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Case Report

Anatomic Acromioclavicular Joint Reconstruction with Semitendinosus Allograft and 8-Plate: A Case Report on Surgical Techniques

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Abstract

Background: Acromioclavicular (AC) joint dislocation is a quite common shoulder injury, especially among young, athletic people. Despite various treatment approaches, AC joint injuries still pose significant treatment challenges. Common concerns include postoperative pain, limited shoulder mobility, and hardware-related complications. In recent years, a number of surgical methods have been developed with the goal of improving functional outcomes while reducing complications. In this study, we report a surgical technique using semitendinosus allograft and an 8-plate for a patient with type III AC joint dislocation.
Case Report: A 33-year-old man sustained a type III AC joint dislocation following a motorcycle accident. Initial non-surgical management failed to relieve pain or restore full shoulder mobility. As a result, the patient underwent surgical intervention using semitendinosus allograft in combination with an 8-plate device. At the three-month follow-up, the patient had complete shoulder range of motion (ROM) and showed no symptoms of discomfort, dislocation, or joint prominence.
Conclusion: AC joint dislocation treatment remains debated, but recent advancements in surgical methods have made it more effective. Reconstruction using semitendinosus allograft and 8-plate device offers improved clinical outcomes with fewer complications.

Keywords: Case Reports; Acromioclavicular Joint; Reconstructive Surgical Procedures; Allografts; Tendon Transfer; Joint Dislocations

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Background

Acromioclavicular (AC) joint dislocation typically results from a traumatic event, involving either direct or indirect force. This leads to joint injury as well as sprain or rupture of the surrounding AC and coracoclavicular (CC) ligaments, which support the joint. AC joint dislocations account for approximately 9-12 percent of shoulder injuries. These injuries are more commonly seen in young athletes and occur about five times more often in men. Many of these injuries are underdiagnosed (1, 2).

Several techniques are commonly used to treat high-grade AC joint injuries. These methods are generally classified into two groups: AC fixation techniques such as hook plate fixation, tension band wiring, and repair or reconstruction of AC capsule, and CC fixation techniques, including CC fixation or reconstruction (3, 4). The Rockwood classification system identifies six grades of injury, considering the integrity of the AC and CC ligaments, the direction of clavicular dislocation, and the clavicle's attachment to the deltoid and trapezius muscles (5). Type III injuries are typically managed non-surgically. However, conservative treatment may result in long-term pain and development of AC joint osteoarthritis. Therefore, some studies have supported surgical intervention for type III injuries in young, active patients (6).

Treatment of AC joint injuries has always been challenging, while the most effective approach still remains undefined. Shoulder motion limitations, lack of appropriate hardware, chronic pain, and the need for hardware removal are among clinical concerns in the surgical management of these injuries. Following a comprehensive review of the literature on the challenges of treating this type of injury, we present a case of type III AC dislocation in a young patient who was surgically treated using the reconstruction with semitendinosus allograft and 8-plate technique. The main reasons for selecting this specific technique were having appropriate hardware, avoiding hardware removal, and achieving a rapid, pain-free return to full activity without shoulder motion restrictions.

Case Report

The patient was a 33-year-old right-handed man, a driver and smoker, who sustained a type III AC joint dislocation of the right shoulder following a motorcycle accident two months prior. Initially, the patient was managed conservatively. However, after two months of supportive treatment, he re-presented with persistent pain and limited shoulder mobility.

On clinical examination, the skin appeared intact, and the AC joint was visibly prominent (Figure 1).

Figure 1. Prominence of the acromioclavicular (AC) joint

There was tenderness upon palpation of the joint. Shoulder movements were painful, with active abduction and forward flexion limited to 100 degrees, while passive range of motion (ROM) remained full. Neurological and vascular examinations were normal. X-ray revealed a type III AC dislocation according to the Rockwood classification (Figure 2).

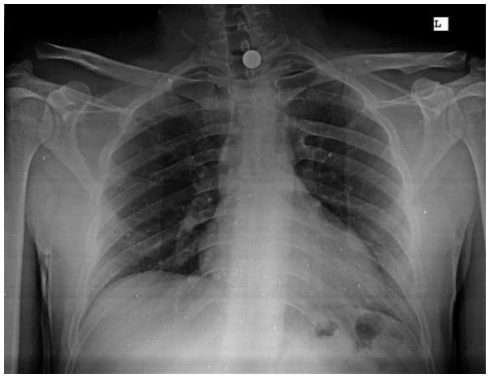

Figure 2. Type 3 acromioclavicular (AC) joint dislocation

Technique

Patient Positioning and Anesthesia: Following induction of general anesthesia, the patient was placed in the beach chair position. Subsequently, the right shoulder was prepped and draped in a sterile fashion.

Surgical Technique: The semitendinosus allograft was prepared on the side table. A skin incision was made from the AC joint to the coracoid, and the deltotrapezial fascia along the clavicular alignment was opened (Figure 3).

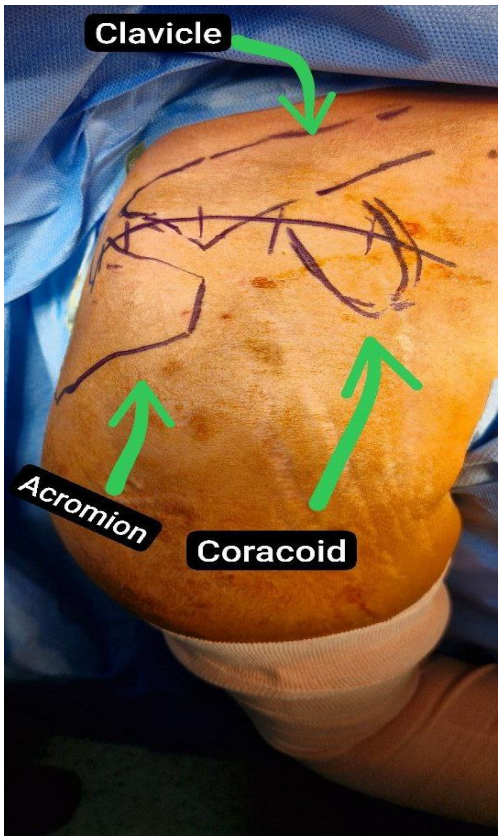

Figure 3. Surgical incision site

The AC joint was exposed, and fibrous tissue was debrided to allow for reduction (Figure 4).

Figure 4. Exposure of the distal clavicle and removal of the fibrous tissue

Next, the coracoid process was exposed, and a FiberTape suture along with the semitendinosus tendon (in an 8-shape configuration) was passed beneath the coracoid (Figure 5).

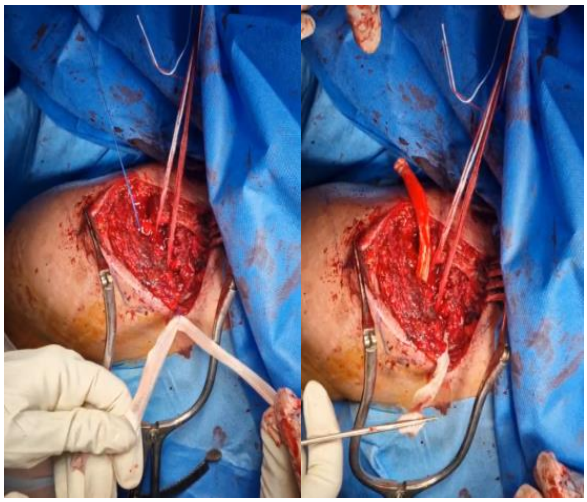

Figure 5. Passage of the FiberWire and semitendinosus tendon beneath the coracoid

Then, at approximately 30 mm and 55 mm from the lateral edge of the clavicle, two holes were drilled in a posterior-to-anterior and superior-to-inferior direction. A two-hole 8-plate (Figure 6) was positioned on the clavicle, aligned with the previously drilled holes.

Figure 6. View of the 8-plate

Next, both ends of the FiberWire suture were passed through the clavicular drill holes and subsequently the holes of the 8-plate. Anatomic reduction of the AC joint was achieved. The FiberWire was tightly knotted first, followed by secure fixation of the semitendinosus tendon. To reinforce the reduction, the ends of the graft were sutured together (Figure 7).

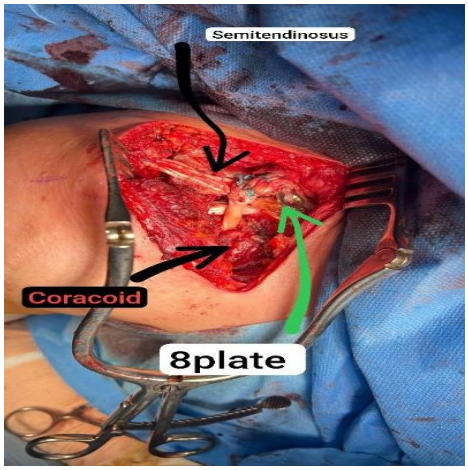

Figure 7. Final view of the semitendinosus tendon and 8-plate

The reduction was checked under C-arm fluoroscopy, and it was found to be satisfactory. The deltotrapezius fascia and skin were then closed in layers (Figure 8).

Figure 8. Closure of the deltotrapezius fascia

With this technique, both vertical and horizontal stability were restored through reconstruction of the CC and AC ligaments. Postoperative radiographs obtained immediately after the procedure indicated successful reduction of the AC joint dislocation (Figure 9).

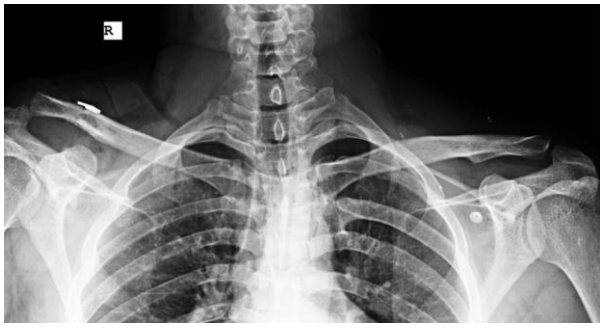

Figure 9. Postoperative initial X-ray

On postoperative day two, the patient was discharged with an abduction pillow and instructions for ROM exercises for the elbow, wrist, and fingers. Pendulum exercises were started at two weeks postoperatively, and the use of the abduction pillow was discontinued at four weeks. Active ROM physical therapy was permitted six weeks after surgery. At three months, the patient demonstrated full shoulder ROM without any signs of dislocation, pain, and AC joint prominence (Figure 10 A, B, C).

Figure 10A. No prominence of the acromioclavicular (AC) joint at post-operative month three

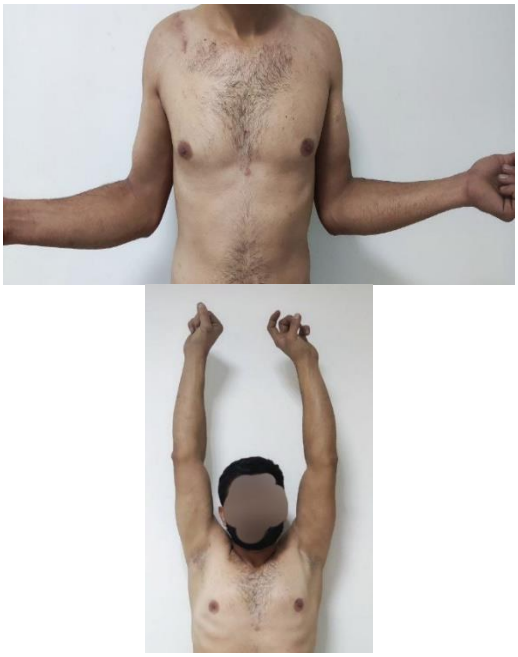

Figure 10B. Full shoulder range of motion (ROM) in all directions at post-operative month three

Figure 10C. Postoperative X-ray of the patient three months after the surgery

Discussion

The management of acute and chronic AC dislocations is a contentious topic within the orthopedic community

(7). The primary goal of treating these type of injuries is to restore the joint anatomy and natural alignment while enabling a full, unrestricted ROM during activity (8). Over the years, several surgical techniques have been proposed for the management of type III AC dislocations. These include hook-plate fixation, Steinmann pins, wire cerclage, the modified Phemister technique, the Bosworth screw technique for rigid fixation of the CC ligament, non-rigid fixation with sutures in the Ladermann procedure, the TightRope system, double-button technique, reinforcement with a semitendinosus autograft tendon, and various arthroscopic procedures.

AC joint fixation using Kirschner wires (K-wires) and Steinmann pins was among the earliest surgical treatments for AC dislocations. However, their current use is limited due to the potential for severe complications, such as pin migration and the potential injury to adjacent neurovascular structures (9). In a retrospective study involving 40 patients treated with hook plate fixation, Mannan et al. demonstrated that AC joint fixation with a hook plate was an effective treatment option for type III and V Rockwood AC dislocations. This method yields favorable functional outcomes in terms of pain, regular activity, ROM, and shoulder strength (10). Despite its associated complications, the hook plate still remains one of the most commonly used devices for surgical treatment worldwide. Reported complications include the need for implant removal after a specified period and the potential for partial loss of reduction after device removal (11).

De Groot et al., in a current concepts article, stated that the Rockwood classification could not differentiate between patients who would benefit from surgery and those who would not. They recommended two groups of patients as suitable candidates for surgical treatment with grafting: high-demand patients with high-grade injuries (instability), and those with low-grade injuries (no instability) who failed to respond to conservative treatment. They also mentioned that there was evidence suggesting that grafting might be the most appropriate option for managing chronic injuries and revision surgeries (12). Maliwankul et al. stated that postoperative widening of the clavicular tunnels might lead to loss of reduction. To minimize the effects of this issue along and tunnel widening, they recommended early removal of the hardware and suture materials once complete ligament healing was confirmed (13). In a systematic review, Shah et al. indicated that the arthroscopic management of acute and chronic CC ligament injuries was associated with a low failure rate. Moreover, arthroscopic reconstruction of the CC ligament appeared to be a safe and effective alternative to open surgery for chronic AC joint dislocations (14). Lee et al. also demonstrated satisfactory clinical results after an average follow-up of two years in a cohort of 27 patients with severe AC joint injuries, treated using an arthroscopic CC fixation technique with multiple soft anchor knots (15).

Given the lack of consensus on the ideal method for managing such injuries, we proposed a novel technique in order to restore anatomical and structural repair of the upper and posterior AC ligaments. Its primary advantages include accelerated patient recovery, reliable reduction, shorter operative time, reduced postoperative pain, and improved shoulder ROM. Additionally, the use of 8-plate device, due to its availability, eliminates the need for hardware removal in the future, unlike the hook plate. As a result, this method helps reduce patient re-admission, the complications of re-anesthesia, and additional costs. The future evaluation of the proposed surgical technique through a well-designed patient series and comparative studies for both acute and chronic CC and AC ligament ruptures is essential.

Conclusion

Although AC joint dislocation is a relatively common injury, its optimal treatment remains a topic of debate. Surgical treatment options have made significant progress in recent years, with new methods continuing to emerge. Individualizing surgical interventions based on patients' characteristics, including age and level of physical activity, is essential. Reconstruction using semitendinosus allograft in combination with 8-plate device is considered an effective surgical option, offering improved clinical outcomes with fewer complications. Further studies with larger patient cohorts may be required to confirm its long-term efficacy.

Conflict of Interest

The authors declare no conflict of interest in this study.

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