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The comparison of Ethibond sutures and semitendinosus autograft in the surgical treatment of acromioclavicular dislocation

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Objective: The aim of this study was to compare the results of the surgical reconstruction of the acromioclavicular joint (ACJ) dislocations using No. 5 Ethibond suture or semitendinosus autograft.

Methods: This analytical cross-sectional study was conducted on the medical records of 39 patients (35 males and 4 females; mean age: 32.6±11.8 years), with complete ACJ joint dislocation (Type 3 to 6). Twenty one patients underwent reconstruction using No. 5 Ethibond suture (Group A) and 18 patients using semitendinosus tendon autograft (Group B). The patients' database records were queried for the information regarding the evaluations during follow-up period (mean: 25.7 months) such as radiographic evaluations, Constant score, VAS score and infection.

Results: The mean Constant score was 91±1 and 92±2.1 in Groups A and B, respectively. There was a reduction of ACJ based on Zanca view in 15 patients in Group A and 12 patients in Group B. There was subluxation of ACJ by less than 25% in six patients in Group A and five in Group B, in that, the difference was not significant. Patients expressed acceptable satisfaction and equal pain severity in rest and daily activity in both groups. No deep infection has been observed.

Conclusion: Since both surgical techniques led to satisfactory results, reduction of ACJ, excellent functional score and acceptable patient satisfaction, No. 5 Ethibond suture technique could be recommended as the treatment of choice due to the absence of morbidity in removing semitendinosus autograft tendon.

Key words: Acromioclavicular joint dislocation; Constant score; Ethibond suture; semitendinosus autograft; Visual analogue score.

Acromioclavicular (AC) joint dislocation is a common injury among young athletes and represents nearly 12% of all shoulder dislocations. It is five times more common in men. The treatment method depends on the severity of the injury.[1-7] There are currently more than 60 different techniques such as AC joint reduction and fixation with screw, muscular transfer, removal and reconstruction of the posterior section of the clavicle, coracoclavicular fixation using Bosworth screw and arthroscopic reconstruction of the coracoacromial ligament.[8-15] None, however, is regarded as the gold standard technique.[8-10]

No. 5 Ethibond suture and semitendinosus autograft are two widely used options in the reconstruction of AC dislocations. We hypothesized that both options would provide similar outcome. The aim of the present study

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was to examine and compare the outcomes of AC joint reconstruction with either No. 5 Ethibond suture or semitendinosus autograft in the treatment of AC dislocations.

Patients and methods

On this cross-sectional analytical study the medical records of 39 patients with complete AC dislocations (Types 3, 4, 5 and 6 according to Rockwood classification) were reviewed. The patients were referred to our center between September 2006 and September 2009 and 21 of them underwent AC reconstruction using No. 5 Ethibond suture (Ethicon Inc., Somerville, NJ, USA) (Group A) and 18 using semitendinosus autograft (Group B). The majority of patients with Type 3 AC dislocation were managed conservatively and not included in this study. All the surgeries were performed by the senior author.

In Group A, a two-folded No. 5 Ethibond suture was driven beneath the coracoid and passed through two drill holes on the clavicle separated by one centimeter. The sutures were tied after anatomical reduction of AC joint. Then AC joint was fixed with a 2-mm Kirschner wire and the AC joint capsule was repaired. In Group B, ipsilateral semitendinosus autograft was harvested using a tendon striper and passed beneath the coracoid and then through two drill holes in the clavicle. Following anatomical reduction of the AC joint the two tips of the tendon were tied up on the clavicle with No. 1 Vicryl suture. The AC joint was then fixed with a 2-mm Kirschner wire and the capsule was repaired. In both groups, a shoulder arm sling was used for two weeks after the surgery. The pins were removed at the end of six weeks under local anesthesia and routine daily activities and a rehabilitation program was introduced, allowing full range of motion. Return to intense activity was allowed at the end of the third month. All patients were followed up at 3, 6, and 12 months. All the relevant information were elicited from the patients' hospital records such as demographic data, type of dislocation, surgery time and technique, postoperative radiographic assessment, wound infection, Constant and VAS scores, and patient satisfaction level. The data were analyzed using SPSS software v.19 (SPSS Inc., Chicago, IL, USA). Chi-square test test and independent T test were used during group comparison.

Results

The study group included a total of 39 patients (35 men and 4 women). There was 21 patients (19 men and 2 women) who had a reconstruction with No. 5 Ethibond sutures, and 18 (16 men and 2 women) with semitendinosus autograft. The mean age of the whole series was 32.6±11.8 (range: 21 to 47). The mean age was 31.9±10.4 in Group A and 33.4±11.2 in Group B ($p>0.05$). The mean follow-up period was 25.7 months (range: 12 to 49 months). In Group A, 7 patients had Type 3 and 14 Type 5 injury and in group B, there were 5 patients with Type 3 and 13 cases with Type 5 injury ($p>0.05$). The mean time between the injury and surgery was 5.7±2 days in Group A and 5.5±3.1 days in Group B ($p>0.05$). No patient had a deep infection. Only 11 patients in Group A and 10 patients in Group B had a mild pin tract infection, all completely recovered following the removal of the pins. According to the Constant scores taken at 1 year follow-up, the results were excellent in 71.4%, good in 19.1%, and fair in 9.5% of the measurements in Group A and excellent in 66.7%, good in 27.7% and fair in 5.6% in Group B ($p>0.05$). In the last visit, the mean Constant shoulder scores were 91±1 in Group A and 92±2 in Group B ($p>0.05$) (Table 1).

The Zanca view radiographs taken at the final follow-up visit showed a complete reduction of the AC joint in 15 patients (71%) in Group A and 12 (67%) in group B. Six patients (29%) in Group A and five patients (28%) in Group B had 25% subluxation. A subluxation of more than 25% was observed in only one patient (5%) in Group B. The mean VAS score of the groups at the final visit were 0.01±0.2 and 0.1±0.8 during rest; 0.7±0.21 and 0.5±0.3 during routine daily activities, and 1.2±0.03 and 0.6±0.31 during intense activity in Group A and B, respectively. The only significant difference was between the VAS scores during intense activities ($p=0.041$).

Table 1. Functional results in both groups during the first year based on the Constant score.

Surgical technique	Constant score	3 months	12 months
Group A - Ethibond suture	Excellent	66.7%	71.4%
	Good	23.8%	19.1%
	Fair	9.5%	9.5%
Group B - Semitendinosus autograft	Excellent	61.1%	66.7%
	Good	33.3%	27.7%
	Fair	5.6%	5.6%

Discussion

Since the very first surgical operation on the AC dislocation conducted by Cooper in 1861, several different techniques have been proposed.[16] The present study examined and compared the results of two different surgical techniques using No. 5 Ethibond suture and semitendinosus tendon graft on 39 patients with AC dislocations. The results of the study indicated that both techniques were highly effective in the treatment of AC dislocations. Constant score of the shoulder function and radiographic evaluation of the AC joint reduction showed no significant difference in shoulder function, pain and AC joint reduction between the groups. The results are in agreement with the results of the previous studies.[17,18] Fraschini et al. compared functional and radiographical outcomes of two surgical procedures (Dacron vascular prosthesis technique and the LARS (Ligament Advanced Reinforcement System) technique versus conservative treatment in chronic acromioclavicular dislocations.[19] They found surgical treatment to be significantly more effective than the conservative treatment.[19] Tauber et al. compared semitendinosus autograft technique and modified Weaver-Dunn technique and reported the mean Constant scores of 81±8 and 93±7 respectively.[20] Choi's study also showed the mean Constant score of 89.5.[21] The mean scores of both Tauber et al. study and Choi et al.'s study are very close to our results reporting the Constant scores of 91±1 and 92±2.1. However, the minor differences are possibly due to the differences in the surgical techniques used and the surgical experience. Weinstein et al. reported that the treatment effectiveness was reduced significantly when the time lag between the injury and the surgery was more than three months.[22] Thus, one reason for the effectiveness of both surgical techniques in our study may be due to the short time period between the injury and the surgery which were 5.7±2 and 5.5±3.1 days in No. 5 Ethibond suture and semitendinosus autograft respectively. Rolf et al. in a study comparing early and delayed surgical treatment, found that early reconstruction resulted in better reduction, less complications and more patient satisfaction.[23] In our study, 21 patients had superficial infections which has also been reported in the study conducted by Boström et al., where five patients had infections.[24] Boström et al. suggested prophylactic use of antibiotics. The VAS score in the present study indicated high level of patient satisfaction which has also been observed in other studies.[25,26] However, Lin et al. reported about 50% patient dissatisfaction after tension band wiring technique.[27] In the present study patient satisfaction was lower among the patients undergoing surgery using No. 5 Ethibond suture.

In conclusion, two different surgical techniques provided similar results in the reconstruction of the AC dislocation in our study. The degree of reduction, shoulder function and patient satisfaction were similar. However, avoiding the morbidity of graft harvesting is an advantage of No. 5 Ethibond suture.

Conflicts of Interest: No conflicts declared.

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