

Critical Glenoid Bone Loss Resulting in Recurrent Shoulder Instability following an Arthroscopic Bankart Repair: Systematic Review and Meta-Analysis

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INTRODUCTION: Glenoid bone loss has been reported to occur in as much as 86% of patients with recurrent shoulder instability. Several studies have quantified the amount glenoid bone loss as a risk factor for surgical failure; however, most of these studies have been underpowered with a small sample size. We performed a systematic review and meta-analysis in efforts to quantify the amount of glenoid bone loss associated with recurrent shoulder instability following an arthroscopic Bankart repair. We hypothesized that the percentage of glenoid bone loss associated with recurrent instability after an arthroscopic Bankart repair is lower than the previously proposed critical value of 25%.

METHODS:

A systematic review was performed according to the PRISMA guidelines; two online databases (MEDLINE and Google Scholar) were searched for literature on the measurement and outcomes of anterior glenoid bone loss and its association with glenohumeral instability. Studies were screened independently by two reviewers. For relevant articles, the corresponding author of the publication was contacted to request de-identified raw data from their study. Data collected included patient age at surgery, gender, duration of follow up, percentage glenoid bone loss, failure, SANE, ASES, Rowe and WOSI. Receiver Operator Curve analysis and logistic regression models were performed.

RESULTS: Twelve studies met the selection criteria, 3 biomechanical studies and 9 clinical studies. Five of the clinical studies reported methods of bone loss measurement, quantity of bone loss, failure rates, and patient-reported outcomes. The corresponding authors for these 5 manuscripts were contacted and raw de-identified data was obtained from 3 of the authors, creating a total sample size of 528 patients. In the combined study cohort, recurrent dislocation or subluxation occurred in 23.7% of patients. The ROC analysis demonstrated that 16.0% of glenoid bone loss was predictive of recurrent shoulder dislocation or subluxation (Youden index 0.59, sensitivity 80%, specificity of 79%). There was a significant difference in age between those who failed the arthroscopic Bankart and those who did not (22.9 years vs. 24.3 years; $p=0.009$). In patients who did not sustain a dislocation or subluxation, the ROC analysis demonstrated that 20.0% of glenoid bone loss was predictive of a Single Assessment Numeric Evaluation (SANE) score less than 85% (Youden index 0.93, sensitivity 93%, specificity 100%).

DISCUSSION AND CONCLUSION:

This is the first meta-analysis and largest study quantifying critical glenoid bone loss predictive of recurrent instability after an arthroscopic Bankart repair. Patients with 16.0% anterior glenoid bone loss are at significant risk of recurrent instability when treated with an arthroscopic Bankart repair alone.

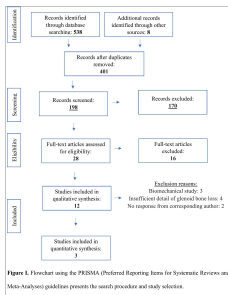


Figure 1. Flowchart using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines presents the search procedure and study selection.

Table 1
Comparative Studies Included in the Systematic Review*

First Author	PMID	Journal	Year	Summary
Lincoln	3302758	Knee Surg Sports Traumatol Arthrosc	2020	In patients with glenoid bone loss 12.0% after arthroscopic Bankart repair with bone graft, apparent dislocation rate was only 2.0%, in patients with glenoid bone loss 25% with osteochondral autograft, dislocation rate was 40.2%. Operative critical extent of glenoid bone loss 17.0%. Patients with more than 17.0% of glenoid bone loss had the highest dislocation rate, more than double that of patients with 0% loss.
Shin	3302754	Am J Sports Med	2021	Patients with more than 17.0% of glenoid bone loss had the highest dislocation rate, more than double that of patients with 0% loss.
Yamamoto	3302630	Orthop Traumatol Surg Res	2020	Patients with any glenoid bone loss had 100% greater risk of recurrent instability than patients with no glenoid bone loss. 17.0% of glenoid bone loss was predictive of recurrent instability.
Dicker	3302630	Am J Sports Med	2020	Patients with any glenoid bone loss had 100% greater risk of recurrent instability than patients with no glenoid bone loss. 17.0% of glenoid bone loss was predictive of recurrent instability.

*SAGE, Single Assessment Numeric Evaluation; WOSI, Western Ontario Shoulder Instability

Table 2
Non-comparative Studies Included in the Systematic Review

First Author	PMID	Journal	Year	Summary
Yan	3302679	Arthroscopy	2020	Preoperative measurement instability occurred in about 80.0% of patients undergoing arthroscopic Bankart repair. During surgery, the patients with the greatest amount of glenoid bone loss had the highest failure rates. Patients for total anterior approach are 100% failure, and 0% failure for the other two approaches.
Rossi	3302633	Am J Sports Med	2021	Patients with any glenoid bone loss had 100% greater risk of recurrent instability than patients with no glenoid bone loss. 17.0% of glenoid bone loss was predictive of recurrent instability.
Shin	3302638	Am J Sports Med	2021	Patients with any glenoid bone loss had 100% greater risk of recurrent instability than patients with no glenoid bone loss. 17.0% of glenoid bone loss was predictive of recurrent instability.
Yu	3302674	ISJ	2018	Patients with any glenoid bone loss had 100% greater risk of recurrent instability than patients with no glenoid bone loss. 17.0% of glenoid bone loss was predictive of recurrent instability.
Rehder	3302696	ISJ	2016	Patients with any glenoid bone loss had 100% greater risk of recurrent instability than patients with no glenoid bone loss. 17.0% of glenoid bone loss was predictive of recurrent instability.

Table 3
Results

% Recurrent Instability	Patients Included		Patients Excluded	
	Failures	SANE < 85%	Failures	SANE < 85%
16.0%	100%	100%	100%	100%
20.0%	93%	100%	93%	100%
25.0%	79%	100%	79%	100%