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Original article

Complications of coracoid transfer procedures for the treatment of recurrent shoulder dislocation

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ABSTRACT

Background: Different surgical procedures have been described for the treatment of the recurrent anterior dislocation of the shoulder. Despite the documented success of the open procedures, some studies suggest that the arthroscopic technique leads to more favorable results. However, there still seems to be some disagreement concerning the incidence of complications, when comparing open and arthroscopic techniques.

Objective and methods: As an attempt to clarify these doubts about the incidence of complications associated with the different techniques, this study contains a free literature review along with a retrospective case series of the patients who underwent these procedures in an University hospital in the past 10 years.

Discussion and conclusion: There are various techniques for the treatment of the recurrent dislocation of the shoulder, all of them with known success when it comes to prevention of recurrence. However, all of them are invariably associated with high complication rates.

Despite being associated with a slightly higher re-operation rate, in the literature, the arthroscopic technique was found to have an overall lower rate of complications when compared to the open procedures. Centro Hospitalar São João (CHSJ) presented a higher rate of *screw related complications* and *revision surgery* than the literature. However, concerning other complications and when assessing the procedures individually, no tendency was verified. One can therefore conclude that, despite being scarce, the Centro Hospitalar São João CHSJ data roughly overlap the literature.

Introduction

Different surgical procedures have been described for treatment of the recurrent anterior dislocation of the shoulder.[1] Currently, efforts are being made to determine parameters that can be widely used to decide what procedure to perform. Balg and Boileau[2] have created an instability score (ISIS) to determine pre-operative risk factors in patients with recurrent instability. This score intends to help the surgeon decide whether to perform a soft tissue procedure or a bone graft procedure. So, in patients with high recurrence risk, coracoid transfer procedures that place the coracoid process on the anteroinferior border of the glenoid cavity are an alternative to the soft tissue procedures (Bankart). The first coracoid transfer procedure was described by Latarjet[3] in 1954 and by Helfet (who named the procedure after Bristow) in 1958, having suffered some modifications since then.

The difference between both (Latarjet and Bristow) lies in the coracoid graft position. The Bristow procedure places the longer axis of the graft perpendicularly,[4] whereas the Latarjet procedure places it parallel to the glenoid cavity.[5] In both, the final effect is a bone block that reinforces the anteroinferior border of the glenoid cavity and a stabilizing sling effect achieved by the transfer of the coracoid and conjoint tendon through the subscapular muscle.[6]

Despite the documented success of the open procedures, some studies suggested that the arthroscopic technique is associated with a cosmetically more favorable result, as well as with a lower post-operative morbidity and a faster recovery. And, as far as the procedure is concerned, studies claim that this minimally invasive technique allows a more accurate positioning of the graft, theoretically lowering the complications associated with its dislocation.[7] However, there still seems to be some disagreement concerning the incidence of complications, when comparing open and arthroscopic techniques.[8]

Abbreviation: CHSJ, Centro Hospitalar São João.

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This study focuses exclusively on coracoid transfer procedures, which, despite being effective on patients with a high risk of recurrence, are also associated with certain complications that must be taken into consideration before, during and after the surgery.

Thus, as an attempt to clarify these doubts about the incidence of complications associated with the different techniques, this study contains a free literature review alongside a retrospective *case series* of the patients who underwent these procedures in an university hospital in the past 10 years.

Methods

A literature review was performed, using the PubMed database. The keywords were Complications; Bristow; Latarjet; Open; Coracoid Transfer; Bone-block; Arthroscopic; Shoulder; Glenohumeral; Instability; Dislocation.

Complication was defined as an adverse event or morbidity caused by the surgery and the complications included in this study were recurrent instability (dislocation, subluxation and positive apprehension test), pseudarthrosis, graft dislocation, graft fracture, osteolysis/graft reabsorption, arthrosis, screw related complications (loose, migration, fracture), pain, hematoma, infection (deep or superficial), neuromuscular/vascular complications, revision surgery and functional restrictions.

The inclusion criteria were: English or Portuguese language studies published after 2005; Case series with human participants; studies reporting the complications of the original or modifications of the Bristow/Latarjet procedures for the treatment of the recurrent dislocation of the shoulder.

The exclusion criteria were: studies on any language other than Portuguese or English; studies published before 2005; studies in animals; level of evidence V, opinion articles, anatomic studies, biomechanical studies, or studies referring only to the surgical or image techniques. Case reports, abstract only publications and revision articles with no original data were also excluded, as well as studies reporting only the outcomes of revision surgeries and isolated soft tissue stabilization procedures (Bankart). The studies reporting the results of more than one technique were only included if a clear distinction of the outcomes of each procedure was possible.

The title, abstract or both of each article were reviewed. The full texts were reviewed when inclusion was anticipated, when there was no abstract available or when a decision regarding inclusion or exclusion could not be made from the title and/or abstract alone. The references of the included studies were also reviewed for potential inclusion, for any additional articles not identified through the database search. A total of 19 articles were included,[1,5,8–24] the data were organized and descriptive statistics were calculated and analyzed.

A retrospective review of the patients submitted to coracoid transfer procedures in the Orthopedics and Traumatology department of the *Centro Hospitalar São João* (CHSJ), an University hospital in Porto was also performed. The data were extracted from computer records. The inclusion criteria were: surgeries performed between January 2006 and December 2015. The exclusion criteria were: soft tissue stabilization procedures and revision surgeries.

From the 69 patients submitted to stabilization procedures for the recurrent dislocation of the shoulder, only 34 were submitted to coracoid transfer procedures. The others underwent soft tissue procedures. Thus, 34 patients were included and such as in the literature review, the data were organized and descriptive statistics were calculated and analyzed.

In the statistical analysis, the chi-square test was used to evaluate the differences in the incidence of complications among the different procedures. When the sample was too small, the Fisher's Exact test was used. A similar way was used to assess the qualitative differences of the functional scores results and the t student test was used to analyze continuous variables. $p < 0.05$ was deemed statistically significant.

Table 1
General data from the literature and CHSJ, the University hospital. Since many articles do not refer to some of the variables, the total number may not coincide in all of them. The data from each included study is discriminated in Table 2.

	Literature	CHSJ
Analyzed studies	19	–
Total of shoulders	962	34
Gender		
Male	713	27
Female	185	7
Mean age at the time of the surgery	27.6 years old	28 years old (15–57)
Operated shoulder		
Dominant	365	–
Non-dominant	212	–
Left	–	15
Right	–	19
Average follow up period	8 years (3 months–35 years)	8 months (1 month–5 years)
Technique		
Bristow	429	19
Latarjet	307	10
Arthroscopic Latarjet	226	5

Results

Literature review

In the literature review, a total of 898 patients (962 operated shoulders) were included, of which 713 (79%) were male and 185 (21%) were female.

The mean age at the time of the procedure was 27.6 years old. The dominant side was involved in 365 (63%) cases whereas the non-dominant side was involved in 212 (37%). The average follow-up period was 8 years (ranging from 3 months to 35 years) (Table 1). From all the operated shoulders, 429 underwent the Bristow procedure, 307 the Latarjet procedure and 226 the arthroscopic Latarjet procedure (Table 1). The data from each included study is discriminated in Table 2.

Range of motion limitation refers to movements in every direction, but the most significant one was the restriction in external rotation, found in 82% of the shoulders with *range of motion limitation*. Screw related complications include screw fracture, migrations and the presence of loose or prominent screws. *Neuromuscular complications* include intraoperative alerts (26), axillary nerve damage (5), musculocutaneous nerve damage (1) and deltoid muscle atrophy (3). Besides intraoperative nerve alerts, no other intraoperative complications were reported in the literature.

As presented in Table 4, and although the open techniques were generally associated to a higher rate of complications, the arthroscopic technique is associated with a significantly higher number of *hematoma* and *revision surgery*.

Relative to the functional scores, graphics A and B compare the qualitative functional results ("Excellent", "Good", "Fair" and "Poor") reported in the literature, associated with the Bristow and Latarjet techniques (Graphic A) and with open and arthroscopic techniques (Graphic B). There is a significantly higher percentage of "Excellent" results with the arthroscopic techniques when compared to the open procedures, while these were associated with higher "Good" and "Fair" results (Fig. 1).

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