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ORIGINAL RESEARCH

Tightrope Fixation for Acromioclavicular Joint Dislocation

[1]Dr. Prithiviraj.R, [2]Dr. Koteeswar Rao R G, [3]Prof. Dr. Krishnagopal.R

[1]Final year Post Graduate, [2]Assistant Professor, [3]Professor and HOD, Department of Orthopedics, Mahatma Gandhi Medical College and Research Institute, Puducherry, India

Corresponding author
Dr. Prithiviraj.R
Final year Post Graduate, Department of Orthopedics, Mahatma Gandhi Medical College and Research Institute, Puducherry, India

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ABSTRACT

Introduction: Acromioclavicular (AC) joint dislocations are common shoulder injuries, often resulting from direct falls onto the shoulder tip. The severity of these injuries, classified by the Rockwood system, ranges from mild to severe. While mild injuries may resolve with conservative treatment, severe dislocations often require surgical intervention, such as TightRope fixation, to restore function and prevent long-term complications. This study aims to assess the efficacy of TightRope fixation in treating severe AC joint dislocations and improving functional outcomes. **Materials and Methods:** A prospective observational study was conducted at the Tertiary care hospital at Pondicherry among six adult patients with Rockwood types III-VI AC joint disruptions who underwent open surgical fixation. Patients with compound injuries or prior AC joint arthritis were excluded. Pre- and post-operative data were collected using a standardized interview schedule. Functional outcomes were assessed at 1, 3, and 6 months using the Constant and Pain scores. **Results:** The study included six patients aged 30-62, predominantly male and right-sided. Most dislocations were Rockwood type 3 (50%) or 5 (50%). All patients underwent TightRope fixation with variations in suture material.Functional outcomesdemonstrated significant improvement over time. At six months, patients achieved near-normal function. Initial pain levels were moderate but decreased significantly by three months and were minimal at six months. **Conclusion:** These results suggest that TightRope fixation is an effective treatment for acromioclavicular joint dislocations with favorable functional and pain outcomes.

INTRODUCTION

Acromioclavicular (AC) joint dislocations are common injuries, particularly among athletes and young individuals. The most frequent mechanism of injury is a direct fall onto the shoulder tip, with the upper limb in adduction. This type of fall can cause significant stress on the AC joint, leading to ligamentous and capsular damage.(1,2)AC joint dislocations account for approximately 9-12% of all shoulder injuries and are more common in young, active individuals, particularly those involved in contact sports.(2)The incidence is reported to be around 1.8 per 10,000 people per year in urban populations(1)

The severity of acromioclavicular (AC) joint dislocations is typically classified using the Rockwood system, which categorizes injuries into six types based on the degree of clavicle displacement. Mild injuries (Types I and II) are generally treated conservatively with good outcomes. Severe injuries (Types III-VI), involving complete ligament rupture and instability, often require surgical intervention to restore shoulder function.(3) While lower-grade AC joint dislocations may have relatively good outcomes with conservative management, higher-grade injuries can lead to significant long-term morbidity, including chronic pain, joint instability, and reduced function, highlighting the importance of appropriate and timely treatment.(4–6)Several surgical techniques address acromioclavicular (AC) joint dislocations, each with advantages and risks.(7)

TightRope fixation is one of the surgical technique used to treat severe AC joint dislocations. It offers improved stability, early recovery, and reduced complications compared to other methods.(8)This study aims to evaluate the effectiveness of TightRope fixation in restoring functional outcomes for acromioclavicular joint dislocations.

MATERIALS AND METHODS

A hospital-based prospective observational study was conducted at Mahatma Gandhi Medical College and Research Institute, Pondicherry, from January to December. Approximately six patients with acute acromioclavicular (AC) joint dislocations were enrolled. Inclusion criteria included Rockwood types

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III to VI AC joint disruption in skeletally mature adults of all genders, fixation with TightRope by open method. Patients with compound injuries or pre-existing acromioclavicular joint arthritis were excluded. A pre-tested, semi-structured interview schedule was used for data collection.

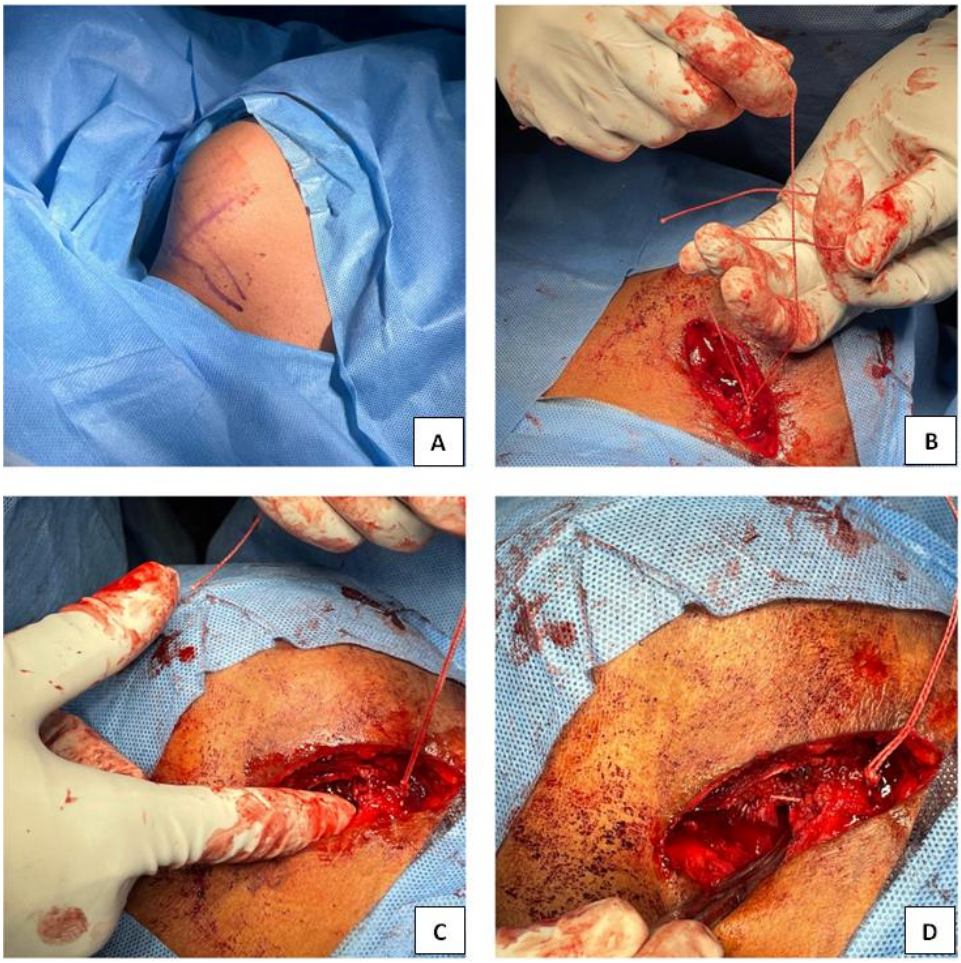
Patients aged 18 and older, regardless of gender, who presented to the MGMCRI casualty or outpatient department with acromioclavicular (AC) joint disruption and met the eligibility criteria were selected for the study. Following surgical intervention, patients were closely monitored through regular follow-up visits. The Constant score and Pain score were employed to evaluate functional outcomes at 1-, 3-, and 6-months post-surgery.

RESULTS

The study included a diverse group of patients aged 30 to 62 years, with a median age of 44 years. The majority of participants were male (five out of six), and the dislocations were predominantly right-sided (five out of six). These demographic characteristics provide insights into the patient population studied. Three patients (50%) had Rockwood type 3 dislocations, while the remaining three (50%) had Rockwood type 5 dislocations. The TightRope fixation technique was used. Two patients underwent variations of the TightRope technique, with one using EthibondTightRope and the other using Fibre Wire TightRope.

Functional outcomes were assessed using the Constant score, with higher scores indicating better shoulder function. At one-month post-surgery, Constant scores ranged from 74 to 83, with an average of 78.33, suggesting early satisfactory outcomes. By three months, scores improved to a range of 79 to 90, with an average of 85, demonstrating continued progress in shoulder function. At six months, Constant scores further increased to a range of 82 to 94, with an average of 89.33, indicating that most patients achieved near-normal shoulder function within six months of surgery.

Pain scores were assessed at 1-, 3-, and 6-months post-surgery. One month following surgery, patients reported moderate levels of pain, with scores ranging from 3 to 5 and an average of 3.83. By the third month, pain levels had significantly decreased, with scores ranging from 2 to 3 and an average of 2.67. At the six-month follow-up, most patients reported minimal to no pain, with scores of 1 or 2 and an average of 1.33. These findings suggest that pain levels progressively improved over time following TightRope fixation for acromioclavicular joint dislocations.



Picture depicting produce of Tight rope fixation

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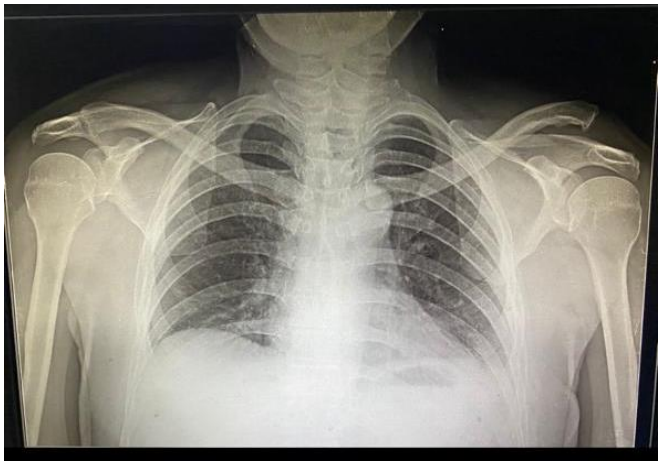

Figure 1: Preoperative SHOUDLER radiograph

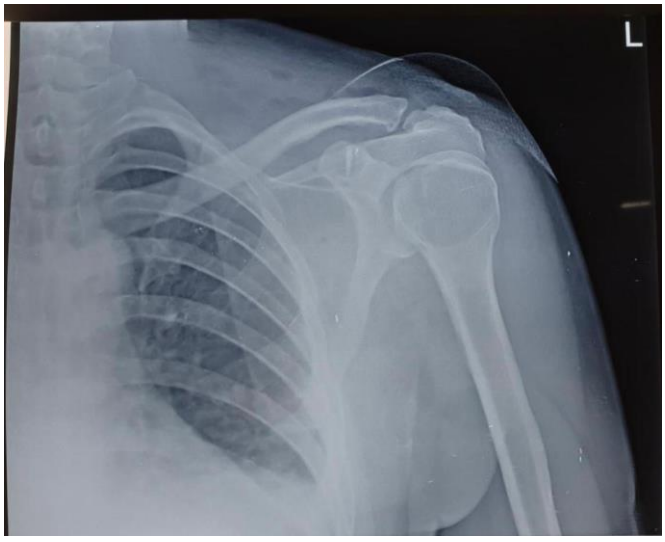

Figure 2: Post operative shoulder radiograph

DISCUSSION

The study findings demonstrated that the TightRope fixation technique is effective in restoring functional outcomes for patients with acromioclavicular joint dislocations, as evidenced by the consistent improvement in Constant scores over six months. The reduction in pain scores over the same period further supports the effectiveness of the technique in alleviating discomfort and enhancing recovery. Throughout findings, the study adds on to the existing evidence of Beitzel K et al(9) and Ozcafer R et al.(10),

The TightRope device consists of a loop of suture material that is passed through the clavicle and the coracoid process. Metal buttons are then secured on either side of the loop to maintain tension and stability.(11)

It can be performed openly or arthroscopically, with the latter being less invasive, When performed arthroscopically, the TightRope fixation is less invasive compared to open techniques like hook plate fixation. This reduces the risk of wound complications and promotes faster recovery.(12)

Hook plate fixation, coracoclavicular screw fixation, ligament reconstruction, and Kirschner wire transfixion are common options.Hook plate fixation is effective but can lead to complications. Coracoclavicular screw fixation, often combined with an Acroplate, offers improved function. Ligament reconstruction aims to restore stability and provides good outcomes. Transfixation is historically used but has been largely abandoned due to pin migration. Combined techniques may enhance stability and reduce re-dislocation risk. (7,13)

Studies have shown promising results in terms of functional outcomes and AC joint reduction. While Acroplate fixation and coracoclavicular screw fixation are alternatives, TightRope fixation may provide superior benefits.(8,10)

Compared to other methods, the TightRope device may have a lower risk of certain complications such as hardware failure, fracture of the clavicle, or erosion of the acromial undersurface, which are common with hook plates.(14)

Unlike rigid fixation methods such as screws, the TightRope device allows for a more natural range of motion in the acromioclavicular joint, thereby

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reducing the risk of postoperative stiffness and improving functional outcomes. A notable advantage of the TightRope device is its typically non-invasive nature, as it often does not necessitate a second surgical procedure for hardware removal, unlike methods such as hook plate fixation or screw fixation.(15,16)

The minimally invasive nature of the procedure often results in minimal scarring, which is particularly advantageous for patients who prioritize aesthetic outcomes. Moreover, the early restoration of joint mobility and function significantly reduces social and psychological distress, enabling patients to resume their normal activities more quickly. (16)

The prospective design of this study is a key strength, enabling accurate tracking of outcomes over time. The inclusion of various suture materials enhances the analysis, providing valuable insights into the versatility of TightRope fixation. However, the small sample size and single-center design may limit the generalizability of the findings. To validate these results and assess the long-term outcomes of TightRope fixation, future studies with larger cohorts and extended follow-up periods are necessary.

CONCLUSION

The findings support the use of TightRope fixation as a reliable method for treating acromioclavicular joint dislocations, providing surgeons with a technique that offers consistent functional recovery and pain reduction.Future studies should explore larger, multicenter trials to confirm these results and investigate the long-term durability of TightRope fixation. Additionally, comparisons with other surgical techniques, such as hook plate fixation or ligament reconstruction, would provide further insights into the best practices for managing acromioclavicular joint dislocations.

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