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A Comprehensive Comparison and Evaluation of Surgical Techniques for Anterior Shoulder Instability: A Bayesian Network Meta Analysis

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Background

- Anterior shoulder instability (ASI) is one of the most common joint instabilities, with a reported incidence of 1.7% in the general population and as high as 21% in contact-sport athletes.[1,2]
- Many techniques may be utilized to surgically manage recurrent ASI, however, there is no clear consensus on which would be considered the most optimal for many common clinical scenerios.[3]
- We perform a network meta-analysis provides a comprehensive analysis and comparison of multiple surgical techniques used for ASI to identify which is associated with the lowest rate of recurrent instability.
- We additionally explore how glenoid bone loss (GBL) and osseus lesions affect recurrence rates.

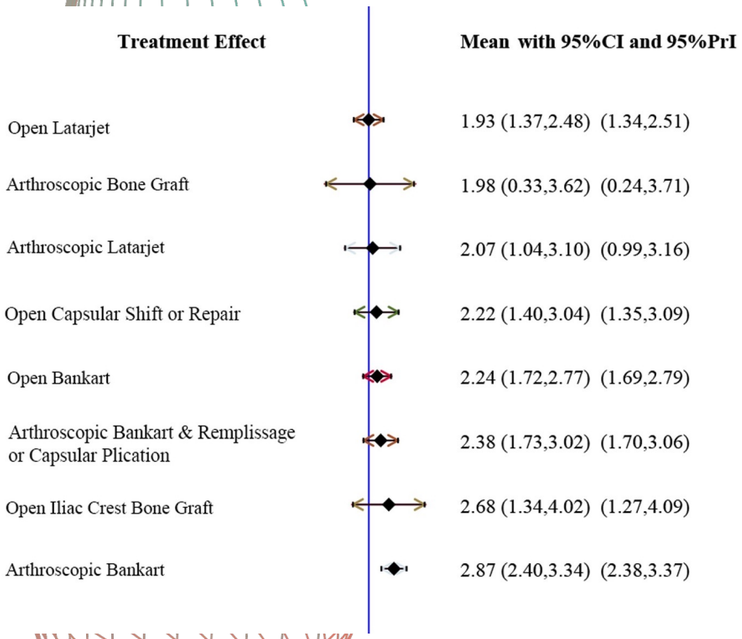
Methods

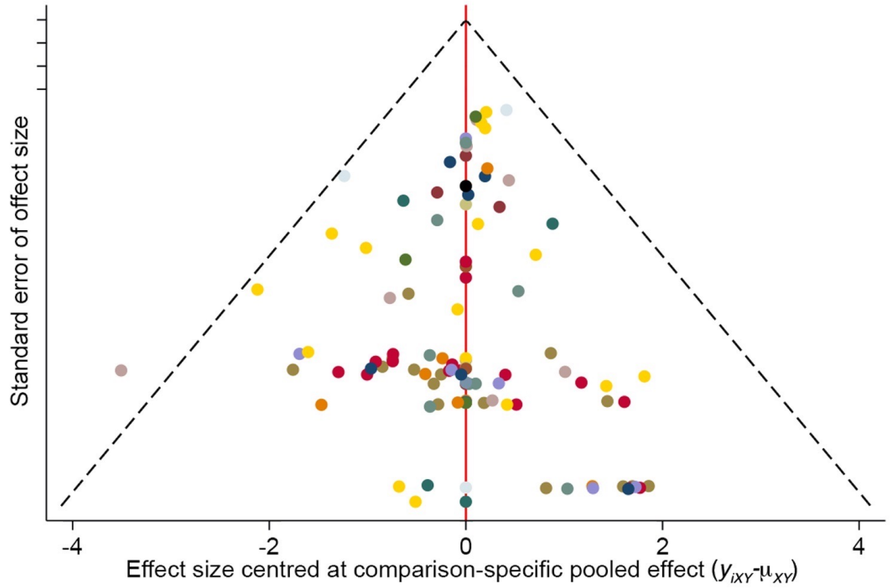
- Duplicate searches of PubMed, MEDLINE, Embase, and Cochrane databases were independently completed by two authors as well as screening and quality assessment for all potential studies.
- Each included study underwent a risk of bias assessment using the Cochrane risk of bias summary tool.[4] The inter-observer reliability at the title/abstract and full-text review stages, as well as when assessing study quality was measured using Cohen's kappa (k) coefficient.[5]
- The surgical techniques evaluated were categorized into groups and the rate of recurrent instability, The primary outcome of interest, underwent a network meta-analysis. Additional analyses were performed relating to the degree of glenoid bone loss and the presence of osseous lesions.

Results

- Of 2699 studies screened, 52 studies were included.[6-57]
- Open Latarjet (OL) had the overall lowest recurrence rate (LOR 1.93), while arthroscopic Bankart repair (ABR) had the highest (LOR 2.87).
- When GBL increased from 0-10% to 10-20% OL had significantly lower recurrent instability (P=0.0016) compared to ABR and the rate of recurrence of ABR also significantly increased (P=0.021).
- In the presence of an engaging Hill-Sachs (HS) lesion, both OL (P=0.01) and ABR with remplissage (P=0.029) had significantly reduced recurrence rates compared to ABR.
- Regardless of procedure, a HS or bony Bankart lesion was associated with increased recurrence (r = 0.44, 0.40; P = 0.0003, 0.006 respectively).

Figure 1: Interval, Edge, and Funnel Plots of Network Comparisons





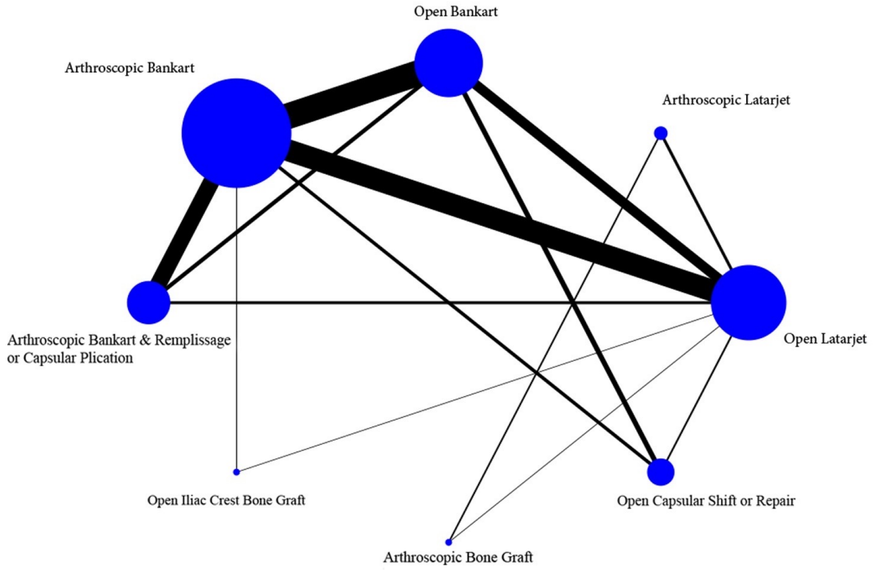


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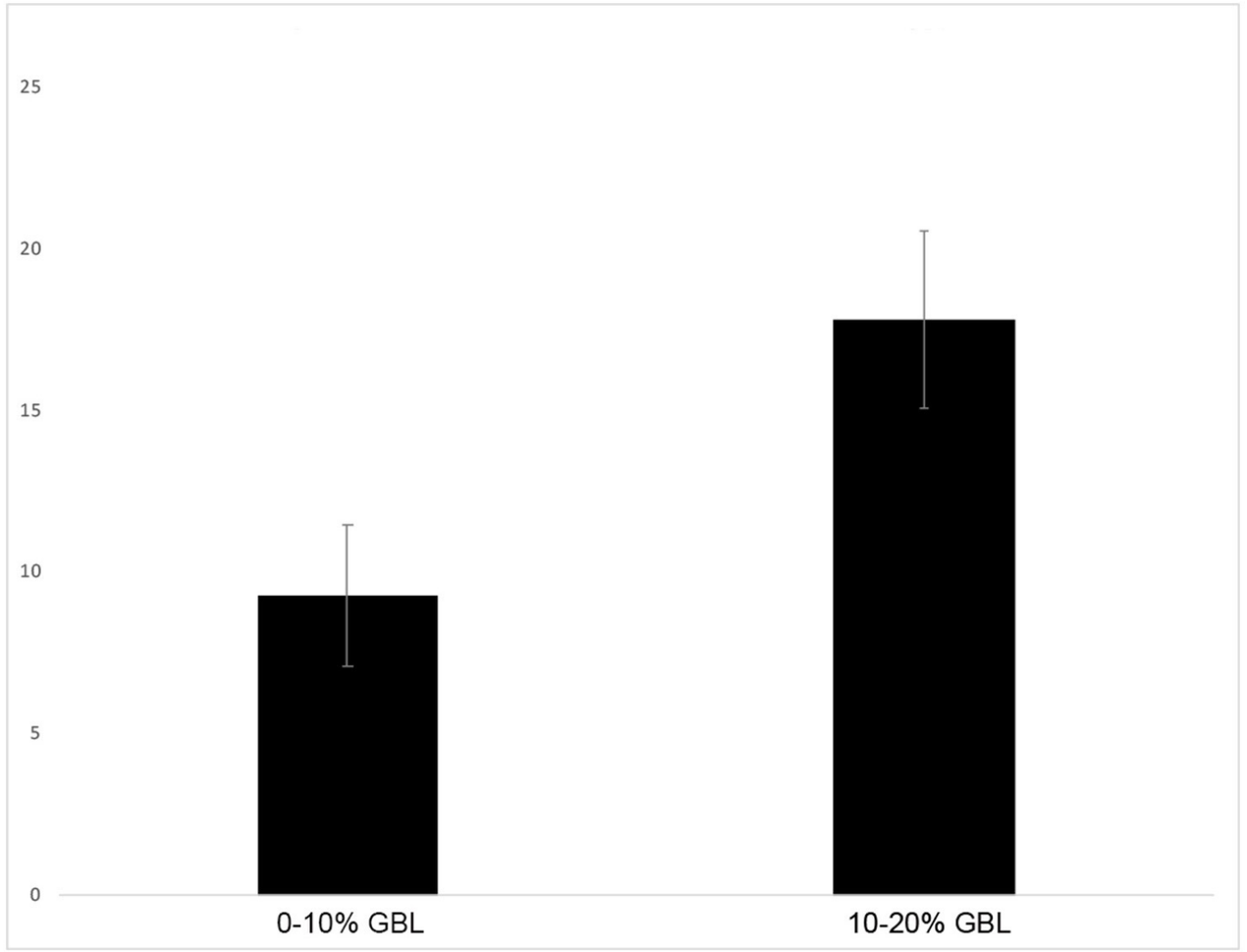
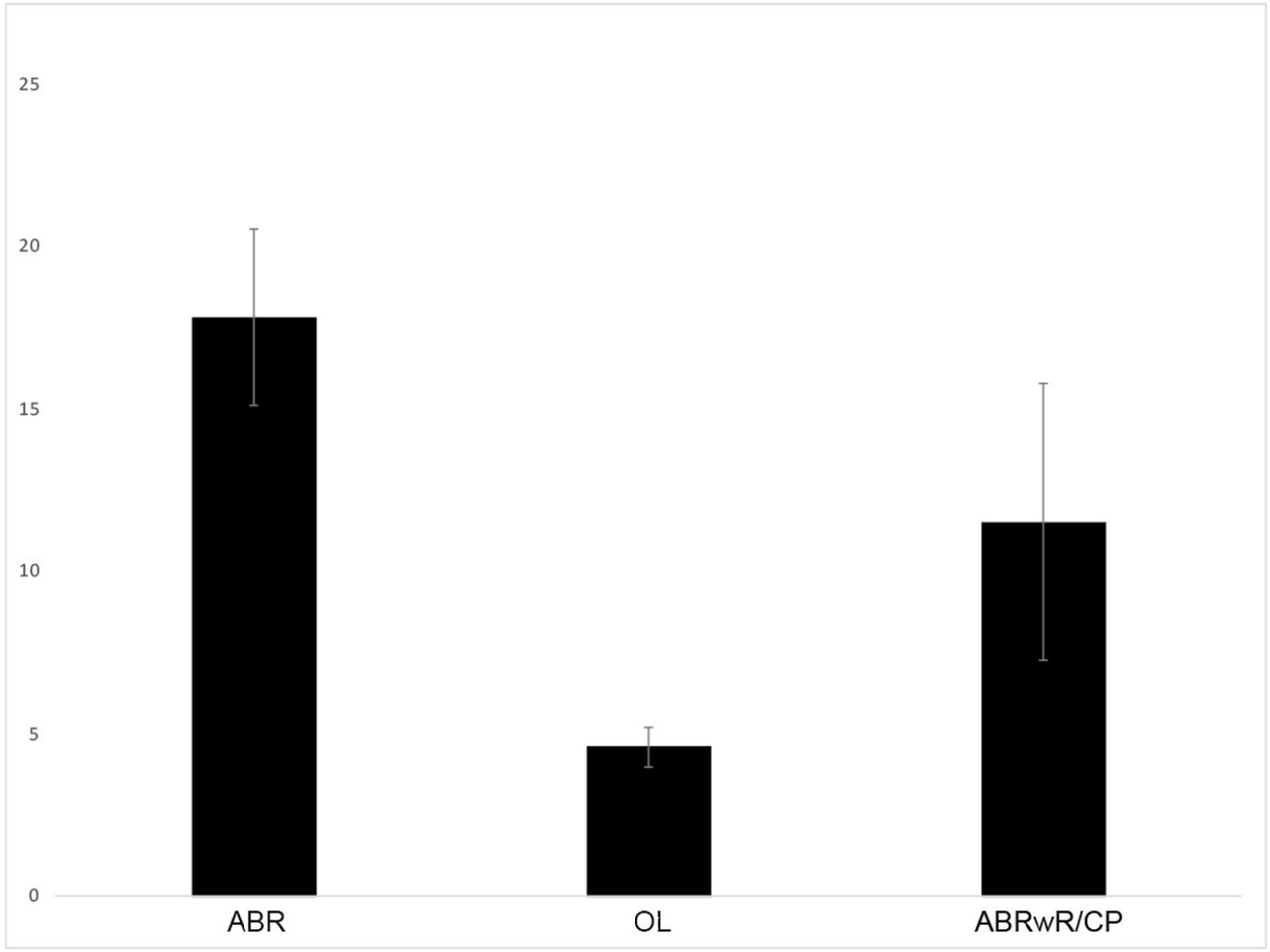
Figure 2: Plot of Recurrence Rate of Arthroscopic Bankart Repair With Respect to Glenoid Bone Loss



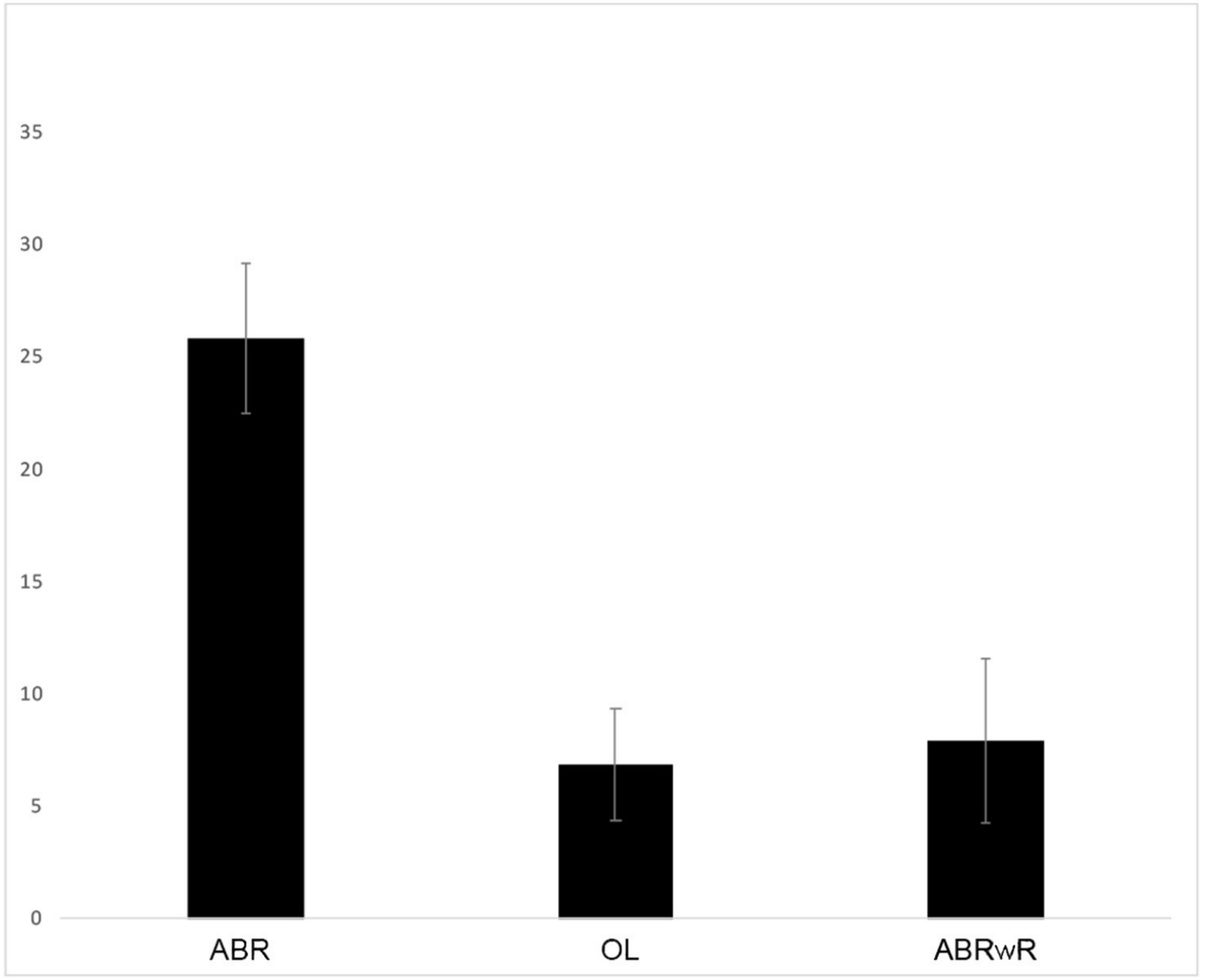
*GBL = Glenoid Bone Loss

Figure 3: Plot of Recurrence Rate When Glenoid Bone Loss is 10-20% With Respect to Procedures



*OL = open Latarjet , ABR = arthroscopic Bankart repair, ABRwR/CP = arthroscopic Bankart repair with remplissage or capsular plication

Figure 4: Plot of Recurrence Rate When Engaging Hill-Sachs Lesion is Present With Respect to Procedures



*OL = open Latarjet , ABR = arthroscopic Bankart repair, ABRwR = arthroscopic Bankart repair with remplissage

Discussion

- Recent literature comparing open Bankart repair (OBR) to arthroscopic Bankart repair (ABR) and open Latarjet (OL)[58,59], ABR to OBR[60], and arthroscopic Latarjet (AL) to OL[61] found results similar to ours. However there were no analyses on GBL or osseous lesions in these studies.
- OL is optimal when GBL is 10-20% or more and an engaging Hill-Sachs (HS) lesion is present and in our evaluation had superior outcomes to AL.
- ABR can be performed with low recurrence and complication rates when GBL is 0-10% and a HS lesion is not present. When an engaging HS lesion is present ABR with remplissage has significant benefit over ABR. OBR is a viable option however ABR remains more popular. ABR with capsular plication did not show significant benefit over ABR in our study.

Discussion Continued

- Other procedures such as open capsular shift or repair, arthroscopic osteochondral bone graft, and open iliac crest bone block were evaluated however conclusions could not be drawn due to small sample sizes and low statistical power.
- More high-quality research is needed evaluating the lesser studied techniques as well as on the impact of osseous lesions and varying levels of GBL on the various procedure used for ASI.
- Limitations of this study include the overall quality of included studies (many being non-randomized and unblinded cohorts), the heterogeneity present in reporting (not allowing for network comparisons of other important outcome measures), and variation in surgical techniques.

Conclusion

- This Bayesian network meta-analysis found the OL to have the overall lowest rate of recurrent instability in the surgical treatment of anterior shoulder instability and a significantly lower rate when compared to the ABR in the setting of increased glenoid bone loss. In the presence of an engaging Hill-Sachs lesion both ABR with remplissage and OL show a similarly low rate of recurrence. Bone loss between 0-10% results in similar outcomes across bony and soft tissue procedures.

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