

Functional Results of Treatment of the Acromioclavicular Joint Dislocations Using Percutaneous Dual-Endo Button Technique

Dr. Sudheer Kumar P.¹; Dr. Suman NV.²; Dr. Naveen Kumar S.³; Dr. Arun KN⁴; Dr. Sagar G⁵; Dr. Syed Nasequddin⁶;
Dr. Prashant Kumar⁷; Dr. Mohan Patil C.⁸

Department of Orthopaedics, Navodaya medical college Hospital & Research Center, Raichur

Abstract:- The Percutaneous double endobutton approach is increasingly used for complete acromioclavicular (AC) joint dislocation repair. This abstract summarizes its functional outcomes, emphasizing restored stability, pain relief, improved range of motion, and high rates of return to pre-injury activities. With low complication rates and favorable long-term results reported, the technique proves effective in managing AC joint dislocations, offering patients a reliable path to functional recovery and satisfaction.

➤ *Materials*

This study encompasses 10 cases of complete acromioclavicular joint disruption treated at the Department of Orthopedics, Navodaya Medical College & Hospital, Raichur, from August 2022 to June 2024.

➤ *Results*

In our prospective study spanning 22 months, the average surgical duration was notably shorter compared to alternative procedures. Additionally, we observed a swifter return of patients to their normal activities.

➤ *Conclusion*

Percutaneous fixation for ACJ injuries is a safe and effective treatment. It provides good results for function and appearance. Our study involves a limited number of cases, and further research is needed to establish it as a novel technique.

I. INTRODUCTION

Acromioclavicular joint (ACJ) injuries constitute about 9% of shoulder girdle injuries, ranging from mild pain to significant displacement, often leading to chronic pain and biomechanical changes. Primarily affecting males under 30, particularly athletes in contact sports due to direct shoulder impact, these injuries prompt debates on management strategies. The AC joint classification system first described by Rockwood in 1984 is still in use today³. According to his classification, while conservative treatment is recommended for Type I and II dislocations, surgery is an accepted treatment method for Type IV–VI dislocations, but there is no unanimity in treatment of type III dislocations^{4,5}.

Management Options include ACJ pinning, percutaneous or open CC screw insertion, CC loop cerclage, ligament repairs, hook plates, coracoid transfer, mini open and various Endobutton reconstructions. Complications are common, and no single optimal approach has been universally established^{1,2}. This study aimed to evaluate a newly developed percutaneous Endobutton technique for managing acute ACJ dislocations in III&IV types.

II. METHODS

Our prospective study Between period of Aug 2022 and June 2024 at Navodaya Medical College & Hospital in Raichur included 10 patients who underwent AC joint repair using the percutaneous double Endobutton method. Approval was obtained from the Ethics Committee, and all patients provided informed consent before surgery.

Inclusion criteria encompassed patients aged 18 to 60 years with acute, acromioclavicular joint disruptions (Rockwood and Young type III–VI). Exclusion criteria excluded chronic injuries, elderly patients, Neurovascular and compound injuries.

Patients were followed for a minimum of 6 months post-operatively, adhering to a specified postoperative protocol. Functional recovery and treatment effectiveness were assessed using DASH questionnaire scores⁶ at 3, 6, 12, and 24-week intervals.

➤ *Surgical Technique*

Patient is induced under General anesthesia and positioned in Beach chair position, Image intensifier C arm is positioned from opposite side and placed in Horizontal position to get Anteroposterior view of AC joint.



Fig 1: C-ARM Positioning

Parts were scrubbed, painted & draped marked anatomical landmarks (coracoid, clavicle and acromion), displaced AC Joint is manually reduced and held in position by using the K wire of 2mm. The K-wire is inserted from the anterolateral corner of the acromion, passing through the AC joint and directed towards the posterior cortex of the distal clavicle.



Fig 2: Pre Op X Ray



Fig 3: Anatomical Landmarks

The entry point is identified under C arm guidance, ensuring it allows for a direct path of the guidewire from the clavicle to the center of the coracoid usually it is about 3 cm from the distal clavicle edge, between the native insertions of the conoid and trapezoid ligaments. A small 1 cm stab incision is then made at this location, the guide wire is employed to locate both the front and back surfaces of the clavicle, thereby identifying the optimal entry point, ideally positioned at the midpoint of the clavicle. The guide wire is then aimed 15- 20 degrees anteriorly and towards the middle of the coracoids under C arm guidance with the help of eccentric drill sleeve and then slowly advanced to pass for 4 quadrants of clavicle & coracoid in the superior to inferior direction,

Should not push the guidewire too far beyond the lower cortex of the coracoid to prevent injuring the neurovascular structures below. Once the guidewire is positioned correctly perform reaming using a 4.5mm drill bit guided by a C-arm. Preparation of endobutton done by replacing the continuous loop suture with two 2 mm Fiber tape sutures threaded through the central holes of the Endobutton.

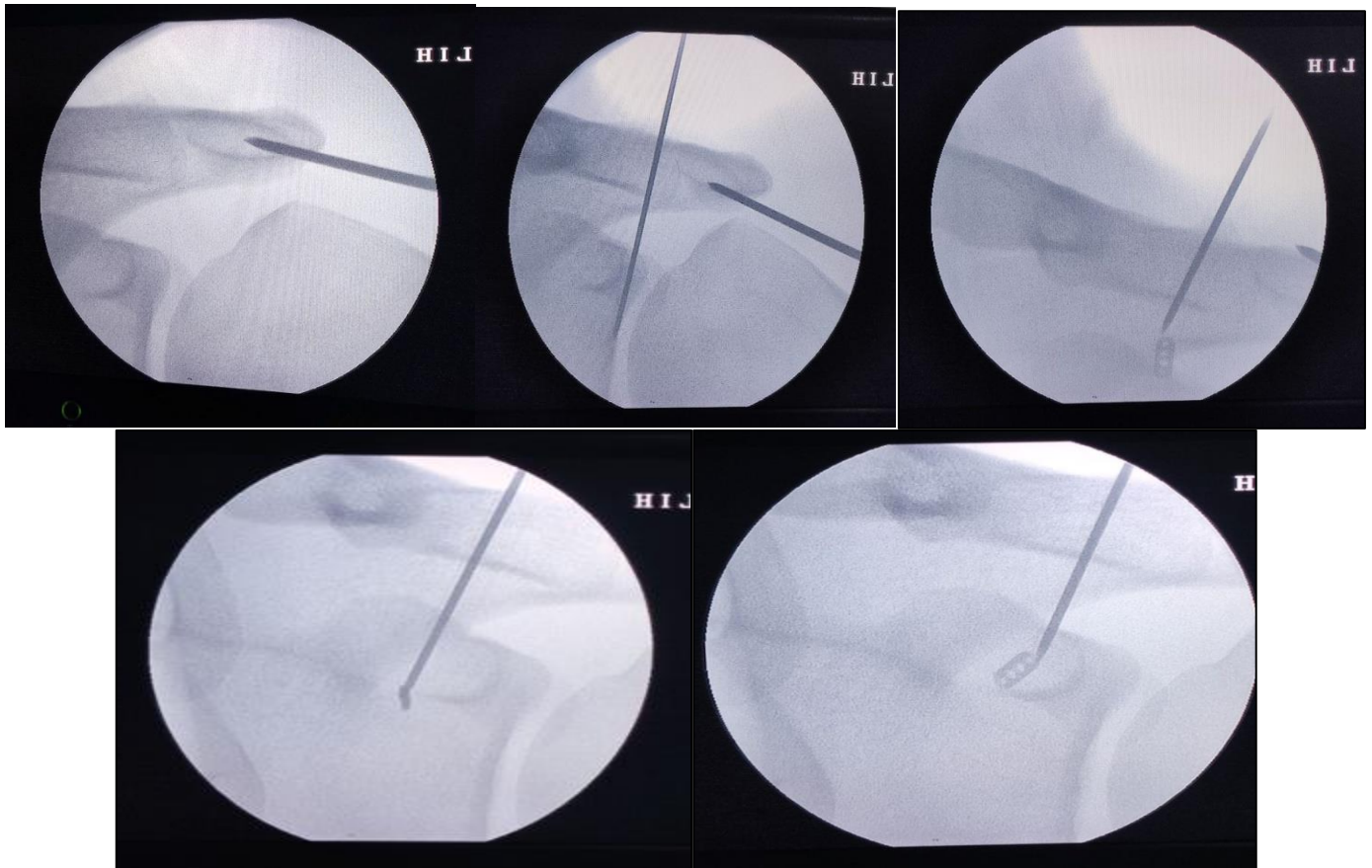


Fig 4: Intra OP C Arm Images

We retain one 'flipping' suture for emergency retrieval if needed. Then construct is introduced through bone tunnels using the blunt end of the guidewire to push it, ensuring it stays vertical along its path under C arm guidance, once guide wire passed beyond coronoid, guidewire remains in place within the tunnel, Pull the Fiber tape tight until the Endobutton flips horizontally and fits securely under the coracoid. At this point, the 'retrieval suture' can be taken out. Next another Endobutton is threaded through the sutures from above, and the two Fiber tape strands are tightened one after the other.

Manual pressure is applied to maintain proper alignment of the AC joint throughout this process. Make sure there is no sagging between the Endobuttons and the bone at both ends. Temporary K wire removed, wound wash given & closed. Patient can perform gentle pendulum-like movements in post op period to increase their range of motion. They can start doing overhead movements after 4 weeks and gradually begin passive stretching and strengthening exercises after 6 weeks following the surgery. Full return to regular activities are allowed after 12 weeks.



Fig 5: Endobutton with Fiber Tape



Fig 6: Post Operative X ray

III. RESULTS

Mean age of our patients is 40 years and Male are predominant and follow up period was for about 6 months. The mechanisms of injury were all high impact, including road traffic accidents and fall on out stretched hand. Seven of them were Rockwood grade III injuries and three of them were Rockwood grade IV injuries. Mean duration of surgery was 60 minutes. There was significant improvement in DASH score⁶. None of them had developed infection in operative site & 1 patient has stiffness but subsided with physiotherapy.



Fig 7: Post op Range of moments

IV. DISCUSSION

There is no definitive evidence favoring surgery or conservative management for Type III AC joint injuries based on current literature. Press et al. found that patients who underwent surgery experienced improved pain relief, subjective pain perception, range of motion (ROM), fewer functional limitations, better cosmetic outcomes, quicker return to full work duties, and long-term satisfaction^{7,8}. This Procedure offers several advantages that contribute to improving patient outcomes. This fixation method provides superior biomechanical strength for stabilizing the AC joint compared to the body's natural coracoclavicular ligaments⁹. Studies have shown that similar techniques performed through open surgery or arthroscopy achieve robust stabilization without excessive rigidity. The percutaneous approach enhances cosmetic outcomes and may lead to reduced post-operative pain and faster recovery by minimizing disruption to surrounding soft tissues. Additionally, this minimally invasive technique supports better biological healing of fractures and ligaments by preserving the natural healing environment. Unlike traditional methods like the hook plate, using an endobutton construct eliminates the need for a second surgery to remove the implant. Moreover, this procedure is efficient, optimizing surgical theater use and potentially reducing the risk of infection.

A potential criticism of this technique would be that we are unable to address any accompanying glenohumeral (GH) pathology with this method, we excluded them from this study¹¹.

Another drawback is that this method does not enable repair of the torn delto-trapezial fascia or reconstruction of the damaged AC joint ligaments, which some experts consider essential for optimal clinical results¹²⁻¹⁵. However, it is important to note that the widely used all-arthroscopic and mini-open methods for CC-ligament reconstructions also do not facilitate these considerations, yet their long-term clinical outcomes remain favorable¹⁶⁻¹⁸.

Technical complications of this procedure include the button system getting stuck under the coracoid process during percutaneous passage, which may necessitate converting to an open method. Other potential issues include persistent instability despite repair, loss of reduction over time, fractures of the clavicle or coracoids, endobutton slippage, and the risk of neurovascular injury. Difficulty in deploying the endobutton through the coracoid may also require conversion to open surgery, during our study period we encountered similar situation & hence it converted to mini open, we excluded from our study and reported by Acar et al¹⁰.

V. CONCLUSION

Percutaneous double endobutton fixation method is rapid, straightforward and cost-effective of Acromioclavicular injuries for Rockwood type III & IV. This method demonstrated excellent outcomes with low complication rates and high rates of functional recovery. This study is limited by its small sample size, relatively short follow-up duration, and the lack of comparison with an open or arthroscopic fixation group. Further extensive studies with longer follow-up are required to fully establish the role of percutaneous double-button fixation in treatment.

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