



FUNCTIONAL AND RADIOLOGICAL OUTCOMES OF ACROMIOCLAVICULAR JOINT INJURY AND CORACOCALVICULAR LIGAMENT RECONSTRUCTION USING SEMITENDINOSUS GRAFT IN 30 PATIENTS.

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ABSTRACT

Background: Acromioclavicular (AC) joint injuries, particularly high-grade disruptions, significantly affect shoulder stability and upper limb function. Surgical reconstruction of the coracoclavicular (CC) ligaments has emerged as a reliable intervention in cases with persistent instability. This study aims to evaluate the functional and radiological outcomes of CC ligament reconstruction using autologous semitendinosus tendon graft in patients with high-grade AC joint injuries over a 2-year follow-up period. **Methods:** A prospective study was conducted on 30 patients (mean age: 34.2 years; range: 22–49 years) with Rockwood type III to V AC joint injuries, treated with anatomic CC ligament reconstruction using autologous semitendinosus tendon graft. Patients were evaluated clinically and radiologically at regular intervals up to 24 months postoperatively. Functional outcomes were assessed using the Constant-Murley Score (CMS), Disabilities of the Arm, Shoulder and Hand (DASH) Score, and Visual Analog Scale (VAS) for pain. Radiological assessment included the maintenance of reduction, graft integrity, and degenerative changes using standard anteroposterior and axillary views. **Results:** At final follow-up, the mean Constant-Murley Score improved significantly from 38.4 ± 5.6 preoperatively to 91.2 ± 4.1 ($p < 0.001$). The mean DASH score decreased from 52.3 ± 7.8 to 6.5 ± 3.2 ($p < 0.001$), and the VAS score for pain reduced from 6.7 ± 1.2 to 0.8 ± 0.5 ($p < 0.001$). Radiological evaluation demonstrated maintenance of anatomical reduction in 27 patients (90%), with minor loss of reduction in 3 cases (10%) without significant functional impairment. No cases of graft rupture, deep infection, or major complications were observed. Mild radiological changes of arthritis were noted in 2 patients without clinical symptoms. **Conclusion:** Anatomical coracoclavicular ligament reconstruction using autologous semitendinosus graft provides excellent functional and radiological outcomes in high-grade AC joint injuries. The procedure is safe, biomechanically stable, and effective in restoring shoulder function over a 2-year follow-up. Early surgical intervention and meticulous technique are key factors for optimal outcomes.

KEYWORDS : Acromioclavicular joint injury, coracoclavicular ligament reconstruction, semitendinosus graft, shoulder instability, Rockwood classification.

INTRODUCTION:

Acromioclavicular (AC) joint injuries are common, particularly among young active individuals and athletes, and can significantly impair shoulder function and upper limb biomechanics. These injuries account for approximately 9–12% of all shoulder girdle injuries, with Rockwood type III to V injuries often requiring surgical intervention due to complete disruption of the acromioclavicular and coracoclavicular (CC) ligaments [1,2].

The optimal treatment strategy for these high-grade injuries remains a subject of debate. Non-operative management has shown acceptable outcomes for low-grade injuries (type I–II), but high-grade injuries often result in chronic pain, instability, and poor functional outcomes if not managed surgically [3,4].

Traditional fixation methods—such as clavicular hook plates, trans acromial K-wires, and synthetic tightrope systems—have provided varied success but are frequently associated with complications such as hardware irritation, osteolysis, and need for implant removal [5,6,7]. These limitations have led to increasing interest in biologic, anatomical ligament reconstructions using autografts or allografts, which aim to restore the normal biomechanics of the AC joint without permanent hardware [8,9,10].

Autologous semitendinosus grafts, owing to their strength, biological incorporation, and low donor site morbidity, have emerged as an effective option for anatomical CC ligament reconstruction [11,12]. Several biomechanical and clinical studies have demonstrated their superiority in restoring horizontal and vertical stability of the clavicle in both acute and chronic settings [13,14,15]. However, high-quality prospective data evaluating long-term functional and radiological outcomes in Indian or similar populations are limited.

This prospective study aims to assess both the functional and radiological outcomes of CC ligament reconstruction using semitendinosus autograft in 30 patients with high-grade AC joint dislocations, followed over a 2-year period. The outcomes are also compared with existing literature to determine relative efficacy and safety.

MATERIALS AND METHODS:

This prospective study was conducted at a tertiary-level orthopedic hospital in Surat between January 2021 and December 2022. All patients provided informed written consent.

A total of 30 patients with acute high-grade AC joint injuries (Rockwood types III, IV, and V) were included.

Inclusion Criteria: (1) age 18–60 years, (2) acute injury (<3 weeks), and (3) radiological confirmation of type III–V injury.

Exclusion Criteria: polytrauma, chronic dislocation (>3 weeks), prior shoulder surgery, systemic illness affecting healing, or refusal to consent.

All surgeries were performed by the same surgical team under general anesthesia. The semitendinosus graft was harvested from the ipsilateral leg and tunneled anatomically through drill holes in the clavicle and passed under coracoid process. Fixation was done using No. 2 fiber wire sutures in a figure-of-eight configuration. Temporary trans articular K-wire fixation was used in cases with instability intra operatively.

Postoperatively, the shoulder was immobilized in a sling for 4 weeks. Passive range of motion exercises began at week 3, active-assisted exercises at week 5, and strengthening at 8 weeks. Return to full activity was allowed after 3 months.

Functional outcomes were assessed using the Constant-Murley Score (CMS), Disabilities of the Arm, Shoulder and Hand (DASH) Score, and Visual Analog Scale (VAS) for pain. Radiological assessments included CC distance, maintenance of reduction, and degenerative changes. Follow-ups were conducted at 1, 3, 6, 12, and 24 months. Statistical analysis used paired t-tests with $p < 0.05$ considered significant.

RESULTS:

Among 30 patients (24 males, 6 females), the mean age was 34.2 ± 6.8

years. The mechanisms of injury included road traffic accidents (70%) and sports trauma (30%). Based on Rockwood classification: 12 had type III, 10 had type IV, and 8 had type V injuries.

Functional Outcomes:

Outcome Measure	Preoperative (Mean $\pm$ SD)	Postoperative (2 Years) (Mean $\pm$ SD)	p-value
Constant-Murley Score (CMS)	38.4 $\pm$ 5.6	91.2 $\pm$ 4.1	< 0.001
DASH Score	52.3 $\pm$ 7.8	6.5 $\pm$ 3.2	< 0.001
VAS Pain Score	6.7 $\pm$ 1.2	0.8 $\pm$ 0.5	< 0.001

No significant difference in outcomes was observed between Rockwood subtypes.

Radiological Outcomes:

27 patients (90%) maintained anatomical reduction.

3 patients had minor loss of reduction (mean CC increase: 4.2 mm), but remained asymptomatic.

Mild degenerative changes were seen in 2 patients at final follow-up

Complications:

Total: 6 patients (20%)

2 patients had superficial infections (treated conservatively)

2 patients had K-wire migration and implant failure (implant removal required)

2 patients developed stiffness with subacromial impingement and skin prominence (resolved with physiotherapy)

DISCUSSION:

This study demonstrates that CC ligament reconstruction with semitendinosus autograft provides excellent functional and radiological outcomes at 2-year follow-up for high-grade AC joint injuries.

Our results compare favorably with those reported by Tauber et al., who observed a CMS improvement to 90 in chronic AC injuries using semitendinosus grafts [17]. Similarly, Salzmänn et al. reported a CMS of 85.6 at 2 years with semitendinosus reconstruction in 28 patients [18]. Mazzocca et al. demonstrated favorable biomechanical outcomes supporting this technique [9].

In terms of complications, our 20% rate is comparable to Venjakob et al. (17%) and Tauber et al. (18%) [17,19]. The observed K-wire migration in two cases reinforces the ongoing concern over hardware use and emphasizes the benefit of avoiding permanent implants.

Compared to synthetic devices and hook plates, biological reconstruction avoids implant irritation and hardware-related complications while promoting native ligament healing [6,7,10]. However, drawbacks include surgical complexity, risk of donor-site morbidity, and graft integration variability.

Limitations of this study include a small sample size, absence of a control group, and lack of MRI for graft integration assessment. Further randomized trials comparing autografts with synthetic methods are warranted.

CONCLUSION

Anatomic coracoclavicular ligament reconstruction using autologous semitendinosus graft is an effective and reliable treatment for high-grade acromioclavicular joint dislocations. It provides excellent functional recovery, durable radiological stability, and near-anatomical ligament restoration. Importantly, this technique also offers superior rotatory stability of the clavicle compared to non-anatomic or synthetic methods. Additionally, the use of autologous graft avoids complications associated with permanent implants such as Dog Bone buttons or Bosworth screws, including implant-related failure, rejection, and hardware irritation. With a manageable complication profile and high patient satisfaction at 2-year follow-up, this technique remains a preferred option, especially in active individuals and athletes. Early surgical intervention, meticulous graft handling, and structured rehabilitation are critical to ensuring optimal outcomes.

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