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Prospective Study Of Acromioclavicular Joint Reconstruction Using Semitendinous Graft Augmented With Fibre Tape And Dog Bone Bottom.

Article History:

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Abstract: ***INTRODUCTION***: Acromioclavicular joint dislocation (ACD) is the most common injury affecting the shoulder girdle. It is associated with sports-related trauma and high-energy injuries. AIM: To evaluate the functional and radiological outcomes of acromioclavicular joint reconstruction using semitendinosus graft augmentation. ***METHODS***: This prospective observational study was conducted at sms medical college from December 2023 to November 2024. 26 patients diagnosed with Rockwood type III and V acromioclavicular joint dislocations were included who underwent acromioclavicular joint reconstruction using semitendinosus graft augmentation. ***RESULT***: The present study demonstrated significant improvement in functional and radiological outcomes following acromioclavicular joint reconstruction using semitendinosus graft augmentation. The procedure provided satisfactory restoration of coracoclavicular distance, excellent shoulder function recovery, and minimal complications during follow-up. ***CONCLUSION***: The present study concludes that acromioclavicular joint reconstruction using semitendinosus graft augmentation is a safe and effective procedure for Rockwood type III and V dislocations, with favourable outcomes. This technique achieved satisfactory joint stability with minimal complications and good overall patient recovery.

Keywords: Acromioclavicular joint dislocation, Rockwood classification, semitendinosus graft augmentation.

INTRODUCTION

Nowadays Acromioclavicular joint dislocation (ACD) is the most common injury affecting the shoulder girdle1,2 . It is associated with sports-related trauma and high-energy injuries. The injury usually occurs following a direct blow to the lateral aspect of the shoulder, leading to disruption of the acromioclavicular and coracoclavicular ligaments. Management of ACD is based on the Rockwood classification system3. Rockwood grades I and II injuries are managed conservatively , whereas grades IV to VI typically require surgical intervention due to significant instability and displacement. However, the treatment for Rockwood grade III injuries is still controversial, with both conservative and operative methods can be required4-6. Even after treatment there are some patients who continue to experience chronic symptoms such as pain, weakness, deformity, cosmetic dissatisfaction, and limitation of shoulder

function.7Chronic acromioclavicular joint instability is defined as the symptoms lasting for more than six weeks following the initial injury or failed previous surgery. Surgical treatment in these cases is done only to restore the anatomy and stability of the acromioclavicular joint while achieving good functional recovery.8 There are a lot of operative techniques present for the management of chronic ACD.In recent years, anatomic reconstruction using autogenous tendon grafts is widely performed due to its superior biomechanical properties and ability to mimic native ligament anatomy9. Various graft options are available including semitendinosus, tibialis anterior, and palmaris longus tendons, have been utilised successfully for reconstruction. But because of its easy availability, adequate strength, low donor-site morbidity, and cost-effectiveness ,the semitendinosus tendon graft is used as a favourable option. Therefore The present study was done to evaluate the functional and radiological outcomes of acromioclavicular joint reconstruction using semitendinosus graft augmentation in patients with Rockwood type III and V acromioclavicular joint dislocations.10,11 This study aimed to assess post-operative shoulder function, restoration of coracoclavicular distance, and complications associated with the procedure, thereby determining the effectiveness and reliability of this biological reconstruction technique.

AIM

To evaluate the functional and radiological outcomes of acromioclavicular joint reconstruction using semitendinosus graft augmentation .

METHODOLOGY

This prospective observational study was conducted at sms medical college from December 2023 to November 2024. 26 patients diagnosed with Rockwood type III and V acromioclavicular joint dislocations were included who underwent acromioclavicular joint reconstruction using semitendinosus graft augmentation. Patients presenting with complaints of acute acromioclavicular joint instability were included in the study after obtaining informed consent. Detailed history, clinical examination, and radiological assessment including coracoclavicular distance measurement were performed pre-operatively.Post-operatively, patients were followed up at regular intervals of 6 weeks, 3 months, and 6 months. Functional outcomes were assessed using DASH score, ASES score, and Constant shoulder score. Radiological evaluation was performed by measuring the coracoclavicular distance on follow-up radiographs. Complications associated with the procedure were also noted and observed.

RESULTS

Table 1. Demographic Profile and Injury Characteristics (n = 26)

Age group (years)	Number	Percentage
<20	5	19.2%
21-30	6	23.0%
31-40	11	42.3%
>40	4	15.3%
Gender		
Male	16	61.5%
Female	10	38.4%

The majority of patients in the present study belonged to the 31–40 years age group (42.3%), followed by 21–30 years (23.0%), indicating a higher incidence among the active working population. Male patients predominated (61.5%) compared to females (38.4%), showing greater exposure of males to high-energy trauma and sports-related injuries.

Table 2: Mode of injury and side involved

Mode of Injury	Number	Percentage
Road Traffic Accident	15	57.6%
Fall	7	26.9%
Sports Injury	4	15.3%
Side involved		
Right side	17	65.3%
Left side	9	34.6%

Road traffic accidents were the most common mode of injury, accounting for 57.6% of cases, followed by falls

(26.9%) and sports injuries (15.3%). The right side was more frequently involved (65.3%) compared to the left side (34.6%), indicating predominance of injury to the dominant upper limb.

Table 3: Rock wood classification and duration from injury to surgery

Rockwood Classification	Number	Percentage
Type III	19	73.1%
Type V	7	26.9%
Duration from injury to surgery (days)		
<7	20	76.9%
7-14	4	15.3%
>14	2	7.6%

The majority of patients had Rockwood type III acromioclavicular joint dislocation (73.1%), while type V injuries accounted for 26.9% of cases. Most patients underwent surgery within 7 days of injury (76.9%), indicating early surgical intervention in the majority of cases.

Table 4. Coracoclavicular Distance Assessment

CC distance	Mean	SD	P value
Pre-operative CC Distance (mm)	16.4	2.1	0.0001*
Post-operative CC Distance (mm)	10.9	1.8	

The mean pre-operative coracoclavicular distance was 16.4 ± 2.1 mm, which decreased to 10.9 ± 1.8 mm post-operatively following surgical reconstruction. The significant reduction in coracoclavicular distance indicates satisfactory anatomical restoration and maintenance of acromioclavicular joint stability after surgery.

Table 5. Functional Outcome Scores

Follow-up Period	DASH Score (Mean ± SD)	ASES Score (Mean ± SD)	Constant Score (Mean ± SD)
Pre-operative	58.6 ± 6.2	25.8 ± 5.6	26.2 ± 7.1
6 Weeks	32.4 ± 5.1	54.5 ± 6.4	61.8 ± 5.9
3 Months	12.8 ± 3.4	72.5 ± 5.2	79.5 ± 4.7
6 Months	3.2 ± 1.5	88.7 ± 3.8	90.6 ± 4.2

There was significant improvement in functional outcome scores during follow-up, with progressive reduction in DASH scores and corresponding increase in ASES and Constant scores from pre-operative assessment to 6 months post-operatively. These findings indicate excellent recovery of shoulder function and successful restoration of joint stability following surgical reconstruction.

Table 6. Complications Observed

Complication	Number	Percentage
Loss of Reduction	2	7.6%
Superficial Infection	1	3.8%
Implant-related Irritation	1	3.8%
Re-dislocation	0	0%
Neurovascular Injury	0	0%

Complications observed in the present study were minimal, with loss of reduction seen in 7.6% of patients, while superficial infection and implant-related irritation were noted in 3.8% each. No cases of re-dislocation or neurovascular injury were reported, indicating that the procedure was relatively safe and associated with low complication rates.

DISCUSSION

In the present study, 42.3% belonged to the 31–40 years age group, followed by the 21–30 years age group comprising 23.0% of cases. Patients younger than 20 years were 19.2%, while patients 15.3% were above 40 years . This data indicate that acromioclavicular joint dislocations were more commonly observed among young and middle-aged adults who are physically active and more prone to high-energy trauma. Gender distribution showed a predominance of male patients, with 61.5% males and 38.4% females. The higher incidence among males may be attributed to greater participation in outdoor

activities, sports injuries, and road traffic accidents.Similarly Kumar CY et al12 reported the mean age of the patients was 34.44 (11.83) years with most between 20 and 40 years. And A male predominance (81.3%) was noted.

In the present study, road traffic accidents accounted for 57.6% of the cases, followed by falls which constituted 26.9% of patients. Sports-related injuries were observed in 15.3% of the study population. The predominance of road traffic accidents suggests that high-energy trauma plays a major role in the occurrence of acromioclavicular joint dislocations. With regard to the side involved, the right side was affected in 65.3% of patients, whereas the left side was involved in 34.6% of cases. The higher involvement of the right side may be attributed to dominance of the upper limb and increased exposure during trauma.Kumar et al13 Road also reported Traffic Accidents (RTA) as the most common mode of injury (10/14). Other modes of injury were Fall (2/14) and Sports injuries (2/14) (One person was a cricketer and the other was a volleyball player).

In the present study, Rockwood type III acromioclavicular joint dislocation was the most common injury pattern, accounting for 73.1% of the cases, whereas type V injuries constituted 26.9% of patients. The predominance of type III injuries indicates that moderate to severe acromioclavicular instability was more frequently encountered in the study population. Regarding the duration from injury to surgery, the majority of patients (76.9%) underwent surgical intervention within 7 days of injury. Four patients (15.3%) were operated between 7–14 days, while only 7.6% underwent surgery after 14 days of injury. Early surgical management in most patients may have contributed to better reduction and favourable functional outcomes. Our study is inconsistent with Kumar CY et al12 where Most injuries were AC dislocation grade III (87.5%). The average time from injury to surgery was 9.18 (6.42) days; however, nearly half of the cases were operated upon within 7 days of injury (43.75%)

The mean pre-operative coracoclavicular (CC) distance in the present study was 16.4 ± 2.1 mm, indicating significant displacement of the clavicle associated with acromioclavicular joint instability. Following surgical reconstruction using semitendinosus graft augmentation, the mean post-operative CC distance decreased to 10.9 ± 1.8 mm. The marked reduction in CC distance demonstrates satisfactory anatomical reduction and restoration of the acromioclavicular joint alignment. Post-operative values were found to be within near-normal physiological range, suggesting effective maintenance of joint stability. These findings indicate that the surgical technique provided good radiological outcomes with adequate coracoclavicular ligament reconstruction.Kumar et al13 also reported the mean pre-operative coracoclavicular (CC) distance was 16.11 mm with SD ±1.94 and mean post-operative CC distance was 10.76 mm with SD of ±2.76.

In the present study, functional outcomes showed significant improvement during the follow-up period following acromioclavicular joint reconstruction. The mean DASH score progressively decreased from 58.6 ± 6.2 pre-operatively to 3.2 ± 1.5 at 6 months, indicating marked reduction in disability and improvement in upper limb function. Similarly, the mean ASES score improved from 25.8 ± 5.6 pre-operatively to 88.7 ± 3.8 at final follow-up. The Constant shoulder score also demonstrated substantial improvement, increasing from 26.2 ± 7.1 before surgery to 90.6 ± 4.2 at 6 months. These findings suggest excellent functional recovery, restoration of shoulder stability, and successful clinical outcomes following surgical reconstruction.Also Kumar et al13 in their showed Mean DASH scores during follow up were 60, 9.71 and 0.36 at 6weeks, 3 months and 6 months respectively.There was a significant difference in the pre and post-operativeCC distance (P value <0.0001) and DASH t scores (P <0.0001).Dr. Sameer Shrivastava et al Postoperative assessments showed significant improvements in Constant scores (22.8±7.15 pre-op vs. 88±8.76 post-op), ASES scores (23.4±5.3 pre-op vs. 86.33±9.27 post-op),with a p-value of 0.0007. Patients were clinically evaluated using DASH (Disabilities of Arm, Shoulder and Hand) and ASES (American Shoulder and Elbow Surgeons) scores. Radiologically there was a mean CCD reduction of 7.1 mm (n=26) and mean post-operative CCD of 13.1 (Normal range 11-13 mm) Clinically, the mean post-operative ASES was 89.4 (n=22) (Best score 100). A mean reduction of 50.5 was reported from pre to post-operative DASH scores, with a mean post-operative score of 12.5 (n=18) (Best score 0) reported by Lee PYF et al.14

In the present study, complications following acromioclavicular joint reconstruction were minimal and manageable. Loss of reduction was observed in 7.6% of patients, making it the most common complication encountered during follow-up. Superficial infection and implant-related irritation were each noted in 3.8% of cases and were managed conservatively without significant long-term morbidity. No patient developed recurrent dislocation or neurovascular injury following surgery. The low incidence of complications indicates that the procedure is relatively safe and reliable. Overall, the surgical technique demonstrated satisfactory clinical outcomes with minimal post-operative adverse events.

Complications were minimal, with one case of wound

infection and one case of loss of reduction in study done by Dr. Sameer Shrivastava et al15.

CONCLUSION

The present study showed that acromioclavicular joint reconstruction using semitendinosus graft augmentation is an effective surgical technique for the management of Rockwood type III and V acromioclavicular joint dislocations. The procedure showed significant improvement in functional outcomesIt is assessed by reduction in DASH scores and improvement in ASES and Constant shoulder scores during follow-up. Radiological assessment also showed decrease in coracoclavicular distance, indicating maintenance of joint stability. The majority of patients achieved good to excellent functional recovery with minimal complications. Therefore, semitendinosus graft augmentation can be considered a safe, effective, and biologically reliable option for acromioclavicular joint reconstruction with satisfactory functional restoration and low complication rates.

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