Latarjet Procedure for Anterior Glenohumeral Instability

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

Gary F. Updegrove,* MD, Patrick S. Buckley,† MD, Ryan M. Cox,† MD, Stephen Selverian,† MD, Manan S. Patel,† BA, and Joseph A. Abboud,†‡ MD
Investigation performed at the Rothman Orthopaedic Institute, Thomas Jefferson University, Philadelphia, Pennsylvania, USA

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. Recurrent instability and functional shoulder impairment have been shown to develop in up to 92% of these adolescent patients, with young male athletes being at the highest risk for recurrence. 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. Shoulders that have been stabilized operatively have demonstrated lower rates of degenerative arthropathy compared with nonoperatively managed shoulders with \( \geq 1 \) recurrent dislocations. 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.

This open-access article is published and distributed under the Creative Commons Attribution - NonCommercial - No Derivatives License (https://creativecommons.org/licenses/by-nc-nd/4.0/), which permits the noncommercial use, distribution, and reproduction of the article in any medium, provided the original author and source are credited. You may not alter, transform, or build upon this article without the permission of the Author(s). For article reuse guidelines, please visit SAGE’s website at http://www.sagepub.com/journals-permissions.
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).1,8,29

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 instability. 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 al31 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 neuralgia, and hardware complications.31 A study by Friedman et al15 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.

\[ P < .002 \]

**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 Walch12 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
TABLE 1
Patient Demographic Data

|                  | Primary (n = 54) | Revision (n = 103) | P Value |
|------------------|------------------|-------------------|---------|
| Age, y           | 31.4 ± 11.1      | 27.1 ± 8.9        | .016    |
| Sex, n (%)       |                  |                   |         |
| Male             | 46 (85.2)        | 91 (88.3)         | .572    |
| Female           | 8 (14.8)         | 12 (11.7)         |         |
| CCI              | 0.36 ± 0.87      | 0.26 ± 0.58       | .608    |
| BMI, kg/m²       | 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    |

*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 parallel to 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/m², 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.

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.\(^1\)\(^1\)

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; \( P = .139 \)), dislocation 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\(^22\) 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.\(^22\)

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\(^22\) 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.
REFERENCES

1. An VGV, Sivakumar BS, Phan K, Trantalitis J. A systematic review and meta-analysis of clinical and patient-reported outcomes following two procedures for recurrent traumatic anterior instability of the shoulder: Latarjet procedure vs. Bankart repair. J Shoulder Elbow Surg. 2016; 25(5):853-863.

2. Balg F, Boileau P. The instability severity index score: a simple pre-operative score to select patients for arthroscopic or open shoulder stabilisation. J Bone Joint Surg Br. 2007;89(11):1470-1477.

3. Berendes TD, Pilot P, Nagels J, Voelkelo AJH, Nelissen RGHH. Survey on the management of acute first-time anterior shoulder dislocation amongst Dutch public hospitals. Arch Orthop Trauma Surg. 2015; 135(4):447-454.

4. Bhattach S, Frank RM, Ghodadra NS, et al. The outcomes and surgical techniques of the Latarjet procedure. Arthroscopy. 2014;30(2): 227-235.

5. Bottoni CR, Wilckens JH, DeBerardino TM, et al. A prospective, randomized evaluation of arthroscopic stabilization versus nonoperative treatment in patients with acute, traumatic, first-time shoulder dislocations. Am J Sports Med. 2002;30(4):576-580.

6. Buscayret F, Edwards TB, Szabo I, Adeleine P, Coudane H, Walch G. Glenohumeral arthrosis in anterior instability before and after surgical treatment: incidence and contributing factors. Am J Sports Med. 2004;32(5):1165-1172.

7. Carpinteiro EP, Barros AA. Natural history of anterior shoulder instability. Open Orthop J. 2017;11:909-918.

8. Chong M, Karataglis D, Learmonth D. Survey of the management of acute traumatic first-time anterior shoulder dislocation among trauma clinicians in the UK. Ann R Coll Surg Engl. 2006;88(5):454-458.

9. DeFroda S, Bokshan S, Stern E, Sullivan K, Owens BD. Arthroscopic Bankart repair for the management of anterior shoulder instability: indications and outcomes. Curr Rev Musculoskelet Med. 2017;10(4): 442-451.

10. Ding DY, Meislin RJ. The arthroscopic Latarjet: a bony solution for a bony injury. Bull Hosp Joint Dis. 2017;75(1):52-56.

11. Domos P, Lunini E, Walch G. Contraindications and complications of the Latarjet procedure. Shoulder Elbow. 2018;10(1):15-24.

12. Edwards BT, Walch G. The Latarjet procedure for recurrent anterior shoulder instability: rationale and technique. Oper Techn Sports Med. 2012;20(1):57-64.

13. Flinkkila T, Tiimio K. Open Latarjet procedure for failed arthroscopic Bankart repair. Orthop Traumatol Surg Res. 2015;101(1):35-38.

14. Friedman LGM, Griesser MJ, Miniaci AA, Jones MH. Recurrent instability after revision anterior shoulder stabilization surgery. Arthroscopy. 2014;30(3):372-381.

15. Galvin JW, Ernat JJ, Waterman BR, Stadecker MJ, Parada SA. The epidemiology and natural history of anterior shoulder instability.Curr Rev Musculoskelet Med. 2017;10(4): 411-424.

16. Gupta A, Delaney R, Pelkin K, Lafosse L. Complications of the Latarjet procedure. Curr Rev Musculoskelet Med. 2015;8(1):59-66.

17. Hobby J, Griffin D, Dunbar M, Boileau P. Is arthroscopic surgery for stabilisation of chronic shoulder instability as effective as open surgery? A systematic review and meta-analysis of 62 studies including 3044 arthroscopic operations. J Bone Joint Surg Br. 2007;89(9): 1188-1196.

18. Hohmann E, Tetsworth K, Glatt V. Open versus arthroscopic surgical treatment for anterior shoulder dislocation: a comparative systematic review and meta-analysis over the past 20 years. J Shoulder Elbow Surg. 2017;26(10):1873-1880.

19. Hovelius L, Saeboe M. Neer Award 2008. Arthropathy after primary anterior shoulder dislocation: 223 shoulders prospectively followed up for twenty-five years. J Shoulder Elbow Surg. 2009;18(3):339-347.

20. Hovelius L, Sandstrom B, Saebo M. One hundred eighteen Bristow-Latarjet repairs for recurrent anterior dislocation of the shoulder prospectively followed for fifteen years, study II: the evolution of dislocation arthropathy. J Shoulder Elbow Surg. 2006;15(3):279-289.

21. Hovelius L, Sandstrom B, Sundgren K, Saebo M, one hundred eighteen Bristow-Latarjet repairs for recurrent anterior dislocation of the shoulder prospectively followed for fifteen years, study I: clinical results. J Shoulder Elbow Surg. 2004;13(5):509-516.

22. Hovelius L, Vikerfors O, Olofsson A, Svensson O, Rahme H. Bristow-Latarjet and Bankart: a comparative study of shoulder stabilization in 185 shoulders during a seventeen-year follow-up. J Shoulder Elbow Surg. 2011;20(7):1095-1101.

23. Hovelius L, Sundstrom BC, Rosmark DL, Saebo M, Sundgren KH, Malmqvist BG. Long-term results with the Bankart and Bristow-Latarjet procedures: recurrent shoulder instability and arthropathy. J Shoulder Elbow Surg. 2001;10(5):445-452.

24. Mohtadi NGH, Chan DS, Hollinshed RM, et al. A randomized clinical trial comparing open and arthroscopic stabilization for recurrent traumatic anterior shoulder instability: two-year follow-up with disease-specific quality-of-life outcomes. J Bone Joint Surg Am. 2014;96(5):353-360.

25. Owens BD, Deberardino TM, Nelson BJ, et al. Long-term follow-up of arthroscopic Bankart repair for initial anterior shoulder dislocations in young athletes. Am J Sports Med. 2009;37(4):669-673.

26. Owens BD, Duffey ML, Nelson BJ, DeBerardino TM, Taylor DC, Mountcastle SB. The incidence and characteristics of shoulder instability at the United States military Academy. Am J Sports Med. 2007; 35(7):1168-1173.

27. Plancher KD, Petterson SC, Walch G. Open Latarjet: a reliable, successful method to prevent recurrence in the presence of bony defects. Oper Techn Sports Med. 2013;21(4):238-245.

28. Ploth JE, Aboalata M, Seppel G, et al. Prevalence of and risk factors for dislocation arthropathy: radiological long-term outcome of arthroscopic Bankart repair in 100 shoulders at an average 13-year follow-up. Am J Sports Med. 2015;43(5):1084-1090.

29. Ramhamadany E, Modi CS. Current concepts in the management of recurrent anterior gleno-humeral joint instability with bone loss. World J Orthop. 2016;7(8):343-354.

30. Robinson CM, Howes J, Murdoch H, Will E, Graham C. Functional outcome and risk of recurrent instability after primary traumatic anterior shoulder dislocation in young patients. J Bone Joint Surg Am. 2006;88(11):2326-2336.

31. Rollick N, Ono Y, Kurji HM, et al. Long-term outcomes of the Bankart and Latarjet repairs: a systematic review. Open Access J Sports Med. 2017;8:97-105.

32. Schmid SL, Farshad M, Catanzaro S, Gerber C. The Latarjet procedure for the treatment of recurrence of anterior instability of the shoulder after operative repair: a retrospective case series of forty-nine consecutive patients. J Bone Joint Surg Am. 2012;94(11):a75.

33. Shields DW, Jefferies JG, Brooksbank AJ, Millar N, Jenkins PJ. Epidemiology of glenohumeral dislocation and subsequent instability in an urban population. J Shoulder Elbow Surg. 2018;27(2):189-195.

34. Streubel PN, Krych AJ, Simone JP, et al. Anterior glenohumeral instability: a pathology-based surgical treatment strategy. J Am Acad Orthop Surg. 2014;22(5):283-294.

35. Voos JE, Livermore RW, Feeley BT, et al. Prospective evaluation of arthroscopic Bankart repairs for anterior instability. Am J Sports Med. 2010;38(2):302-307.

36. Waterman BR, Kilcoyne KG, Parada SA, Eichinger JK. Prevention and management of post-instability glenohumeral arthropathy. World J Orthop. 2018;9(3):229-241.

37. Yapp LZ, Nicholson JA, McCallum C, Macdonald DJ, Robinson CM. The Latarjet as a primary and revision procedure for anterior shoulder instability: a comparative study of survivorship, complications and functional outcomes in the medium to long-term [published online August 1, 2019]. Shoulder Elbow. doi:10.1177/1755873219846926.

38. Zimmermann SM, Scheyerer MJ, Farshad M, Catanzaro S, Rahm S, Gerber C. Long-term restoration of anterior shoulder stability: retrospective analysis of arthroscopic Bankart repair versus open Latarjet procedure. J Bone Joint Surg Am. 2016;98(23):1954-1961.