and gaining full range of motion satisfactorily.<sup>2,3,17,19</sup>

It would be appropriate to operate the selected cases such as young and active people, sportsmen and heavy workers with ACJ stage III dislocations in early periods of injury. This would be beneficial to avoid secondary procedures to cope with instability, chronic pain or degenerative changes. Although Modified Weaver Dunn procedure does not provide an anatomical restoration for ACJ, it might satisfactorily hinder repeated surgical interventions to deal with subsequent clinical symptoms.<sup>2,4,16-20</sup> In a recent study, Fremerey et al<sup>9</sup> found no difference between results of conservative approach and surgical treatment of type III and IV acromioclavicular injuries, using UCLA and Constant-Morey scoring systems.

## CONCLUSION

We did not find any statistical differences between patients who were treated conservatively or surgically for stage III AJC dislocations in terms of function or satisfaction. Therefore we suggest that the type of treatment for should be considered according to the patients' expectations and the personal characteristics in stage three ACJ dislocations.

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