



Original article

Evaluation of the functional results after rotator cuff arthroscopic repair with the suture bridge technique[☆]



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ABSTRACT

Objective: To evaluate the results of arthroscopic treatment of large and extensive rotator cuff injuries (RCI) that involved the supra and infraspinatus muscles using the suture bridge (SB) technique.

Methods: Between July 2010 and November 2014, 37 patients with RCI who were treated with SB technique were evaluated. The study included all patients with a minimum follow-up of 12 months who underwent primary surgery of the shoulder. Twenty-four patients were male and 13 were female. The mean age was 60 years (45–75). The dominant side was affected in 32 cases. The most common cause of injury was trauma (18 cases). The mean preoperative motion was 123°, 58°, T11. Through magnetic resonance imaging, 36 fatty degenerations were classified according to Goutallier. Patients underwent rotator cuff repair with SB technique, which consists of using a medial row anchor with two Corkscrew[®] fibertape[®] or fiberwire[®] at the articular margin, associated with lateral fixation without stitch using PushLocks[®] or SwiveLocks[®].

Results: The mean age was 60 years and mean fatty degeneration was 2.6. The mean range of motion (following the AAOS) in the postoperative evaluation was 148° of forward elevation, 55° in lateral rotation and medial rotation in T9. Using the criteria of the University of California at Los Angeles (UCLA), 35 (94%) patients had excellent and good results; one (2.7%), fair; and one (2.7%), poor.

Conclusion: Arthroscopic repair of a large and extensive RCI using SB technique had good and excellent results in 94% of the patients.

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[☆] Study conducted at the Faculdade de Ciências Médicas da Santa Casa de São Paulo, Departamento de Ortopedia e Traumatologia, Grupo de Cirurgia de Ombro e Cotovelo, São Paulo, SP, Brazil.

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Avaliação dos resultados funcionais após reparo artroscópico do manguito rotador com a técnica equivalente transóssea (*suture bridge*)

R E S U M O

Palavras-chave:

Manguito rotador
Artroscopia
Suturas

Objetivo: Avaliar o resultado do tratamento artroscópico das lesões do manguito rotador (LMR) grandes e extensas dos tendões dos músculos supraespal e infraespal por meio da técnica *suture bridge* (SB).

Métodos: Entre 2010 e 2014, 37 pacientes com LMR submetidos a esse tratamento foram avaliados. Todos tinham seguimento mínimo pós-operatório de 12 meses e foram submetidos a cirurgia primária: 24 eram do sexo masculino e 13 do feminino. A média foi de 60 anos (45 a 75). O lado dominante foi acometido em 32 casos. Entre as lesões, 18 foram decorrentes de trauma. O movimento pré-operatório foi de 123°, 58°, T11. Por meio da ressonância magnética foi classificada a degeneração gordurosa de 36 pacientes de acordo com Goutallier. Os pacientes foram submetidos a reparo do manguito pela técnica de SB, com o uso de uma fileira medial de duas âncoras Corkscrew® com fibertape® ou fiberwire® na margem articular, associadas à fixação lateral sem nós com o uso de PushLocks® ou SwiveLocks®.

Resultados: A média de idade foi de 60 anos e a degeneração gordurosa média foi de 2,6, de acordo com Goutallier. A amplitude média dos movimentos (pela *American Academy of Orthopaedic Surgeons* [AAOS]) pós-operatória foi de 148°, 55°, T9. Pelos critérios da *University of California at Los Angeles* (UCLA), 35 (94%) pacientes tiveram resultados excelentes e bons; um (2,7%) paciente apresentou resultado regular e um (2,7%), ruim.

Conclusão: O reparo artroscópico da LMR grande e extensa pela técnica de SB trouxe resultados bons e excelentes em 94% dos pacientes operados.

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Introduction

Surgical treatment of rotator cuff injuries (RCI) has been increasingly indicated; recently, arthroscopy became the most widespread method¹ since there is no need to detach the deltoid muscle, allows complete visualization of the shoulder joint and rotator cuff lesions, evaluation of associated lesions, less cumbersome postoperative recovery, early return to work activities, and lower rate of postoperative infection.^{2,3}

Since the description of the insertion of the rotator cuff tendons by Apreleva et al.,⁴ the purpose of repair, regardless of the technique, became the anatomical restoration of structures.⁵ Among the variations in the RCI arthroscopic suture technique, the most used are: single row with simple suture,⁶ double row,⁷ and the suture bridge (SB) technique.⁸ The latter presents the advantages of better contact and coaptation of the tendon to the bone and promotion of healing⁹; it provides a stronger repair than the double-row technique¹⁰ and produces a self-reinforcement effect that helps support the structural integrity and potentially improve the biology of healing.¹¹

This study aimed to assess the clinical results of patients who underwent arthroscopic repair of the rotator cuff using the transosseous-equivalent suture technique, or SB, and its comparison with the literature.

Patients and methods

From November 2006 to November 2014, 41 patients with RCI underwent arthroscopic surgical treatment with the SB

technique, performed by the Shoulder and Elbow Group of the Department of Orthopedics and Traumatology of this institution. Inclusion criteria were patients with large and extensive injuries according to the classification of Cofield,¹² involving tendons of the supraspinatus and infraspinatus muscles, in whom the SB technique was used, and who underwent only primary surgery and presented a minimum postoperative follow-up of one year. Thirty-seven patients were reassessed. Four did not fit the inclusion criteria.

The study included 24 male (64.8%) and 13 female patients (35.1%). Mean age was 60 years (range: 45–75 years). The dominant limb was affected in 32 cases (86.4%). Among the lesions, 18 (48.6%) were due to trauma.

Mean range of motion at preoperative evaluation was 123° of elevation (range: 20° to 160°). Mean lateral rotation was 58° (range: 20° to 60°) and mean medial rotation was T11 (range: gluteus to T5). Fatty degeneration was assessed and classified according to Goutallier et al.¹³ by magnetic resonance imaging (MRI) in 36 patients. A mean grade of 2.60 was observed, ranging from 2 to 4: 23 (63.8%) cases were classified as grade 2, five (13.8%) as grade 3, and eight (22.2%) as grade 4. The MRI of one patient was not found for evaluation.

All patients underwent surgery on a beach chair position, under general anesthesia associated with brachial plexus block. Arthroscopic inspection of the joint was performed prior to repair of the cuff. Subsequently, the subacromial space was approached, at this point, bursal debridement, tendon mobilization, and debridement of the greater tubercle of the humerus bone were performed, followed by cuff repair using

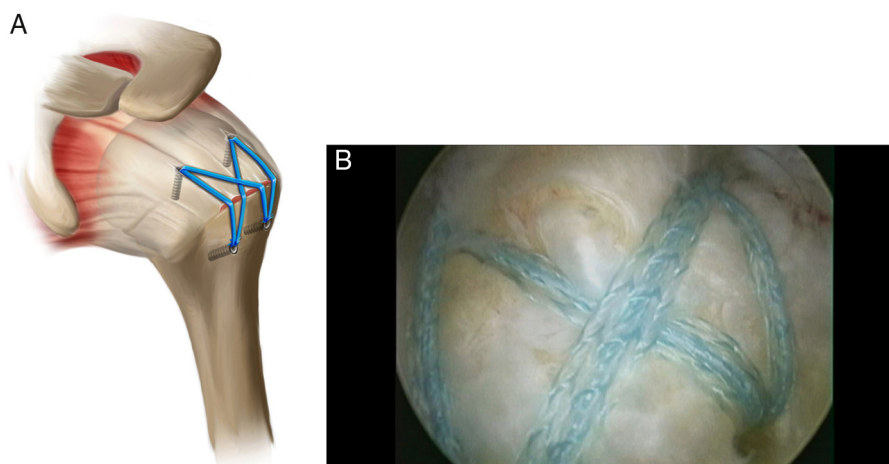


Fig. 1 – Transosseous equivalent suture technique (suture bridge). (A) Drawing showing the rotator cuff repair; (B) intraoperative image of the shoulder after the repair.

the SB technique, which consisted of a medial row of two anchors in the articular margin associated with the lateral fixation without stitches, as described by Park et al.⁸ (Fig. 1A and B). In the medial row, Bio-Corkscrew[®] anchors were used in all patients, with Fibertape[®] in 33 (89.1%) cases and Fiberwire[®] in four (10.8%). For lateral fixation, two PushLock[®] anchors were used in 34 patients (89.18%), and SwiveLocks[®] were used in the other four (10.8%).

Resection of the lateral portion of the clavicle was performed in 13 patients (35.1%); tenotomy and tenodesis of the long head of the biceps were performed in 26 (70.2%) and 23 (62.1%), respectively. In three patients (8.1%), the long head of the biceps was absent. Acromioplasty was conducted in 36 patients (97.2%). In the patient in whom it was not performed, a severe degenerative lesion of the rotator cuff tendons was observed. In six patients (16.2%), a simple tendon-tendon suture was made for closure of the remaining lesion. High subscapular lesion was identified in four patients (10.8%), sutured with a simple stitch.

Mean time of immobilization in the postoperative period, with a functional sling, was seven weeks (range: 6–12).

Mean follow-up was 30 months (range: 12–63 months). Patients were evaluated using the criteria proposed by the University of California at Los Angeles (UCLA).¹⁴ The range of joint motion was measured following the criteria of the American Academy of Orthopaedic Surgeons (AAOS).¹⁵

This study was duly submitted to and approved by the Ethics Committee of the institution and was registered under CAEE No. 45987815.9.0000.5479.

Results

Mean UCLA score¹⁴ of the 37 patients was 33.7 points (range 16–35). Results were considered excellent in 30 (81%) cases and good in five (13.5%). In one case (2.7%), the result was fair, as it evolved with adhesive capsulitis in the postoperative

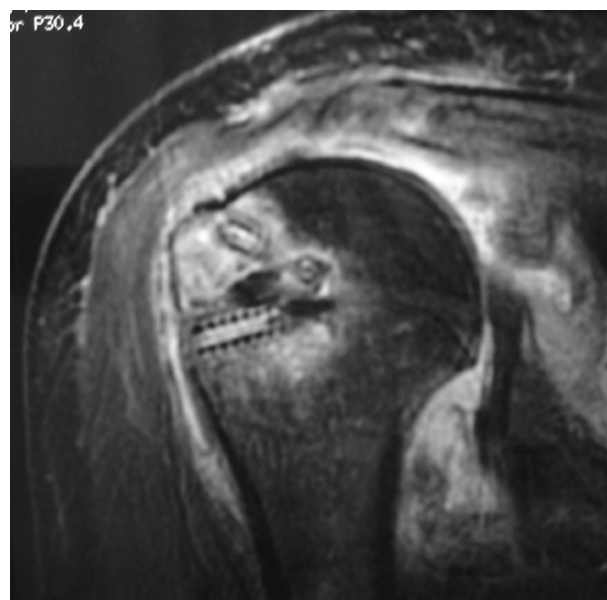


Fig. 2 – T2-weighted coronal view two months postoperatively, of a patient with poor UCLA score, showing suture dehiscence.

period; in another case (2.7%), it was considered poor, since the patient presented a new symptomatic rupture, confirmed by MRI (Fig. 3).

Mean range of motion at postoperative evaluation was 148° (range: 120° to 160°) of elevation, 55° (range: 20° to 70°) of lateral rotation, and T9 (range: L4–T5) medial rotation, i.e., gains were observed in all directions of movement, with a mean increase of 25° of elevation, 3° of lateral rotation, and two vertebral levels of medial rotation.

Discussion

The increase in overall longevity associated with the practice of physical activity has led to the consideration of surgical RCI treatment in older patients; the literature indicates that arthroscopic repair is consistently better.¹⁶⁻²⁰

The study by Hattrup²¹ established an association between lesion size and age of the patient; this was actually observed in the present study, in which the mean age of patients was 60 years. It is noteworthy that lesions in elderly patients are not only large, but also usually have a degenerative character, with atrophied muscles and thin tendons of poor quality for suture,²⁰ which further complicates the RCI treatment; this is one of the indications for the SB technique.⁸

As previously mentioned,⁸ the SB technique was developed in order to increase the contact and coaptation of the tendon to bone, to achieve scarring⁹ and thereby the healing of the injury. Furthermore, this technique has been documented by numerous authors for its efficacy and effectiveness in repairing large and extensive RCIs.²² This was one of the factors that led to the choice of this technique in the present study. It must be emphasized that the present study had large and extensive lesions as an inclusion criterion (Fig. 3).

Regarding the etiology, in 2015 Miyazaki et al.²⁰ demonstrated a significant association between trauma and incidence of large and extensive Cofield lesions,¹² as was observed in the present study, in which 48.6% of the injuries had a traumatic origin.

The development of arthroscopic repair techniques has reduced the incidence of re-ruptures and revisions for rotator cuff repair. It is now known that the ideal treatment should provide sufficient strength to maintain the repair of the lesion with enough shoulder movement and stability to allow healing of the tendon to the bone without the appearance of a new lesion.²³

Using the arthroscopic SB technique, excellent and good results were obtained in 94.5% of the present cases according to the UCLA score.¹⁴ Using this technique, only two cases (5.4%) presented unsatisfactory results, one case (2.7%) with fair outcome and one case (2.7%), poor, in patients aged 56-71 years. These results prove the efficacy of the technique used in the repair of these lesions.



Fig. 3 – Intraoperative image of the shoulder showing an extensive rotator cuff lesion.

The increased degree of fatty degeneration led to the recurrence of rotator cuff rupture after arthroscopic repair in 31.8% of the patients in the study by Ozbaydar et al.,²⁴ in 2005, and in 30% of those in the study by Godinho et al.,²⁵ in 2010. Most cases were asymptomatic, as patients had no pain or functional loss.²⁶ In this service, postoperative routine MRI images were not performed; the examination was requested only for the one symptomatic case in this study, which evidenced suture dehiscence (Fig. 2). The authors believe that the suture failure happened because, in addition to not maintaining the immobilization (sling), as recommended, and not attending the postoperative rehabilitation, the patient presented Goutallier et al.¹³ grade 4 fatty degeneration in the preoperative MRI, above the average of 2.6 in the current study.

Five cases presented signs of a capsular inflammatory process that suggested adhesive capsulitis during the arthroscopic joint inspection procedure, but did not require supplementary treatment, whether intra- or postoperatively.

Conclusion

The arthroscopic treatment of RCI using the SB technique led to 94.5% excellent and good results when assessed by the UCLA functional score.

Conflicts of interest

The authors declare no conflicts of interest.

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