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Use of absorbable versus nonabsorbable anchors in the treatment of glenohumeral instability

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INTRODUCTION

In cases of shoulder instability, the placement of anchors, with the open or arthroscopic technique, can be used to repair the types of lesions denominated Bankart [disinsertion of the labrum and ligament – mainly the inferior glenohumeral ligament of the anterior border of the glenoid (most frequent), which may be an isolated detachment of the labrum and ligament or associated with a bone fragment].

A significant improvement in instability and a decrease in recurrence have been achieved as a result of improvements in the arthroscopic technique, better selection of candidate patients for intervention, and improved quality of the implants. The characteristics of the patients that have directly contributed to a positive outcome include age, sex, number of dislocations, sports activities, presence or absence of significant Hill-Sachs lesions, and a better assessment of glenoid bone loss.

In turn, the quality of the implants could influence the effectiveness of the surgery. In recent decades, many types of suture anchors have been introduced to the market and classified as absorbable/biodegradable anchors, in order to differentiate them from the metallic material that constituted the previous models.

Although the metallic anchor is considered safe and promotes firm fixation to the tissue, it can generate complications such as migration and chondral damage, impair the surgical review, and limit imaging studies, as well as facilitate the incarceration of the metallic implant in the bone. In turn, bioabsorbable anchors provide fixation for a limited time and healing may occur incompletely.

Few studies have prospectively compared the effectiveness of these two types of anchors in the treatment of unstable shoulder syndrome, through arthroscopic Bankart lesion repair.

METHODOLOGY

In the methodology, we define the clinical question, the structured question (PICO), the eligibility criteria of the studies, sources of information consulted, search strategies used, critical evaluation method (risk of bias), data to be extracted, measures to be used to express results, and the method of analysis.

Clinical question

Is the use of absorbable anchors in the treatment of glenohumeral instability more effective and safer when compared to nonabsorbable anchors, especially in relation to the occurrence of secondary arthrosis?

Structured question

- P (population): Arthroscopically treated glenohumeral instability;
- I (intervention): Absorbable anchors;
- C (comparison): Nonabsorbable anchors;
- O (outcome): Pain, function, quality of life, secondary arthrosis, and recurrence.

Eligibility criteria

- PICO components.
- Randomized clinical trials (RCTs) and/or observational cohort studies that complement the information with

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a relevant number of patients, follow-up time, or outcomes not covered in the RCTs.
- No period or language restrictions.
- Full text or abstract with necessary data.

Exclusion criteria

- *In vitro* and/or animal studies.
- Case series or case reports.
- Narrative or systematic reviews.

Information sources consulted and search strategies

Medline via PubMed, manual search, and Embase

(Bankart OR Shoulder Dislocation OR Shoulder Joint OR Shoulder instability) AND (Absorbable Implants OR Metal OR Metals OR Biocompatible Materials OR Biodegradable OR bioabsorbable OR nonabsorbable) AND (Therapy/broad[filter] OR Comparative study OR Comparative studies OR Epidemiologic Methods OR Systematic[sb]).

Risk of bias and quality of evidence

For RCTs, the following items are evaluated: focal question, randomization, blinded allocation, double blinding, losses, intention-to-treat (ITT) analysis, definition of outcomes, sample size calculation, and JADAD score[1].

Data extracted

Author, year of publication, study design, characteristics and number of patients, intervention, comparison, outcomes (pain, function, recurrence, secondary arthrosis, other complications, and quality of life), and follow-up time.

Outcome measures

For categorical variables, we use absolute numbers, percentage, absolute risk, reduction or increase in risk, number needed to treat or harm, and 95% confidence interval (95%CI). For continuous variables, we use mean or median, standard deviation, and difference between means.

Expression of the results

The results are presented as follows: diagram of recovery and selection of studies (Figure 1), characteristics of the studies, risk of bias (Table 1), results by outcome, and synthesis of evidence.

When it is possible to aggregate the results of the included studies in relation to one or more common outcomes, a meta-analysis is performed using the RevMan 5.3 software (Cochrane)[2].

Analysis of the quality of evidence

The quality of the evidence is assessed using the GRADEpro software[3].

RESULTS

The results are presented as follows: flowchart (Figure 1) and selection of studies, summaries of RCTs, risk of bias, results by outcome, quality of GRADE[3,10] evidence, and synthesis of evidence.

Characteristics of the included studies

The included studies were two randomized controlled trials.

Milano G et al., 20104

Inclusion criteria: patients with traumatic anterior glenohumeral instability and recurrent dislocation, presence of intra-articular lesions such as anteroinferior glenoid labrum lesion (Bankart or ALPSA lesion [Anterior Labroligamentous Periosteal Sleeve Avulsion, which is a variant of Bankart lesion]), anteroinferior glenohumeral ligament (AIGHL) injuries, and the presence of superior labral anterior and posterior (SLAP) lesion. Exclusion criteria: instability without dislocation, bone glenoid defect greater than 20% according to the "PICO" criterion, and Hill-Sachs lesion greater than 30% of the humeral head. Intervention and comparison: patients underwent arthroscopic surgical repair of the lesion using biodegradable or metallic anchors. Outcomes analyzed: subjective quality of life (DASH) and function (Rowe score and Constant score) of the shoulder evaluated after arthroscopic repair of anterior shoulder instability with biodegradable or metallic anchors. The follow-up time was 2 years.

Tan CK et al., 20065

Inclusion criteria: patients with traumatic anterior glenohumeral instability and recurrent dislocation. Exclusion criteria: patients with previous surgery or a single episode of shoulder dislocation. Intervention and comparison: the patients underwent arthroscopic surgical repair of the Bankart lesion (detachment of the glenoid labrum from the anteroinferior border of the glenoid) using biodegradable or metallic anchors. When an associated SLAP lesion was diagnosed during surgery, this was also corrected. Outcomes analyzed: patients were evaluated preoperatively and postoperatively for shoulder instability, pain, and quality of life. Clinical improvement was represented by a reduction in the Oxford Instability Shoulder Score (OISS – maximum possible score 60) and Visual Analogue Scale (VAS for pain; VAS for instability – maximum possible score 10),

and an increase in SF-12 OS (Short Form-12 Questionnaire Physical Score) and SF-12 MS (Short Form-12 Questionnaire Mental Score). Follow-up time was 1.5–5 years (mean 2.6 years).

Risk of bias and quality of evidence

Neither study was double blind nor examined by intention-to-treat analysis. In particular, in the study by Tan 2006[5], randomization and prognostic variables were not clearly described and the JADAD score was less than 3. The estimated overall strength of evidence was low. When evaluating the GRADE[3] evidence for recurrence, the outcome was moderate.

Analysis of results by outcome

We were able to perform the meta-analysis in only one outcome because it was included in the two selected works, and the evaluation was also performed for the quality of the evidence using the GRADE method.

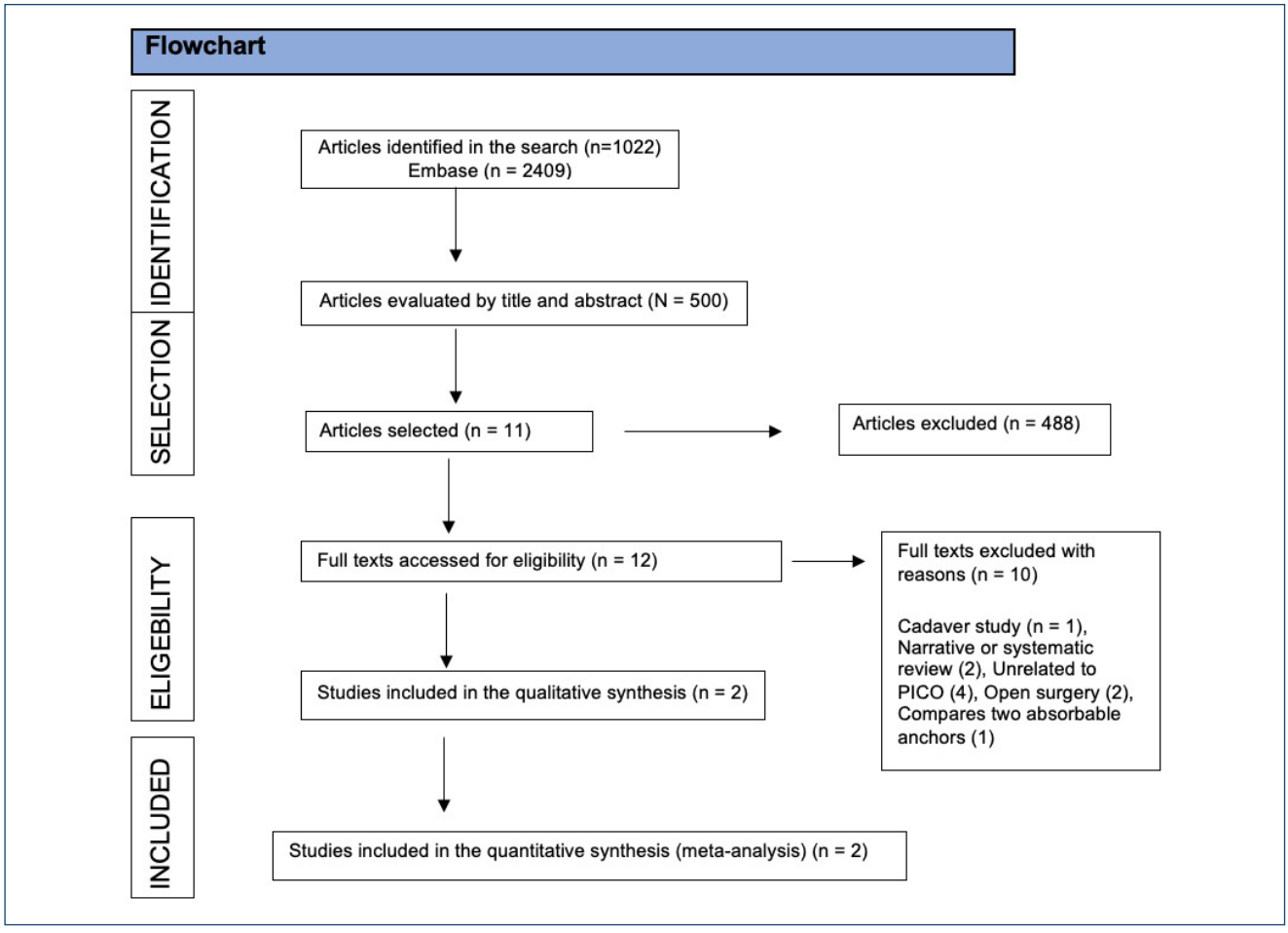

Figure 1. Flowchart of selected works.

Table 1. Descriptive table of the biases of the included randomized clinical trials.

Study	Focal question	Proper randomization	Concealed allocation	Double blinding	Losses (<20%)	Prognostic or Demographic characteristics	Outcomes	Intention-to-treat analysis	Sample calculation	JADAD
Milano G 2010	YES	YES	YES	NO	YES	YES	YES	NO	YES	3
Tan CK 2006	YES	?	YES	NO	YES	?	YES	NO	NO	2

Cochrane Systematic Reviews Database [Year], Number [Issue].

Milano 2010[4]

There was no difference in the subjective assessment of disease-related quality of life using the DASH questionnaire (p>0.05).

There was no difference in shoulder function related to joint stability, or in its global function, evaluated using the Rowe and Constant scores, respectively (p>0.05).

Tan CK 2006[5]

There was no statistically significant difference (p>0.05) between the two types of anchors in terms of clinical improvement assessed using the Oxford Instability Shoulder Score, Visual Analogue Scale for pain and instability, and Short Form-12 (see Table 2 for results).

Recurrence

There was no difference in the risk of recurrence between the two forms of treatment.

Summary of the evidence

The use of absorbable anchors in the treatment of recurrent traumatic shoulder instability does not show differences in terms of pain, function, quality of life, and recurrence outcomes, when compared to treatment with nonabsorbable anchors, with a minimum follow-up of 2 years. A moderate quality of evidence was found.

There is no consistent evidence for the study of the osteoarthritis outcome.

DISCUSSION

The aim of this study was to assess whether absorbable anchors are effective, as well as whether their use reduces the risk of chondrolysis and, consequently, secondary glenohumeral arthrosis, when compared with nonabsorbable anchors.

In the review by Papalia 2014[6], whose objective was to evaluate the clinical outcomes and complications between absorbable and nonabsorbable anchors in the surgical treatment of shoulder instability, the author concluded that "*given the good overall results reported after shoulder stabilization surgery with different types of anchors, it is not possible to comment on which type of anchor is best recommended for routine use.*"

The review of Brown 2017[7], with the objective of evaluating several factors involved in the shoulder instability surgery, including types of anchors, number of anchors used in the procedure, and absorbable versus nonabsorbable, found no difference in the risk of recurrent instability after arthroscopic Bankart reconstruction.

A retrospective study, Uluyardımcı 2021[8], comparing JuggerKnot® anchors, Biomet Inc., Warsaw, IN, USA, with metallic anchors, concluded that satisfactory results were obtained with the use of full suture anchors in the arthroscopic Bankart repair for traumatic anterior shoulder instability. "*The total suture anchors and the metallic suture anchors have similar results in the medium term and the total suture anchors are a reliable and effective option for the arthroscopic Bankart repair. The authors present as a result in one of the evaluated outcomes that according to the Samilson-Prieto classification*[9]*, there was no evidence of glenohumeral osteoarthritis in any of the patients in either group (JuggerKnot® anchors group 41.1±10.4 [ranging from 30 to 60 months] and metallic anchors group 39.6 ± 9.4 [ranging from 28 to 60 months]])*."

In this study, we found few clinical trials comparing bioabsorbable anchors in relation to metallic anchors, as in previous reviews[6,7]. Our data coincide with the literature with no significant differences in the evaluated scores or the rate of recurrence of dislocation in the operated shoulders. We did not find RCTs reporting osteoarthritis/glenohumeral osteoarthrosis secondary to the arthroscopic procedure in the treatment of instability.

CONCLUSIONS

The use of absorbable anchors is as effective as the use of metal anchors in the arthroscopic treatment of glenohumeral

Table 2. Strength of evidence assessed by GRADE.

Certainty assessment							No. of patients		Effect		Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirect evidence	Imprecision	Other considerations	ABSORBABLE ANCHORS	NONABSORBABLE	Relative (95%CI)	Absolute (95%CI)		
Recurrence												
2	Randomized clinical trials	Serious[a,b]	Not serious	Not serious	Not serious	None	5/104 (4.8%)	5/104 (4.8%)	Not estimable	0 less per 1,000 (from -60 to +60)	⊕⊕⊕◯ Moderate	

CI: Confidence interval. [a]No intention-to-treat analysis. [b]Absence of double blinding.

instability, with a low risk of recurrence. The strength of the global evidence for the other outcomes evaluated is low due to the high risk of bias.

To evaluate the osteoarthritis/shoulder osteoarthrosis outcome secondary to the procedure, further studies are necessary.

AUTHORS' CONTRIBUTIONS

AA: Data curation, Formal Analysis, Visualization, Writing – original draft, Writing – review & editing. **AU**: Data curation, Formal Analysis, Visualization, Writing – original draft, Writing – review & editing. **HK**: Data curation, Formal Analysis, Visualization, Writing – original draft, Writing – review & editing. **IAZS**: Data curation, Formal Analysis, Software, Visualization, Writing – original draft, Writing – review & editing. **MMN**: Data curation, Formal Analysis, Visualization, Writing – original draft, Writing – review & editing. **MA**: Data curation, Formal Analysis, Visualization, Writing – original draft, Writing – review & editing. **PRNS**: Data curation, Formal Analysis, Visualization, Writing – review & editing. **PO**: Data curation, Formal Analysis, Visualization, Writing – review & editing. **WMB**: Data curation, Formal Analysis, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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