Latarjet Procedure for Anterior Glenohumeral Instability

Early Postsurgical Complications for Primary Coracoid Transfer Versus Revision Coracoid Transfer After Failed Prior Stabilization

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Background: The Latarjet procedure (coracoid transfer) is often used to successfully treat failed instability procedures. However, given the reported increased complication rates in primary Latarjet surgery, there is a heightened concern for complications in performing the Latarjet procedure as revision surgery.

Purpose: To evaluate the early outcomes and complications of the Latarjet procedure as primary surgery compared with revision surgery.

Study Design: Cohort study; Level of evidence, 3.

Methods: A total of 157 patients were included and retrospectively reviewed: 103 patients in the revision group and 54 patients in the primary group. Patients were evaluated by physical examination findings as well as by documentation of complications and reoperations extracted from their electronic medical records.

Results: The mean follow-up was 7.8 ± 11.0 months for the primary group and 7.0 ± 13.2 months for the revision group. There were no significant differences in overall complication rates between the primary and revision groups (16.7% vs 8.7%, respectively; $P = .139$). The complication rate was significantly higher in patients in the revision group who had undergone a prior open procedure compared with those who had undergone only arthroscopic procedures (30.0% vs 4.1%, respectively; $P < .001$). Of those patients who sustained a complication, 7 of the 9 underwent a reoperation in the primary group (13.0%), and 7 of the 9 did so in the revision group (6.8%); the risk of reoperations was not different between groups ($P = .198$). There were 4 patients in the primary group (7.4%) and 5 patients in the revision group (4.9%) who experienced recurrent dislocations during the follow-up period ($P = .513$). There was no difference in postoperative range of motion.

Conclusion: The Latarjet procedure is a reasonable option for the treatment of failed arthroscopic instability repair with an early complication rate similar to that found in primary Latarjet surgery.

Keywords: Bankart; labrum; Latarjet; instability; complication; revision

Anterior shoulder dislocations occur in approximately 2% of the population, with 80% of these occurring in young patients.[26] Recurrent instability and functional shoulder impairment have been shown to develop in up to 92% of these adolescent patients,[7,22,30,33] with young male athletes being at the highest risk for recurrence.[2,24,30] Aside from acute pain, functional impairment, and instability, these patients are now at an increased risk for developing long-term degenerative arthritis, which is correlated with the number of recurrent episodes of dislocation.[6,19,28] Shoulders that have been stabilized operatively have demonstrated lower rates of degenerative arthropathy compared with nonoperatively managed shoulders with ≥1 recurrent dislocations.[15,19] For this reason, some authors have recommended early operative management of anterior glenohumeral instability for the prevention of recurrent shoulder instability and subsequent degenerative arthritis.[5,36]

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Multiple arthroscopic and open operative techniques exist for the management of anterior glenohumeral instability. These include labral repair (ie, Bankart repair), glenoid rim fracture reduction and fixation (ie, bony Bankart repair), capsular imbrication, capsular shift, remplissage of Hill-Sachs lesions, iliac crest bone grafting, use of allografts, and coracoid transfer (ie, Latarjet procedure).[9,18,29]

The optimal surgical treatment of anterior glenohumeral instability continues to be debated in the literature.[1,2,10,24,34,38] Factors such as patient activity level, age, sex, labral injuries, Hill-Sachs lesions of the humeral head, presence of a glenoid rim fracture, and anterior glenoid bone loss all play a role in guiding the treatment strategy. According to recent surveys of surgeons,[3,8] arthroscopic Bankart repair is currently the treatment of choice for the primary management of recurrent stability. However, recurrent dislocation and revision surgery rates after arthroscopic Bankart repair range from 0% to 30%[17,23,24,35] and from 14% to 60%,[24,25] respectively.

The Latarjet procedure has also been shown to be a successful treatment option after failed prior soft tissue stabilization.[13] A recent systematic review performed by Rollick et al[31] that compared the Latarjet procedure with Bankart repair found that the redislocation rate was significantly lower in the Latarjet group (15.1% vs 2.7%, respectively; $P < .001$). This study did, however, note a significantly higher complication rate in the Latarjet group (0.0% vs 9.4%, respectively; $P = .002$).[31] In fact, the fear of complications is a significant concern for surgeons when considering the Latarjet procedure. Most of these complications occur intra- and postoperatively within the first few months.[16] Reported complications include superficial infections, superficial vein thrombosis, musculocutaneous neurapraxia, and hardware complications.[31] A study by Friedman et al[14] noted that 73% of dislocations after the Latarjet procedure occurred within the first year after surgery.

The purpose of this study was to evaluate the early outcomes and complications of Latarjet coracoid transfer as a primary procedure compared with those in which the Latarjet procedure was performed as revision surgery. We hypothesized that patients who underwent the Latarjet procedure as a primary treatment for instability would have better results and fewer complications than those patients who underwent the Latarjet procedure as revision surgery.

METHODS

Study Design

After receiving institutional review board approval, a retrospective review of our institutional database was performed using Current Procedural Terminology (CPT) codes 23462 (capsulorrhaphy, anterior, any type; with coracoid process transfer) and 23460 (capsulorrhaphy, anterior, any type; with bone block) to identify all patients who underwent the Latarjet procedure between 2007 and 2016. Patient electronic medical records and operative reports were reviewed to collect demographic data. Patients younger than 18 years at the time of the procedure, patients with rotator cuff tears, patients who underwent an arthroscopic Latarjet procedure, and those with inadequate documentation were excluded from the study. Those who underwent arthroscopic Latarjet surgery were excluded because of the limited number of arthroscopic procedures performed at our institution.

A total of 198 patients were queried based on CPT codes, and 157 patients were included in this study after the application of inclusion and exclusion criteria. Patients were placed into 1 of 2 groups: those who underwent Latarjet surgery as a primary stabilization procedure (primary group) and those who underwent Latarjet surgery after a failed prior instability procedure (revision group). Thus, 103 patients were included in the revision group, and 54 were included in the primary group.

Demographic data including age, Charlson Comorbidity Index (CCI), body mass index (BMI), and operative history were recorded. Patient-specific information including percentage of glenoid bone loss and complications was recorded based on chart review. The percentage of bone loss was extracted from the preoperative or operative note and not directly measured.

Surgical Technique

All procedures were performed by fellowship-trained shoulder and elbow surgeons. Although techniques varied slightly given surgeon preference, open procedures were performed according to a modification of the original Latarjet technique as described by Edwards and Walch[12] and Plancher et al.[27] Patients were placed in the beach-chair position, and exposure was obtained through a standard deltopectoral approach. The coracoid was exposed, and

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Ethical approval for this study was obtained from Thomas Jefferson University.

TABLE 1
Patient Demographic Data[a]

	Primary (n = 54)	Revision (n = 103)	P Value
Age, y	31.4 ± 11.1	27.1 ± 8.9	.016
Sex, n (%)			.572
Male	46 (85.2)	91 (88.3)	
Female	8 (14.8)	12 (11.7)	
CCI	0.36 ± 0.87	0.26 ± 0.58	.608
BMI, kg/m^2	25.6 ± 4.2	24.4 ± 3.5	.773
Glenoid bone loss, %	25.9 ± 6.6	23.6 ± 9.0	.169
Follow-up, mo	7.8 ± 11.0	7.0 ± 13.2	.723

[a]Values are reported as mean ± SD unless otherwise indicated. BMI, body mass index; CCI, Charlson Comorbidity Index.

medial tissues including the pectoralis minor were reflected from the bone while leaving the conjoint tendon intact. The blood supply to the coracoid through the medial conjoint tendon was protected. The coracoacromial ligament was either reflected from the lateral coracoid or incised 1 cm lateral to the origin. The coracoid was osteotomized at the bend with a 90° sagittal saw. There were 2 drill holes placed from posterior to anterior, and graft preparation was completed. The glenoid was exposed through a midsubscapularis split and vertical capsulotomy just adjacent to the glenoid rim. A U-shaped labral periosteal sleeve was created, and the anterior glenoid rim was prepared and carefully decorticated to create a bleeding bony bed for healing. The graft was placed on the anterior rim at approximately the 5-o'clock position in the right shoulder and approximately the 7-o'clock position in the left shoulder. Corresponding drill holes paralleling the articular face of the glenoid were placed through the previously prepared graft, and screws of appropriate length secured the graft to the glenoid rim. Careful attention was paid to ensure that the graft did not extend lateral to the glenoid rim. The capsule was then repaired to either the coracoacromial ligament stump or the graft or not repaired, according to surgeon preference.

Statistical Analysis

Comparisons between groups were performed using 2-sample *t* tests for continuous data and chi-square tests for categorical data. For all statistical analyses, $P < .05$ was used to determine statistical significance.

RESULTS

Demographic and Operative Data

Patient demographic data are displayed in Table 1. The revision group was significantly younger than the primary group (27.1 ± 8.9 vs 31.4 ± 11.1 years, respectively; $P = .016$). There were no significant differences between the primary and revision groups for CCI (0.36 ± 0.87 vs 0.26 ± 0.58, respectively; $P = .608$), BMI (25.6 ± 4.2 vs 24.4 ± 3.5 kg/m^2, respectively; $P = .773$), or clinical follow-up (7.8 ± 11.0 vs 7.0 ± 13.2 months, respectively; $P = .723$). There was no significant difference in the percentage of glenoid bone loss between the primary and revision groups (25.9% ± 6.6% vs 23.6% ± 9.0%, respectively; $P = .169$). Of the 103 patients in the revision group, 94 (91.3%) had operative reports and/or confirmation of an open versus closed procedure performed for primary surgery. A total of 20 (21.3%) of these patients had undergone some sort of open procedure before revision Latarjet surgery, while 74 (78.7%) had only arthroscopic procedures attempted.

TABLE 2
Postoperative Range of Motion[a]

	Primary (n = 54)	Revision (n = 103)	P Value
Forward elevation, deg	155 ± 13	153 ± 17	.380
External rotation, deg	39 ± 14	38 ± 14	.913

[a]Values are reported as mean ± SD.

TABLE 3
Postoperative Complications[a]

	Primary (n = 54)	Revision (n = 103)	P Value
Overall	9 (16.7)	9 (8.7)	.139
Reoperations	7 (13.0)	7 (6.8)	.198
Recurrent dislocations	4 (7.4)	5 (4.9)	.513
Hardware complications	3 (5.6)	3 (2.9)	.412
Hematoma	1 (1.9)	1 (1.0)	.640
Nerve palsy	1 (1.9)	0 (0.0)	.166

[a]Values are reported as n (%).

Range of Motion

There were no significant differences between the primary and revision groups for postoperative forward elevation (155° ± 13° vs 153° ± 17°, respectively; $P = .380$) or external rotation (39° ± 14° vs 38° ± 14°, respectively; $P = .913$) (Table 2).

Complications

There were no significant differences between the primary and revision groups in the overall complication rate (16.7% vs 8.7%, respectively; $P = .139$) or reoperation rate (13.0% vs 6.8%, respectively; $P = .198$) (Table 3). There were also no significant differences in the rates of recurrent dislocations (7.4% vs 4.9%, respectively; $P = .513$), hardware complications (5.6% vs 2.9%, respectively; $P = .412$), hematoma (1.9% vs 1.0%, respectively; $P = .640$), or nerve palsy (1.9% vs 0.0%, respectively; $P = .166$) between the primary and revision groups (Table 3). The complication rate was found to be significantly higher in those patients in the revision group who had undergone a prior open procedure compared with those who had undergone only arthroscopic procedures (30.0% vs 4.1%, respectively; $P < .001$).

DISCUSSION

There is limited research directly comparing the early outcomes and complications of the Latarjet procedure being performed as primary or revision surgery for the treatment of shoulder instability. We present the largest cohort of revision Latarjet cases studied in the literature. Our results reject our hypothesis, as we found that there were no significant differences in early outcomes or complication rates between patients who underwent the Latarjet procedure as primary or revision surgery.

Because of the high recurrence rate with Bankart repair, some authors have recommended coracoid transfer as the primary operative treatment in select patients.[2,22,38] The outcomes of primary Latarjet surgery for recurrent anterior instability have been shown to be good overall; however, recurrent dislocation rates of 0% to 5% and subluxation rates ranging from 0% to 10% have been shown after the procedure.[1,4,21,23] We found a recurrent dislocation rate of 7.4% in our primary Latarjet group. Postoperative arthritis and bone block osteolysis are additional complications associated with the Latarjet procedure.[11]

Moreover, the fear of early postoperative complications after the Latarjet procedure often dissuades surgeons from utilizing this procedure in the primary operative management of anterior shoulder instability and likely in revision cases as well. Of our revision Latarjet cases, 32% had undergone ≥2 prior failed instability procedures. We found no significant differences in the overall complication rates (16.7% vs 8.7%, respectively; $P = .139$), redislocation rates (7.4% vs 4.9%, respectively; $P = .513$), or reoperation rates (13.0% vs 6.8%, respectively; $P = .198$) between the primary and revision groups. Based on our results, the decision for initial surgery should not be influenced by the perceived outcome of a potential future Latarjet procedure, as revision Latarjet surgery for instability does not appear to confer any increased risk of complications compared with the procedure being performed as primary surgery.

Midterm outcomes and the restoration of stability in revision Latarjet surgery have been reported in the literature. A recent study by Yapp et al[37] evaluated the Latarjet procedure as primary and revision surgery. They had 60 patients who underwent revision Latarjet surgery and 145 patients who underwent primary Latarjet surgery, with a follow-up of 6.3 and 5.4 years, respectively. They found no differences in Quick Disabilities of the Arm, Shoulder and Hand or Western Ontario Shoulder Instability Index scores between the 2 groups. They also found no difference in overall satisfaction or complication rates. None of their patients in the revision group suffered a redislocation.[37] Schmid et al[32] evaluated 49 patients who underwent revision Latarjet surgery after failed prior instability procedures. They found no redislocations in their cohort and observed significant improvement in subjective shoulder value scores at 38-month follow-up.[32]

Our study is not without limitations. First, we analyzed short-term outcomes with a mean follow-up of between 7 and 8 months for each group. A longer term follow-up has the potential to reveal differences in recurrent instability rates or other complications that were not evident in our study. However, studies by Yapp et al[37] and Schmid et al[32] have shown strong midterm outcomes after revision Latarjet surgery with low redislocation rates. Second, our primary Latarjet group had fewer patients than the revision Latarjet group, likely secondary to surgeon preference of arthroscopic Bankart repair as the initial treatment of anterior shoulder instability.[3,8] Furthermore, because of this, our analysis of the complication rate was slightly underpowered at 0.78. Third, the mean age of patients in the revision group in our study was significantly younger than that in the primary group (27.1 vs 31.4 years, respectively). This difference highlights the young age at which many patients who have undergone prior surgery for shoulder instability present for revision surgery. Finally, because of the retrospective nature of this study, there is the risk of selection bias in that patients who underwent primary Latarjet surgery may have had physical examination findings leading to the decision of performing the Latarjet procedure instead of arthroscopic Bankart repair. However, we did not find significant differences in bone loss between the 2 groups, as this is a large factor in the decision-making process. Additionally, the retrospective nature of this study made it difficult to consistently capture data such as mechanisms of the initial instability event, instability history, reasons for primary Latarjet surgery, and mechanisms of failure for prior procedures.

For the patient without risk factors for failure of arthroscopic stabilization, we feel that arthroscopic stabilization is an effective and reasonable first line of treatment. Arthroscopic Bankart repair is a less invasive procedure with lower complication rates than open bone transfer surgery.[2,7,20,22] There are important patient-specific factors that are evaluated by the surgeon that help to determine the initial recommendation for arthroscopic Bankart repair, open Bankart repair, or the Latarjet procedure to address anterior shoulder instability. In our study, we found a complication rate of 16.7% in the primary Latarjet group. If the patient does exhibit recurrent instability after an initial arthroscopic stabilization procedure, we found that the Latarjet procedure performed in the revision setting has a similar complication profile to when it is performed as index surgery while having effective midterm results, as described in the literature.

CONCLUSION

There was no significant difference in overall complication rates between primary and revision Latarjet surgery; however, a significantly higher complication rate was found when the Latarjet procedure was performed after an open primary procedure. Latarjet coracoid transfer is a reasonable option for the treatment of failed instability repair with early complication rates similar to primary Latarjet surgery.

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