CORACOCLAVICULAR LIGAMENT RECONSTRUCTION USING A SEMITENDINOSUS TENDON GRAFT WITH POLYESTER SUTURE NO. 5 (ETHIBOND) FOR TYPE-III ACROMIOCLAVICULAR DISLOCATION

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ABSTRACT

BACKGROUND

The aim of the study is to review the functional and radiological results of patients after coracoclavicular ligament reconstruction using a semitendinosus tendon graft for type-III acromioclavicular dislocation.

MATERIALS AND METHODS

Nine patients aged 21 to 50 (mean, 35) years with Rockwood Type-III acromioclavicular dislocation underwent coracoclavicular ligament reconstruction with autogenous semitendinosus tendon grafts. Patients were either active in sports or heavy manual workers. Assessments on shoulder function (using the Constant Score), wound size, pain (using Visual Analogue Scale), and reduction (using radiographs of both acromioclavicular joints) were made.

RESULTS

The mean follow-up period was 18 (range, 12–24) months; the mean time to return to work or sports was 16 (range, 12–20) weeks. The mean constant score was 94 (range, 90–98). The mean donor-site scar size was 4 cm and the mean pain score was 0. No major complication or donor-site morbidity was noted. There was one wound dehiscence.

CONCLUSION

Coracoclavicular ligament reconstruction using an autogenous semitendinosus tendon graft was safe in physically active patients having type-III acromioclavicular dislocation.

KEYWORDS

Acromioclavicular Joint, Coracoclavicular Ligament, Semitendinosus Tendon Graft, Reconstructive Surgical Procedures.

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BACKGROUND

For younger, more active patients with type-III acromioclavicular dislocation, surgical treatment is recommended.[1-3] Commonly used methods include the Weaver Dunn procedure[4] and the modified Bosworth technique[5] using devices such as pins,[6] screws,[7,8] or plates.[9,10] These interventions achieve satisfactory Constant scores of 91 to 98,[4,8,11] and redislocation rates of 9 to 50%.[4,8,12] However, such methods have several disadvantages, namely graft infection, foreign body reactions, and the need for implant removal.[11]

Coracoclavicular ligament reconstruction with an autogenous semitendinosus tendon entails no implant removal and no foreign body reaction; donor-site morbidity is the only risk.

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MATERIALS AND METHODS

Records of 9 patients aged 21 to 50 (mean, 35) years who presented with Rockwood type-III acromioclavicular injury[13] between March 2014 to Feb 2017 in Rajiv Gandhi institute of medical sciences, Srikakulam. This injury involves acromioclavicular joint dislocation with disruption of both the acromioclavicular and coracoclavicular ligaments, with the distal clavicle superior to the medial border of the acromion. The diagnosis was made on a standardized Zanca view[14] in which the X-ray beam was aimed at the acromioclavicular

joint with a 10º cephalic tilt and traction anteroposterior views.

All patients were either active in sports or heavy manual workers; 3 were injured during sporting activities, 5 in a traffic accident and 1 in fall from height; all were operated on within 6 weeks of injury. Surgery was performed by or under the supervision of a single surgeon. Patients were placed in a supine position with under shoulder bump under general anaesthesia. One dose of a first-generation cephalosporin was given before skin incision. The semitendinosus graft was harvested from the ipsilateral knee using a tendon stripper.

The acromioclavicular joint was exposed by the deltoid-pectoral approach. A strap incision was started from the acromioclavicular joint and extended distally towards the tip of coracoid process. The plane was developed between deltoid and pectoralis major. In patient 4, the cartilage of the acromioclavicular joint was severely damaged and therefore the distal 5 mm of the clavicle was excised. The distal clavicle was not routinely excised. To mimic the anatomy of the trapezoid and conoid ligaments on the under surface of the clavicle, 2 drill holes were prepared on the superior cortex of the clavicle at the footprint of the original 2 ligaments (postero medial conoid and antero lateral trapezoid), using a 4.5-mm drill bit. The 2 holes were around 15mm apart and the anterolateral hole was around 2 to 2.5 cm proximal to the distal end of the clavicle.

The harvested graft was passed through the 2 drill holes and slung under the coracoid process. With the acromioclavicular joint over-reduced by 2 mm, the graft was sutured to itself with nonabsorbable Braided Polyester (Ethibond) No.5 sutures.

The wound was closed in layers. After the operation, a temporary arm sling was used for one to 2 weeks until pain subsided. Under the supervision of a physiotherapist and the operating surgeon, early active and passive full-range shoulder mobilisation as tolerated was started after one week. Strengthening exercises were started 8 weeks later. Shoulder function was assessed by the Constant score;[15] hindrance in daily activities, range of movement, and strength were scored (1–100, with 100 being highest). Assessments on the donor-site wound size, pain (using visual analogue scale), and reduction (using radiographs of both acromioclavicular joints) were made.

RESULTS

The mean follow-up period was 18 (range, 12–24) months. The mean time to return to work/sports activity was 16 (range, 12–20) weeks. The mean constant score was 94 (range, 90–98). Radiographs showed good reduction in 8 patients and subluxation in one. The mean donor-site scar size was 4-cm long and the mean pain score was 0. No major complication or donor-site morbidity was noted. There was one wound dehiscence.

DISCUSSION

The indication for surgery and choice of technique remain controversial for type-III acromioclavicular dislocation. Early surgical repair is recommended for patients with a prominent distal clavicle or persons frequently performing heavy lifting or overhead work.[1–3] Commonly used surgical techniques include the

Weaver Dunn procedure[4] and the modified Bosworth technique,[5] which entail various fixation devices. These techniques are reported to produce good functional Constant scores, but entail complications, including: foreign body reactions from absorbable polydioxanone suture augmentation,[16] and Dacron grafts,[17] as well as screw loosening.[4] Screw fixation requires a second operation for screw removal before full shoulder mobilisation. Coracoclavicular ligament reconstruction using an autogenous semitendinosus tendon requires no implant removal and entails no foreign body reaction. The only risk is donor-site morbidity. Both semitendinosus and gracilis tendon grafts confer superior initial biomechanical properties compared to coracoacromial ligament transfer.[18] The good initial strength enables early active and passive shoulder mobilization exercises.

A similar technique was first reported in 2001 in a 34-year-old woman. It entailed salvaging a failed acromioclavicular reconstruction with coracoclavicular ligament reconstruction using a loop of autogenous semitendinosus tendon from the ipsilateral knee.[12] The failed reconstruction was complicated with anterolateral shoulder pain interfering with daily activities. Magnetic resonance imaging showed hypertrophic scar around the Gore- Tex graft and osteolysis in the clavicular region of the synthetic device. The Gore-Tex graft and associated fibrous tissue were removed and augmentation was performed with an autogenous semitendinosus graft. Pain-free, full range of movement was reported 24 months later. In one patient with severe cartilage injury, the lateral end of the clavicle was excised (Mumford operation) to prevent future pain. We do not advocate routine excision of the distal clavicle. A study comparing acromioclavicular fixation and coracoclavicular ligament repair with or without distal clavicle excision found no difference in symptomatology, range of movement or strength, but a higher incidence of degenerative changes in patients without distal clavicle excision (4.5% vs 24.3%).[19] Excision of the distal clavicle may cause the posterior distal clavicle to impinge onto the acromion as it arcs medially. To prevent this, the posterior and superior acromioclavicular capsular ligaments should be preserved after excision, because both ligaments contribute greatly to clavicular stability.[20] Acromioclavicular capsular ligament repair plus coracoacromial ligament augmentation were recommended to counteract the destabilising effect of clavicle resection.[21]

Anatomical reconstruction of the conoid and trapezoid ligament has been attempted. The mean length from the clavicular end to the most medial insertion of the coracoclavicular ligament was 40 to 45 mm; the distance between the trapezoid ligament laterally and the conoid ligament medially was 15 mm.[22]

The anatomical centre of the attachment sites on the under surface of the clavicle of the trapezoid and conoid ligaments can be delineated during surgery. The 2 drills

holes were prepared with a 4.5-mm drill bit on the superior cortex of the clavicle at the foot print of the original 2 ligaments, around 15 cm apart and 2 to 2.5 cm proximal to the distal end. The free tendon graft risks rupture, loosening, or wear over time. Wound dehiscence patient was treated with secondary suturing and antibiotics. The patient only had mild pain and his strength and range of shoulder movement was comparable to that on the opposite side.

Concerning donor-site morbidity, the hamstring strength might be weaker at the deep flexion angle. Hamstring tendon grafting is not recommended for sportsmen who require to flex their knees deeply or powerfully, e.g. Judo, wrestling, or gymnastics.[23] Type-III acromioclavicular joint dislocation can be treated conservatively in sedentary workers. Further studies with a larger sample size and comparison with conservative treatment or other operative techniques should provide more information on the feasibility of such techniques.

CONCLUSION

Coracoclavicular ligament reconstruction with an autogenous semitendinosus tendon graft with polyester suture No. 5 (Ethibond) was feasible, more economical and safer in physically active demand patients with type-III acromioclavicular joint dislocation.

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