An Evaluation of the Clinical and Anatomic Predictors of Outcomes at a Minimum of 2 years Following the Latarjet Procedure

William R. Mook, MD
Maximilian Petri, MD
Joshua A. Greenspoon, BSc
Marilee P. Horan, MPH
Grant J. Dornan, MSc
Peter J. Millett, MD, MSc

Steadman Philippon Research Institute
The Steadman Clinic
Vail, CO
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Background

- The Latarjet procedure for recurrent shoulder instability is highly successful
  - Latarjet procedure: only surgical option for glenoid bone loss with the long-term results reported\(^1,2\)

- Reasons for failure are rare and often unclear

- Several authors have described the anatomical variations of the coracoid amongst the general population\(^3,4\)

- Anatomic variables may be important to predicting the success of the Latarjet procedure
  - Conjoint tendon width?
  - Subscapularis tendon width?
  - Size and location of the humeral bone defect (Hill Sachs lesion)?
  - Postoperative glenoid track?\(^5\)
Purpose

1) Quantify the local osseous and soft tissue anatomy of patients undergoing the Latarjet procedure relative to their bipolar bone loss.

2) Evaluate the diagnostic reproducibility and prognostic utility of these radiologic measurements.

3) Correlate preoperative patient characteristics with the outcomes of the open Latarjet procedure.
The Latarjet procedure yields predictably successful outcomes in the treatment of recurrent shoulder instability and there are anatomic variations in the local anatomy that are predictive of postoperative stability and patient reported subjective outcomes.
Methods – Clinical Results

- Institutional Review Board (IRB) approval was obtained prior to study initiation.

- Data were prospectively collected and retrospectively reviewed.

- Demographic information, patient satisfaction, VAS, questions regarding instability, SANE score, ASES score, DASH score, and SF-12 PCS.

- Failures: continued instability events at a minimum of 2 years postoperatively.
Methods – Anatomic Measurements

- Coracoid size (surface area and width)
- Conjoint and subscapularis tendon widths
- Estimated glenoid defect surface area
- Hill-Sach’s Interval (HSI)
- Projected postoperative glenoid track engagement
- 31 MRI/6 CT
Measurement and calculation of the approximate dimensions and effective surface area (mm$^2$) of the cortical surface of the coracoid.

Coracoid Surface Area (mm$^2$):
- Dimensions of an idealized trapezoid:
  \[
  \frac{1}{2} \times (\text{Base 1(A)} + \text{Base 2(B)}) \times \text{Height(C)}
  \]

Coracoid dimensions:
- A: 27.0 mm
- B: 7.3 mm
- C: 14.7 mm
- D: 22.9 mm
Measurement and calculation of the approximate surface area (mm$^2$) of the glenoid osteochondral defect.

Surface Area of the Segment of a Circle (osteochondral defect, mm$^2$) = 
Area$_{Sector}$ ((n/360)/$\pi r^2$) – Area$_{Triangle}$ (½ Base(Height))
Projected postoperative glenoid track width \((x+y)\) (A) =

Width of the glenoid on the sagittal cut demonstrating the anteroinferior articular osteochondral defect \((x)\) (B) + Maximal width of the waist of the coracoid process measured axially \((y)\) (C).
Determination of potential engagement of the postoperative glenoid track and the Hill-Sach’s lesion.

Outside- & Engaged (OUT-E) vs. Inside- & Non-Engaged (IN-NE)
Figure A. Inside- & nonengaged (IN-NE) = Length of the projected postoperative glenoid track (asterisk) is greater than the Hill-Sach’s Interval (red triangle).

Figure B. Outside- & engaged (OUT-E) = Length of the projected postoperative glenoid track (asterisk) is less than the Hill-Sach’s Interval (red triangle).
Results

- 38 shoulders in 38 patients (33 men, 5 women)
- Mean age of 26 years (range 16-43)
- Mean follow-up of 3.3 years (range 2-7.9)
- 25 patients (66%) had prior stabilization surgery
- 6 workman’s compensation claims
Results - Clinical Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Baseline Assessment</th>
<th>Final Follow-up Mean 3.3 years (range 2-7.9)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-12 PCS</td>
<td>45.9 (range 34-58)</td>
<td>54.5 (range 41.9-59.5)</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>SANE</td>
<td>61.3 (range 1-87)</td>
<td>85.5 (range 49-100)</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>ASES</td>
<td>71.8(range 28-100)</td>
<td>88.0 (range 56.6-100)</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>QuickDASH</td>
<td>33.4(range 2.2-80)</td>
<td>7.0 (range 0-34)</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>Patient Satisfaction</td>
<td>N/A</td>
<td>Median 9/10</td>
<td></td>
</tr>
</tbody>
</table>

-Patients with preoperative VAS ≥3 had worse postoperative SF-12 PCS scores (p=0.043).
-20/26 patients (77%) who participated in sports postoperatively were able to do so at or near preinjury levels.
Results

- 26/34 (76%) patients reported that they have not had symptoms of instability since the surgery.
- 4/6 (67%) workman’s compensation patients reported continued instability.
- 2 patients (5%) required further surgical intervention for shoulder stabilization (1 iliac crest bone graft, 1 coracoid nonunion necessitating removal of hardware and a Bankart repair).
- Patients with OUT-E lesions were 3.7 times more likely to experience postoperative instability (RR=3.7, 95% CI [1.228,11.230]).
- No other radiographic measurements analyzed were associated with postoperative instability.
- Inter- and intra- observer reliability of measurements of glenoid bone loss based on the placement of a best-fit circle and manual measurements of surface area inconsistently ranged from fair to substantial, respectively.
Conclusions

• The Latarjet procedure reliably improves patient reported functional outcomes and leads to high levels of patient satisfaction.

• WC claims were associated with continued instability and patients with higher preoperative pain levels demonstrated inferior SF-12 PCS scores.

• Variations in coracoid anatomy as well as the size and location of Hill-Sach’s lesions are largely ignored in planning of the Latarjet procedure in its current state. We have demonstrated that these variables are predictive of stability following the Latarjet procedure.

• Surgeons should strongly consider addressing humeral sided bone loss and/or an alternative glenoid bone graft option when persistent engagement is anticipated based on preoperative approximation of the “glenoid track.”
References


Thank you