

Systematic Review

Recurrence Rate of Instability After Remplissage for Treatment of Traumatic Anterior Shoulder Instability: A Systematic Review in Treatment of Subcritical Glenoid Bone Loss

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Purpose: To report outcomes after arthroscopic remplissage in patients with anterior shoulder instability and subcritical glenoid bone loss, specifically regarding recurrence of instability, return to sport, and changes in range of motion. **Methods:** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were used to perform a search using the PubMed, Embase, Cochrane Library, and Scopus databases. Forest plots were used to evaluate the overall values for recurrent instability, change in external rotation, and return to sport after arthroscopic Bankart repair with or without remplissage. The Methodological Index for Non-randomized Studies and Risk of Bias in Nonrandomized Studies—Interventions checklist were used to evaluate bias. **Results:** Twenty-two articles met the inclusion and exclusion criteria. The Methodological Index for Non-randomized Studies and Risk of Bias in Nonrandomized Studies—Interventions checklists deemed studies as acceptable quality with low bias. Among 694 patients (522 male and 106 female patients) undergoing remplissage, the mean age was 28.3 ± 5.3 years and the mean duration of follow-up was 32.5 ± 13.9 months. The recurrence rate of instability ranged from 0% to 20%. The change in external rotation in 90° of abduction ranged from -11.3° to -1.0° , and the change in external rotation with the arm fully adducted ranged from -8.0° to $+4.5^\circ$. The overall rate of return to sport ranged from 56.9% to 100% after remplissage. The rate of return to sport at the preinjury level ranged from 41.7% to 100%. In addition, arthroscopic remplissage in addition to Bankart repair had a reduced odds of recurrent instability developing, ranging from 0.07 to 0.88, when compared with isolated Bankart repair. **Conclusions:** Arthroscopic remplissage combined with Bankart repair is an effective procedure in the treatment of patients with engaging Hill-Sachs lesions and minimal glenoid bone loss. Patients can expect favorable rates of recurrent instability with a negligible loss of external rotation when compared with isolated Bankart repair. Treatment algorithms may be updated to include this procedure for engaging Hill-Sachs lesions, measuring between 20% and 40% in volume, with subcritical (<20%) glenoid bone loss. **Level of Evidence:** Level IV, systematic review of Level III and IV studies.

Arthroscopic Bankart repair has become a mainstay of treatment in patients with anterior shoulder instability. However, in patients with significant bone loss on the glenoid and/or on the humeral head,

isolated Bankart repair is associated with a high incidence of failure.¹⁻³ Recurrence of instability after isolated Bankart repair has been strongly correlated with the presence of attritional glenoid loss and

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Hill-Sachs lesions, the latter of which has a prevalence of 26.7% to 88.1% among patients with anterior instability reported by studies using computed tomography (CT) evaluation.⁴⁻⁶

Recent literature has shown the inadequacies of soft tissue—only repair, particularly in the setting of bipolar bone loss of the glenoid and humerus. Outcomes of previous research have shown high levels of recurrent instability after Bankart repair even with subcritical glenoid bone loss.⁶⁻¹⁰ Glenoid bone loss under 10%, when paired with a medium-sized Hill-Sachs defect (HSD), has been shown to be associated with significant instability.^{11,12} As such, numerous options are arising to address glenoid and humeral osseous defects, and treatment algorithms are being updated to prevent shoulder instability after primary surgery.

The increased risk of recurrence with a large Hill-Sachs lesion likely results from the reduction of the arc of articulation between the glenoid and humerus.¹³ The concept of the “off-track” HSD, popularized by Burkhart and De Beer,¹⁴ as well as Yamamoto et al.,¹⁵ describes a Hill-Sachs lesion that is located medial to the contact zone of the humerus and is therefore able to engage the glenoid rim. Several methods have been described to treat these off-track lesions.¹⁴⁻¹⁶ Among the treatment methods, the remplissage, described as a capsulotenodesis of the infraspinatus tendon,^{17,18} has emerged as a popular means of treating engaging Hill-Sachs lesions in the presence of subcritical glenoid bone loss.^{17,19-40} However, concerns about loss of external rotation (ER) reported by both clinical and biomechanical studies may currently limit widespread adoption of this technique.^{41,42}

The purpose of this systematic review of the literature was to report outcomes after arthroscopic remplissage in patients with anterior shoulder instability and subcritical glenoid bone loss, specifically regarding recurrence of instability, return to sport, and changes in range of motion. The hypothesis was that there would be a low rate of recurrence with no significant loss of postoperative ER.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were used to perform a systematic review of the available literature.

Search Strategy

A systematic literature search was performed in MEDLINE through PubMed, Scopus, Embase, and the Cochrane Library using the following keywords: “glenoid defect,” “Bankart lesion,” “osseous Bankart,” “bony Bankart,” “humeral defect,” “shoulder instability,” “bipolar instability,” “primary instability,” “recurrent instability,” “glenoid bone loss,” “bony

defect,” “erosive glenoid bone loss,” “attritional glenoid bone loss,” “humeral bone loss,” and “remplissage.” The final search was performed on September 5, 2017. In addition, the references of each article were manually checked for articles that could potentially be included in the analysis. A search was also performed within 2 clinical trial registries, ClinicalTrials.gov and the International Clinical Trials Registry Platform, to identify any ongoing trials relevant to this study. The search terminology was intentionally left open to query all instability articles and then manually extract articles pertaining to remplissage to maximize article selection because terminology is often interchangeable (e.g., Hill-Sachs vs humeral bone loss). Additional articles were reviewed through query of cited references within articles.

Selection Criteria

The inclusion criteria were as follows: clinical trials on patients, comparative cohorts, and case series that collected information on patient physical and subjective outcomes after arthroscopic remplissage. Studies involving animals, cadavers, separate body parts, reviews, operative techniques, non-instability populations, or revision surgery were excluded. Two independent reviewers (J.N.L. and A.K.G.) analyzed all eligible articles to determine whether they met the inclusion and exclusion criteria.

Quality Evaluation

Because no randomized controlled trials were found, the Methodological Index for Non-randomized Studies (MINORS) checklist was used to evaluate the quality of nonrandomized surgical studies.⁴³ This checklist assesses articles on 12 items, with the last 4 being specific to only comparative studies. Scoring is as follows: 0, not reported; 1, reported but poorly done and/or inadequate; and 2, reported in a well-done and adequate manner. The highest possible score is 16 for noncomparative studies and 24 for comparative studies. Each study was scored by 2 authors (J.N.L. and A.K.G.) who reached a consensus if disagreement occurred. The κ (Fleiss) statistic was calculated to determine interrater reliability. As an additional layer of quality evaluation, the Risk of Bias in Nonrandomized Studies—Interventions checklist was used to evaluate bias in articles comparing 2 interventions (remplissage plus Bankart repair vs Bankart repair only). This measure evaluates articles based on 7 domains for evidence of bias.

Data Extraction and Analysis

A standardized form was created to extract data from all included studies. These data included the (1) properties of the study (year, design, number of patients), (2) demographic characteristics of patients (age, sex,

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