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ORIGINAL ARTICLE

Hidden degloving rotator cuff tears secondary to glenohumeral dislocation

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Background: A rare form of rotator cuff tear (RCT) is observed secondary to glenohumeral dislocation, followed by immediate repositioning, as well as formation of scar tissue between tendons and tuberosities. Radiographic diagnosis of such "degloving" tears is problematic because they are obscured by scar tissue. We aimed to describe characteristics of degloving tears and report outcomes following their arthroscopic repair.

Methods: Among 67 patients who underwent arthroscopic repair of RCTs secondary to shoulder dislocation, we identified 8 patients (12%) (7 anterior dislocations and 1 posterior dislocation), aged 54.5 years (range, 38-61 years), with typical characteristics of degloving tears. Preoperative imaging revealed massive 2- or 3-tendon tears in all patients (6 with a ruptured or dislocated long head of the biceps), evaluated preoperatively and at greater than 2 years, using the absolute and age- and gender-adjusted Constant scores, Subjective Shoulder Value, and Simple Shoulder Test score.

Results: The absolute Constant score improved from 27 (range, 17-54) to 89 (range, 62-95). The age- and gender-adjusted Constant score improved from 31 (range, 24-57) to 97 (range, 83-100). The Simple Shoulder Test score improved from 2 (range, 0-4) to 12 (range, 9-12), while the Subjective Shoulder Value improved from 18 (range, 10-30) to 90 (range, 60-100). All patients were very satisfied (63%) or satisfied (37%).

Conclusion: We have described a particular form of RCT secondary to glenohumeral dislocation, resulting in degloving of the rotator cuff, followed by repositioning of tendons. The formation of scar tissue can obscure tendon tears on ultrasound, in which case further imaging is recommended to ascertain the diagnosis and avoid therapeutic delays.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: RCT; rotator cuff tear; massive tear; degloving; glenohumeral dislocation; arthroscopic; radiographic; Constant score

Glenohumeral instability can be isolated or associated with concomitant shoulder pathologies, mainly rotator cuff tears (RCTs), that can impact prognosis if not treated early enough. More rarely, neurologic lesions in the brachial plexus branches may be observed,[30] with or without RCTs, typical of the shoulder "unhappy triad."[11,13,15,34]

The institutional review board of the Centre Orthopédique Santy approved this study in advance (institutional review board No. 2017-15).

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The risk of RCTs increases with age[14,16,24,25,28,33,36] but is also present in young patients.[17,18,22] Some authors reported that glenohumeral dislocations in patients aged over 40 years often cause RCTs,[28,36] which are generally diagnosed by specialists but which may remain undiagnosed in some acute phases. Delayed diagnosis could compromise outcomes of tendon repair owing to increased tendon retraction and fatty infiltration.[2,7,8] Most authors therefore agree that, for patients aged over 40 years, a complete clinical examination should be performed systematically, together with radiographic imaging, where ultrasound may suffice.[27,28,33,36]

In our experience, a rare particular form of RCT is observed in some patients following glenohumeral dislocation: "degloving" of 2 or more rotator cuff tendons, followed by immediate repositioning, as well as formation of a layer of scar tissue between the tendon and the tuberosities. As these RCTs are caused by abnormal displacement of the humeral head rather than excessive tension within the rotator cuff muscles, the torn tendons seldom retract, particularly if the tears are diagnosed within the first few weeks after injury. Radiographic diagnosis of these types of degloving tears is problematic because they are obscured by "scar tissue," which can be observed only during arthroscopic examination and may sometimes be visible on magnetic resonance imaging (MRI) or computed tomography arthrography (CTA). We therefore aimed to describe the clinical, radiographic, and arthroscopic characteristics of degloving tears observed at our center and to report functional outcomes following their arthroscopic repair.

Methods

Study design

We retrieved the records of all patients who underwent arthroscopic repair of RCTs secondary to shoulder dislocation between 2010 and 2015. During this period, the senior author (A.G.) operated on an annual average of 80 patients for shoulder instability and 350 patients for RCTs, in addition to patients treated with conservative methods. Among a total of 67 patients (67 shoulders), we identified 8 patients with typical characteristics of degloving RCTs, without tendon retraction, exhibiting a layer of scar tissue observed on MRI or CTA scans or during arthroscopic examination. The scar tissue is interposed between the torn tendons and their bony footprints and could therefore have an adhesive effect but may not necessarily have a healing potential, as do other connective tissues with active vascularization and immune response. The case notes of these patients were then analyzed to describe common lesion specificities in detail.

Preoperative clinical assessment

All patients had been examined clinically by the senior surgeon (A.G.), who tested the rotator cuff muscles and inspected for potential concomitant osseous or neurologic pathologies and who collected the absolute Constant score[4]; age- and gender-adjusted Constant score[3]; Disabilities of the Arm, Shoulder and Hand (DASH) score[19]; Subjective Shoulder Value (SSV)[5,6]; and Simple Shoulder Test (SST) score.[32] Of the 8 patients, 7 had anterior dislocations and only 1 had a posterior dislocation.

Preoperative radiographic assessment

Our standard radiographic protocol for patients presenting with shoulder dislocations is based on plain radiographs, and if RCTs are suspected, ultrasound assessments are also performed. As the risk of RCTs following shoulder dislocation increases considerably with age, ultrasound assessments are systematically performed for patients aged over 40 years. If ultrasound reveals no tears despite clear and persistent clinical signs, MRI or CTA is performed to ascertain the diagnosis. Of the 8 patients in this cohort, 6 had ultrasound assessments, which confirmed tendon tears in only 3 shoulders. As all 8 patients had typical symptoms of RCTs (positive Jobe test and considerable weakness in external rotation with the arm at the side of the body), MRI was then performed for 2 patients while CTA was performed for 6 patients to ascertain the types and extents of tears. All images were interpreted by an experienced senior radiologist (Y.C.), who observed massive full-thickness tears[5] in all shoulders, which ruled out the possibilities of sleeve avulsions[24] or partial articular-sided supraspinatus tendon avulsions.[35] Three patients had complete tears of the supraspinatus and infraspinatus (2-tendon tears), of whom one had medial subluxation of the long head of the biceps (LHB) due to stretching of the pulley system without a subscapularis tear. Five had complete tears of the supraspinatus, infraspinatus, and subscapularis (3-tendon tears), of whom four had medial dislocation of the LHB while one had a complete tear of the LHB. Fatty infiltration according to the modified classification of Goutallier et al[12] was at stage 0 in 2 shoulders and at stage 1 in 6 shoulders (Table I). The low stages of fatty infiltration confirmed that the tears were recent,

Table I Patient demographic characteristics (n = 8)

	Data
Age, median (range), yr	54.5 (38.0-61.0)
Time from injury to surgery, median (range), mo	2.0 (0.5-4.0)
Follow-up, median (range), yr	3.2 (2.1-7.2)
Men, n	6 (75%)
Dislocation type, n	
Anterior	7 (88%)
Posterior	1 (13%)
Clinical presentation, n	
Pseudoparalytic shoulder	5 (63%)
C8-T1 paralysis	1 (13%)
Type of rotator cuff tear, n	
3-tendon tear (SSP, ISP, and SSC)	5 (63%)
2-tendon tear (SSP and ISP)	3 (38%)
Long head of biceps, n	
Dislocated medially	4 (50%)
Subluxated	1 (13%)
Torn	1 (13%)
Tear diagnosed at first reading, n	
Ultrasound	3 of 6 (50%)
MRI or CTA	7 of 8 (88%)

SSP, supraspinatus; *ISP*, infraspinatus; *SSC*, subscapularis; *MRI*, magnetic resonance imaging; *CTA*, computed tomography arthrography.