

IN BRIEF

Traumatic Anterior Shoulder Instability: A Systematic Review and Proposed Modern Classification System

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Abstract

Numerous surgical techniques have been developed to address recurrent anterior shoulder instability, with the Bankart repair and the Latarjet procedure emerging as dominant. With recent advancements in keyhole surgery, there's been a surge in popularity for all-arthroscopic procedures. Our systematic review aims to determine if there's justification for incorporating these techniques into a classification system for guiding treatment of traumatic anterior recurrent instability. We identified and analysed a variety of key studies, including 12 systematic reviews, three prospective studies, seven non-randomized prospective and retrospective studies, along with one biomechanical study. Our study sheds light on the wide range of procedures available to shoulder surgeons dealing with traumatic anterior recurrent instability. We introduce a novel classification system (BoTH) designed to simplify the decision-making process in this context.

Level of evidence: I

Keywords: Classification, Instability, Shoulder

Introduction

Traumatic anterior shoulder instability presents with two main surgical options: Bankart repair and Latarjet procedure.¹ Additional techniques like Remplissage [Figure 1], free glenoid bone block (FGBB) [Figure 2], and dynamic anterior stabilization (DAS) [Figure 3] are also used.^{2,3} FGBB offers advantages over Latarjet, including anatomical reconstruction and reduced complications.⁴

Remplissage, combined with Bankart repair, has shown success rates of 85-93%,⁵ and DAS involves fixing the intra-articular part of the long head of the biceps through the subscapularis to the anterior glenoid, providing stability augmentation through a sling effect.⁶ Our systematic review over the past 7 years aims to justify incorporating these treatments into a classification system for managing traumatic anterior recurrent instability.

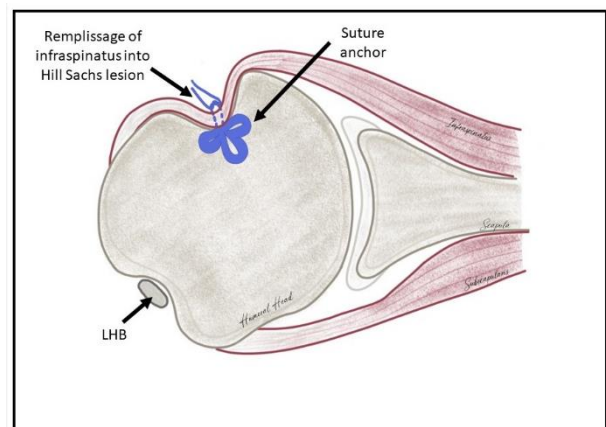


Figure 1. Remplissage

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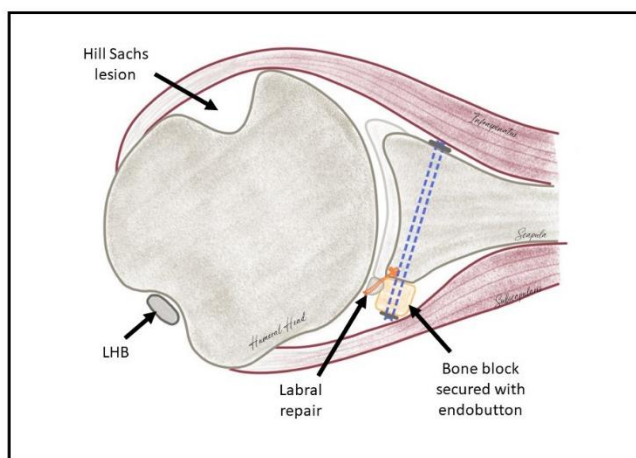


Figure 2. Free bone block reconstruction of the glenoid

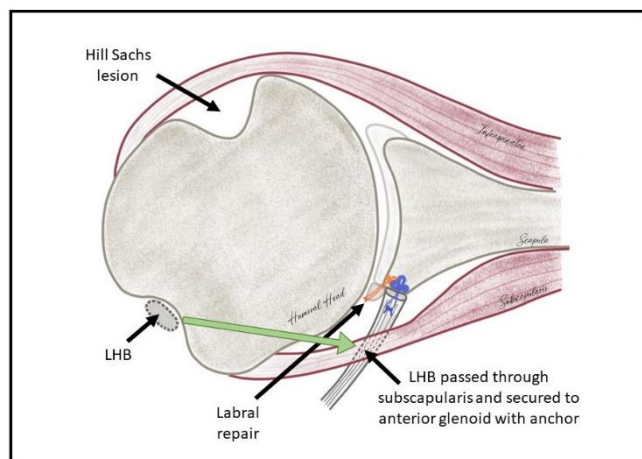


Figure 3. Dynamic anterior Stabilisation using LHB

Main body/ Search Methodology

Eligibility Criteria

We conducted a comprehensive review of literature spanning the past 7 years on the treatment methods of Traumatic Anterior Shoulder instability, including cadaveric and biomechanical studies.

Literature Search

From January 2017 to March 2023, PubMed, OVID Medline, and Embase were searched between March 14th and 28th, 2023, using predefined search terms.

Study Selection

Titles and abstracts of identified studies were screened initially to exclude unrelated topics. Exclusions included general reviews, financial outcome studies, posterior shoulder instability, and revision surgery. Biomechanical studies were limited to comparisons of surgical techniques.

Risk of Bias

Given potential reporting bias and heterogeneous data collection, there may be inherent limitations in the included

studies.

Results

The search yielded 860 studies, with 837 excluded due to duplication or irrelevance. Twenty-three full-text articles met the inclusion criteria [Figure 4].

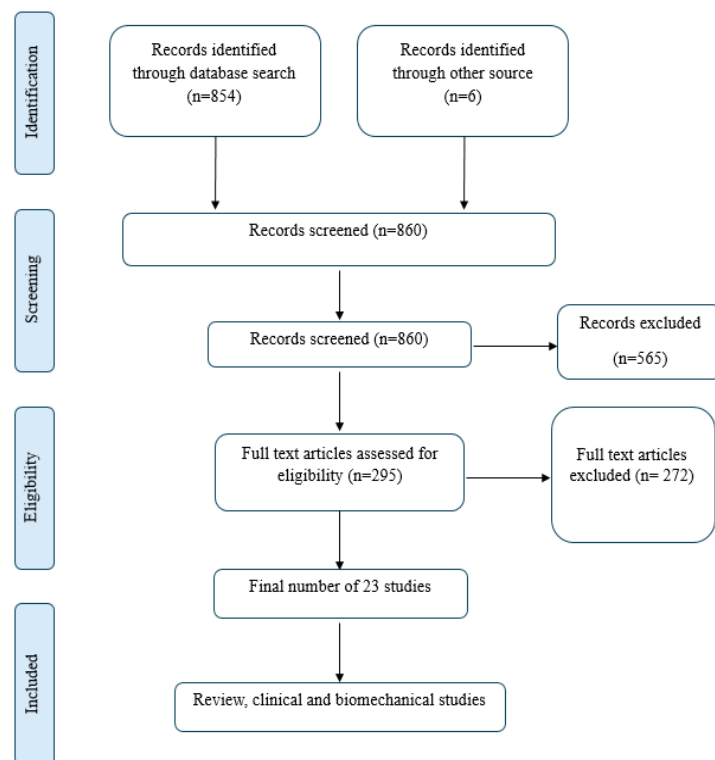


Figure 4. PRISMA Diagram

Results

In our study, we reviewed 12 systematic reviews. Bliven et al. favoured Latarjet [Figure 5] over Bankart repair,⁷ while Imam et al. noted lower recurrence rates with Latarjet but lower infection risk with Bankart repair.⁸ Goodrich et al. noted higher recurrence rates in males after arthroscopic Bankart repair.⁹ Verweij et al. identified risk factors for recurrence after arthroscopic Bankart repair.¹⁰ In prospective studies, Kukkonen et al. found higher short-term redislocation risk with arthroscopic Bankart repair versus open Latarjet.¹¹ Non-randomized studies by Bah et al. found various surgical techniques reliable for shoulder instability,¹² while biomechanical studies by Nicholson et al. explored reducing dislocation frequency and restoring stability.¹³

Discussion

Our study underscores the variety of procedures for treating traumatic anterior recurrent shoulder instability,⁷ what is less clear is which procedure to perform and when.¹⁴ Determining which patients should undergo a Bankart repair remains unclear. Verweij et al.¹⁰ highlighted the

importance of risk factors, such as the instability severity index (ISI) score popularized by Boileau.¹⁵⁻¹⁷

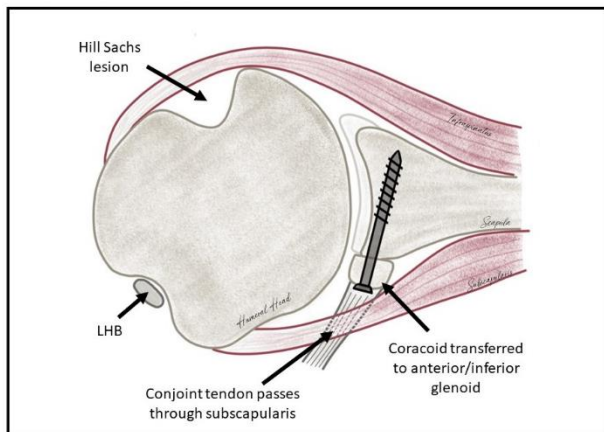


Figure 5. Laterjet procedure

Comparing procedures favoured in cases with bone loss (FGBB, Latarjet, or Bristow), there's minimal differentiation in success rates.^{11,18,19} Taverna et al²⁰ suggested FGBB is most effective in patients with good-quality soft tissues. Their indications for FBGG as opposed to Latarjet excludes those who have had more than five dislocations and in those whom the first dislocation was more than 3 years prior to surgery as they felt that quality of soft tissue would be significantly compromised. In these patients, the sling effect of the conjoint tendon in Latarjet becomes very relevant. It does appear perfectly reasonable to argue for FBGG instead of Latarjet in a subset of patients if there is no compromise in recurrence rate as Latarjet is a non-anatomical procedure which has a learning curve and as associated with significant complications rates.

Remplissage remains pivotal in treating anterior shoulder instability. Meta-analyses suggest its superiority when added to isolated Bankart repair for managing instability with engaging Hill-Sachs lesions and up to 25% glenoid bone loss, reducing redislocation rates and improving functional scores.^{21,22} Itoi et al. proposed Remplissage for off-track lesions with less than 25% glenoid bone loss.²³

The evidence supporting Dynamic Anterior Stabilization (DAS) is promising.^{24,25} Combining DAS with a FGBB procedure may prove beneficial for cases with glenoid bone loss exceeding 15%.²⁴ Biomechanical evidence suggests a role for DAS alongside arthroscopic Bankart repair in patients with less than 15-20% bone loss (subcritical bone loss). DAS may compensate for subcritical bone loss and recurrent instability in patients with poor soft tissue, producing a sling/hammock effect similar to that seen in a Latarjet procedure. Therefore, it may also be the case that the sling effect of LHB or conjoint tendon²⁶ may result in good outcomes in patients with subcritical bone loss and poor-

quality soft tissue.

Our classification system, named BoTH (Bo=bone loss, T=Tissue for the condition of soft tissue, H=Hill Sachs lesion), provides a structured approach to treating shoulder instability, considering the severity of shoulder injury. Based on the evidence gathered, it accounts for both degrees of bone loss and the condition of soft tissue.

For cases with subcritical bone loss (<15-20%) and good quality soft tissue, a Bankart repair alone may suffice. However, if there's an off-track Hill Sachs lesion, Remplissage becomes necessary, as suggested by Itoi et al.²²

In individuals with subcritical bone loss and poor-quality soft tissue due to recurrent dislocations or lax capsule, Dynamic Anterior Stabilization (DAS) may suffice. Additionally, if there's an off-track Hill Sachs lesion, Remplissage may be performed simultaneously.

When glenoid bone loss exceeds 15-20%, a bone block procedure (either Latarjet or FGBB) is recommended. Latarjet may be preferable in cases with compromised soft tissue, as it offers the sling effect. However, in patients with critical glenoid bone loss but good soft tissue quality, FGBB may be suitable, avoiding the risks associated with Latarjet. Since FBGG lacks the sling effect, Remplissage may be necessary for off-track lesions.²⁷ In cases with critical glenoid bone loss, compromised soft tissue quality, and an off-track Hill Sachs lesion, Latarjet may be justified, with additional consideration for Remplissage in those with large Hill Sachs lesions and significant glenoid bone loss [Figure 6].

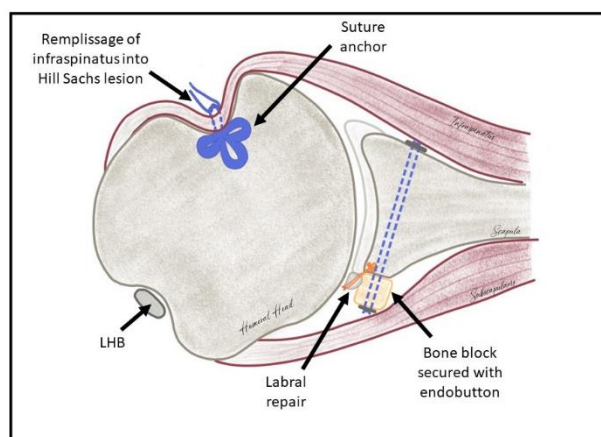


Figure 6. Free bone block reconstruction with Remplissage

Conclusion

Various surgical options exist for managing unstable shoulders, each tailored to specific patient groups based on anatomical damage. The authors propose a classification system (BoTH) to aid in decision-making [Table 1].

Table 1 - Proposed BoTH classification (Bo=bone loss, T=Tissue for the condition of soft tissue, H=Hill Sachs lesion).				
Type	Glenoid Bone Loss	Labrum/capsule Quality	HS Lesion	Treatment
1	<15-20%	Good	No/on-track	Bankart Repair
1+			Off-track	Bankart Repair + Remplissage
2	<15-20%	Poor	No/on-track	Dynamic Anterior Stabilization
2+			Off-track	Dynamic Anterior Stabilization + Remplissage
3	>15-20%	Good	No/on-track	Free Glenoid Bone Grafting
3+			Off-track	Free Glenoid Bone Grafting + Remplissage
4	>15-20%	Poor	No/on-track	Latarjet
4+			Off-track	Latarjet +/- Remplissage

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Authors Contribution:

Mr. Al-Achraf Khoriaty FRCS (Orth): Data curation, formal analysis, investigation, methodology, writing original draft and editing.

Mr. Zien A. Fozo MRCS: Data curation, investigation, visualisation, methodology, writing original draft, project administration.

Mr. Tony Antonios FRCS (Orth): supervision, writing original draft and editing.

Mr. Richard Dimock MRCS: Visualisation.

Prof. Mohamed Imam FRCS (Orth): Conceptualisation, investigation, supervision, writing, revision of manuscript.

Mr. Ali Narvani FRCS (Orth): Conceptualisation, investigation, supervision, writing, revision of manuscript.

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