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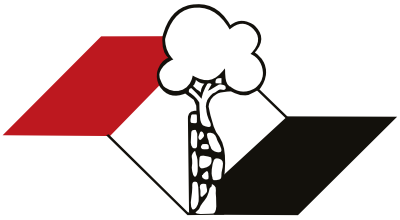

ISSN 1413-7852

Acta Ortopédica Brasileira

Volume 34 – Number 1 – Year 2026

Special

ISSN 1413-7852

Acta Ortopédica Brasileira

Department of Orthopedics and Traumatology, Faculdade de Medicina da Universidade de São Paulo (DOT/FMUSP), São Paulo, SP, Brazil

Affiliated with Associação Brasileira de Editores Científicos

Indexed in PubMed, PubMed Central, Web of Science, JCR, Scopus Elsevier, SciELO, Redalyc (Red de Revistas Cientificas de America Latina y el Caribe,España y Portugal), LILACS (Latin America Health Science Literature) and DOAJ (Directory of open access journals).

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SUMMARY

VOLUME 34 – Nº 1 – SPECIAL – 2026

Editorial

Review Article

SHOULDER AND ELBOW

DOI: http://dx.doi.org/10.1590/1413-785220263401e310247

SBCOC CONSENSUS STATEMENTS: A SCIENTIFIC COMMITMENT TO GOOD MEDICAL PRACTICE

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Increasingly, the quality of care in Shoulder and Elbow Surgery is measured by the ability to bring together three elements that do not always point in the same direction: the best available evidence, the surgeon's experience, and each patient's values. This is how Sackett et al. defined Evidence-Based Medicine — not as the mechanical application of clinical trial results, but as the critical integration of these three domains.[1] In this context, consensus documents produced by scientific societies play a strategic role: they organize the available knowledge and translate it into recommendations applicable to daily practice, particularly where evidence is scarce, conflicting, or difficult to interpret.

This special issue of Acta Ortopédica Brasileira brings together the Consensus Statements of the Brazilian Society of Shoulder and Elbow Surgery (SBCOC), a project initiated during the term of President Marcelo Campos and concluded under the current administration, led by President Eduardo Malavolta. In all, there are ten consensus statements, spanning the main therapeutic dilemmas of the specialty — from rotator cuff tears (double-row repair for large tears, early versus delayed repair for traumatic tears, augmentation with a bioinductive implant, and the treatment of tendinopathy) to anterior shoulder instability (management of bone loss and the number of anchors), as well as arthroplasty and proximal humeral fractures in the elderly, glenohumeral osteoarthritis, and elbow conditions such as epicondylitis. More than a compilation of opinions, each document arose from a critical and structured analysis of the literature, aimed at synthesizing the best available evidence on questions that are frequent, relevant, and often controversial in daily practice. The continuity of the project across administrations reflects the Society's institutional commitment — through its boards, committees, and members — to high-quality scientific work.

Trustworthy recommendations require methodological transparency, critical appraisal of the quality of evidence, and explicit acknowledgment of uncertainty. For this reason, each consensus was conducted as an independent systematic review, with the certainty of evidence assessed using the GRADE approach, under the methodological guidance of Cochrane Brazil — ensuring rigor, reproducibility, and impartiality in the analyses. This process followed internationally established standards for the development of trustworthy guidelines and consensus documents, such as the criteria of the Institute of Medicine, the AGREE II instrument, and the GRADE approach itself.[2–4] Starting from structured questions relevant to the Brazilian setting, SBCOC specialists translated the evidence into applicable recommendations — in the office, in the operating room, and across the various care settings in which our members work.

Beyond supporting clinical reasoning, the SBCOC Consensus Statements strengthen the physician–patient relationship. By offering a structured synthesis of the evidence — with its benefits, risks, alternatives, and limitations — they help sustain shared decision-making, which is increasingly central to contemporary medicine. Translating science into understandable information is what allows patients to take part, in an informed way, in the choices about their own treatment.[5]

These documents also play an important role in the recognition and defense of professional practice. In an environment marked by growing interference from health insurers, litigation, and demands for technical justification of diagnostic and therapeutic procedures, positions issued by a scientific society offer qualified support for medical practice. It is worth recognizing, however, that guidelines and consensus documents are not neutral instruments: when misused — as rigid criteria for coverage or liability — they can turn against the very clinical judgment they are meant to support.[6] For this reason, they should be understood as support for decision-making, not a substitute for it, always in the patient's best interest.

With this special issue, the SBCOC reaffirms its mission to promote education, research, scientific updating, and excellence in care in Shoulder and Elbow Surgery. The Consensus project is an institutional milestone: it is born of collaboration among specialists, spans administrations, relies on independent methodological support, and looks to the future. May these documents serve as a reference for our members, a source of consultation for the orthopedic community, and a lasting stimulus toward critical, ethical, and evidence-based medical practice.

Citation: Malavolta EA, Zanesco L, Campos MCO. SBCOC Consensus Statements: A scientific commitment to good medical practice. Acta Ortop Bras. [online]. 2026;34(1) Esp.: Page 1 of 2. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 06/24/2026 approved on 06/25/2026.
Handling Editor: Olavo Pires de Camargo

CONTRIBUTIONS OF THE AUTHORS

Each author made a personal and significant contribution to the development of this editorial. EAM: Conceptualization; Writing – original draft. LZ and MCOC: Writing – review & editing.

DATA AVAILABILITY DECLARATION

The contents underlying the research are available in the manuscript.

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DOI: http://dx.doi.org/10.1590/1413-785220263401e303256

EVIDENCE-BASED REVIEW & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: BANKART REPAIR WITH REMPLISSAGE FOR RECURRENT GLENOHUMERAL INSTABILITY WITH BONE LOSS

REVISÃO E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIA DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: REPARO DE BANKART ASSOCIADO AO REMPLISSAGE NA INSTABILIDADE GLENOUMERAL RECORRENTE COM PERDA ÓSSEA

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ABSTRACT

Introduction: Recurrent anterior glenohumeral instability with "on-track" Hill-Sachs lesions and subcritical glenoid bone loss remains a therapeutic challenge, with considerable failure rates following isolated arthroscopic Bankart repair (BR). The addition of the Remplissage procedure (BR-R) has been proposed to improve stability and shoulder function, however, its effectiveness in "on-track" lesions remains uncertain. Methods: An evidence-based review was conducted in PubMed, Embase, Cochrane Library, and BVS (search up to August 2025), including comparative clinical studies that evaluated BR-R versus isolated BR in patients with anterior instability, on-track Hill-Sachs lesions, and partial glenoid bone loss. Primary outcomes were recurrence of dislocation and shoulder function; secondary outcomes included residual apprehension, re-operation, and return to sport. Results: Four studies met the inclusion criteria (one systematic review of six cohort studies and three additional cohort studies; 537 patients in total). Across studies, BR-R showed lower recurrence rates (0–7.7% vs. 3.5–30%) and better functional scores (WOSI, SSV, SANE, ASES, ROWE), higher return-to-sport rates at preinjury level in athletes, and less residual apprehension, without clear increase in complications. Overall certainty of evidence was very low. Conclusions: Very low-quality evidence suggests that the addition of Remplissage to arthroscopic Bankart repair may improve stability and functional outcomes compared with isolated Bankart repair in patients with on-track bone loss. ***Level of evidence II; Systematic review.***

Keywords: Shoulder Dislocation; Glenohumeral Joint; Joint Instability; Bankart Lesions; Hill Sachs Lesions; Arthroscopy.

RESUMO

Introdução: A instabilidade glenoumeral anterior recidivante com lesões de Hill-Sachs "on-track" e perda óssea glenoidal subcrítica permanece desafiadora, e as taxas de falha após o reparo artroscópico isolado de Bankart (RB) podem ser significativas. A adição do procedimento de Remplissage (RB-R) foi proposta para melhorar a estabilidade e a função do ombro, porém sua efetividade em lesões "on-track" ainda não está completamente estabelecida. Métodos: Foi realizada uma revisão baseada em evidência nas bases PubMed, Embase, Cochrane Library e BVS (busca até agosto de 2025), incluindo estudos clínicos comparativos que avaliaram RB-R versus RB isolado em pacientes com instabilidade anterior, lesões de Hill-Sachs "on-track" e perda óssea glenoidal parcial. Os desfechos primários foram recidiva da luxação e função do ombro; desfechos secundários incluíram apreensão residual, reoperação e retorno ao esporte. Resultados: Quatro estudos preencheram os critérios de inclusão (uma revisão sistemática de seis estudos de coorte e três estudos de coorte adicionais; total de 537 pacientes). Em conjunto, os estudos mostraram que o RB-R apresenta menores taxas de recidiva (0–7,7% vs. 3,5–30%) e melhores escores funcionais (WOSI, SSV, SANE, ASES, ROWE), maior taxa de retorno ao esporte no nível pré-lesão em atletas e menor apreensão residual, sem aumento claro nas complicações. A certeza global da evidência foi classificada como muito baixa. Conclusão: A evidência, embora de muito baixa qualidade, sugere que a adição do Remplissage ao reparo artroscópico de Bankart melhora a estabilidade e os desfechos funcionais em comparação ao reparo isolado de Bankart em pacientes com perda óssea do tipo "on-track". ***Nível de Evidência II; Revisão sistemática.***

Descritores: *Luxação do Ombro; Articulação Glenoumeral; Instabilidade Articular; Lesões de Bankart; Lesão de Hill-Sachs; Artroscopia.*

Citation: Zanesco L, Pinto GMR, Amaral MVG, Bonadiman JA, Neri KC, França FO, Campos MCO, Malavolta EA. Evidence-based review and recommendations from the brazilian society of shoulder and elbow surgery: bankart repair with remplissage for recurrent glenohumeral instability with bone loss. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 5. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 11/28/2025 approved on 05/05/2026.
Handling Editor: Jorge Henrique Assunção

<< SUMÁRIO

RECOMMENDATION

There is evidence, although of very low quality, that adding the Remplissage procedure to Bankart repair is superior to isolated Bankart repair, resulting in lower recurrence rates and better shoulder function (Level of Evidence III) in the treatment of lesions with "on-track" bone loss. However, studies with greater methodological rigor are needed to clarify this issue further.

The SBCOC Consensus Project recommends that anterior instabilities with "on-track" bone loss be individually evaluated regarding the risk of recurrence. In these cases, adding Remplissage to arthroscopic Bankart repair may provide better functional outcomes, lower recurrence rates, and reduced residual apprehension, especially in patients with higher functional demands or lesions close to the critical threshold of bone loss.

INTRODUCTION

Glenohumeral dislocation is the most frequent dislocation in the human body, accounting for approximately 50% of all joint dislocations. The annual incidence is estimated at 23.9 per 100,000 people, with traumatic anterior dislocation being the most prevalent form, especially in young and active individuals such as athletes and military personnel.[1,2] After a first episode of traumatic anterior dislocation, the risk of recurrence is particularly high in male patients under 20 years of age, and may exceed 70% in this population.[1,3]

Traditionally, in the absence of evident risk factors for recurrence—such as significant bone defects—conservative treatment is usually the initial approach after the first dislocation episode.[1,3,4] However, in the setting of recurrent instability or relevant bone loss, surgical treatment is indicated. The most commonly used techniques are arthroscopic Bankart repair and bone-block procedures, with the Latarjet technique being the most widely performed within this latter group.[2,5,6]

The "glenoid track" concept, described by Yamamoto et al. in 2007[7], represented a significant advance in the understanding of glenohumeral instability, especially in cases with bipolar bone lesions.[8] According to this concept, the extent of the Hill-Sachs lesion and its relationship to the remaining glenoid width determine whether the lesion is "on-track" (within the glenoid contact zone during motion) or "off-track" (outside the contact zone), with a risk of engaging and recurrence.[5,7,9] This classification allows for more accurate patient stratification, helping to guide the choice of the most appropriate surgical procedure.[5]

However, even in cases classified as "on-track" but with significant bone loss or a large Hill-Sachs lesion, isolated Bankart repair (BR) has been associated with considerable failure rates.[5,6,9] In this context, performing a Bankart repair combined with Remplissage (BR-R)—tenodesis of the infraspinatus tendon to fill the humeral head defect[10]—aimed at filling the Hill-Sachs lesion and reducing the risk of engaging and recurrent instability, appears to be a logical strategy. The present consensus aims to review the current literature to assess whether adding Remplissage to arthroscopic Bankart repair in patients with "on-track" lesions and partial bone loss can improve clinical outcomes and reduce the failure rate of joint stabilization.

This evidence review was developed within a collaborative initiative between Cochrane and the Brazilian Society of Shoulder and Elbow Surgery (SBCOC). The aim of this partnership is to synthesize the best available evidence using rigorous, transparent methods and to translate it into clear, practical recommendations for clinical practice

Research Question

In adults with recurrent anterior glenohumeral instability, 'on-track' Hill-Sachs lesions, and subcritical (partial) glenoid bone loss, which approach is more effective — arthroscopic Bankart repair combined with remplissage (BR-R) or isolated Bankart repair (BR) — regarding recurrence of dislocation and shoulder function?"

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and BVS.
- Descriptors used: "Adolescent", "Adult", "Arthroscopy* / methods", "Bankart Lesions / surgery", "Double-Blind Method", "Female", "Follow-Up Studies", "Humans", "Joint Instability* / surgery", "Male", "Middle Aged", "Recurrence*", "Reoperation* / statistics & numerical data", "Shoulder Dislocation / surgery", "Shoulder Joint / surgery", and "Young Adult". (see Appendix 1).
- Search period: Up to August 2025.
- Study selection: according to the highest level of evidence, prioritizing systematic reviews (SRs) of the literature with good methodological quality and up-to-date evidence. In the absence of SRs, randomized controlled trials (RCTs) were considered, followed by observational studies and, finally, case series.

RESULTS

The search identified 244 references (55 in PubMed, 126 in Embase, 36 in the Cochrane Library, and 27 in BVS). Forty-three full-text articles were selected for evaluation, of which 30 were excluded for not incorporating the glenoid track concept (they either did not include or report on-track lesions, did not classify lesions as on-track or off-track, or included off-track lesions in their samples)[11–40], and 9 were excluded for not comparing the methods under investigation.[41–49] Thus, 4 studies were included in the scope of this review.[50–53] (Figure 1)

Included studies

Few scientific studies were identified, most of them retrospective cohort studies. In a multicenter cohort study conducted by Lin et al.[50] (2023), 183 patients aged 14 to 50 years were evaluated with a minimum follow-up of two years, 56 in the BR-R group and

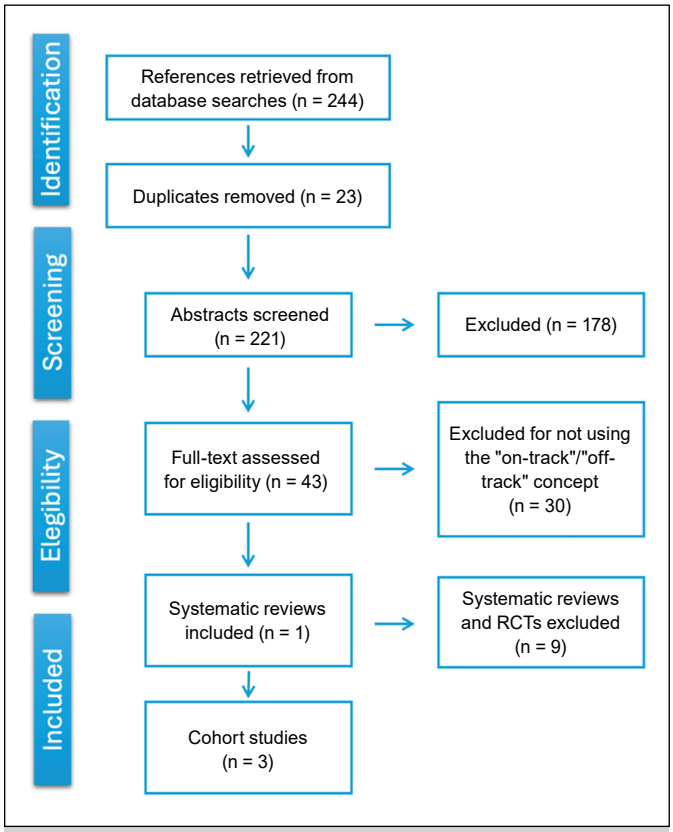

Figure 1. Flow diagram of the literature search.

<< SUMÁRIO

127 in the BR group. All had "on-track" lesions, without glenoid bone loss greater than 15% or other associated comorbidities. The BR-R group had only one recurrence (1.8%) and no reoperations. In the BR group, 14 patients (11.0%) experienced a new dislocation ($p = 0.040$) and 8 (6.3%) required reoperation ($p = 0.11$). In addition, the high-risk BR-R subgroup showed significantly better scores on the Western Ontario Shoulder Instability Index ($p = 0.008$) and Subjective Shoulder Value ($p = 0.001$) compared with the control group.

In the systematic review by Villarreal et al.[51] (2025), six level III studies were evaluated, totaling 537 participants. Of these, 202 underwent the combined technique and 335 underwent isolated Bankart repair. After a mean follow-up of 35 months, recurrence rates ranged from 0% to 7.7% in the Remplissage-plus-Bankart group and from 3.5% to 30% in the isolated Bankart group, corresponding to a 78% relative risk reduction (OR 0.22; 95% CI 0.09–0.53).

In the study by Kirac et al.[52] (2023), involving 64 professional overhead athletes (basketball, volleyball, and handball) with "on-track" lesions and subcritical glenoid bone loss, adding Remplissage to arthroscopic Bankart repair resulted in better functional scores (SANE, ASES, and ROWE), higher return-to-sport rates at the preinjury level, and a lower frequency of subjective apprehension during sports practice compared with isolated Bankart repair. Notably, there were three recurrences in the BR group and none in the BR-R group, reinforcing the effectiveness of Remplissage in preventing recurrent instability even in "on-track" lesions.

Finally, in the study by Yu et al.[53] (2023), adding Remplissage to arthroscopic Bankart repair resulted in significantly higher ROWE scores and a lower frequency of residual apprehension.

The general characteristics of the evaluated studies and the quality of evidence according to the GRADE system[54,55] are presented in Tables 1 and 2, respectively.

Table 1. Characteristics of the included studies.

Studies	Study type	Included studies (Designs)	Sample size	Published protocol
Lin et al (2023)	Cohort Study	- -	183	No
Villarreal et al (2025)	Systematic Review	6 (6 Cohorts)	537	No
Kirac et al (2023)	Cohort Study	- -	64	No
Yu et al (2023)	Cohort Study	- -	53	No

Table 2. Quality of evidence (GRADE): Bankart repair vs. Bankart repair associated with the Remplissage procedure.

Outcome	Studies (n)	Evidence quality
Recurrent Dislocation	6 studies (537)	Very low
Shoulder Function	6 studies (537)	Very low

The GRADE tool (Grading of Recommendations Assessment, Development and Evaluation) is used to appraise and measure the quality of evidence. It is grounded in five domains: risk of bias, imprecision, inconsistency, indirectness of outcomes, and publication bias. Based on this framework, the quality of evidence is classified into four levels: very low, low, moderate, and high[54,55].

CONCLUSION

There is very low-quality evidence showing that Bankart repair combined with Remplissage is superior to isolated Bankart repair in terms of recurrent dislocation and functional outcomes.

CONTRIBUTIONS OF THE AUTHORS

Each author made a personal and significant contribution to the development of this article. LZ: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft; GMRP: Data curation, Formal analysis, Writing – original draft, Writing – review & editing; MVGA, JAB, KCN, and FOF: Data curation, Writing – review & editing; MCOC and EAM: Conceptualization, Methodology, Supervision, Writing – review & editing, Final approval of the version to be published.

DATA AVAILABILITY DECLARATION

The data underlying this study are available within the article.

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Appendix 1. Database search strategies.

PUBMED

#1"Shoulder Joint"[Mesh] OR (Joint, Shoulder) OR (Joints, Shoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) OR (Glenohumeral Joints) OR (Joint, Glenohumeral) OR (Joints, Glenohumeral) OR (Glenoid Labrum) OR (Labrum, Glenoid) OR (Shoulder Dislocation) OR (Joint Instability)
#2"Bankart Lesions"[Mesh] OR (Lesions, Bankart) OR (Bankart Lesion) OR (Lesion, Bankart) OR (Bankart Tears) OR (Tears, Bankart) OR (Hill-Sachs Lesion) OR (Hill Sachs Lesion) OR (Lesion, Hill-Sachs) OR (Hill-Sachs Lesions) OR (Hill Sachs Lesions) OR (Lesions, Hill-Sachs) OR (Bankart Fractures) OR (Fractures, Bankart) OR (Bony Bankart Lesion) OR (Bankart Lesion, Bony) OR (Lesion, Bony Bankart) OR (Bony) OR (Bankart Lesions) OR (Bankart Lesions) OR (, Bony) OR (Lesions, Bony Bankart) OR (Osseous) OR (Bankart Lesions) OR (Bankart Lesions) OR (, Osseous) OR (Lesions, Osseous Bankart) OR (Osseous Bankart Lesion) OR (Bankart Lesion, Osseous) OR (Lesion, Osseous Bankart)
#3"Arthroscopy"[Mesh] OR (Arthroscopies) OR (Arthroscopic Surgical Procedures) OR (Arthroscopic Surgical Procedure) OR (Procedure, Arthroscopic Surgical) OR (Procedures, Arthroscopic Surgical) OR (Surgical Procedure, Arthroscopic) OR (Arthroscopic Surgery) OR (Arthroscopic Surgeries) OR (Surgeries, Arthroscopic) OR (Surgery, Arthroscopic) OR (Surgical Procedures, Arthroscopic)
#4(Repair Bankart) OR(Arthroscopic Bankart Repair) OR (Remplissage Procedure) OR (Arthroscopic Bankart Repair With Remplissage) OR (Bankart Repair MORE Remplissage) OR (Bankart Repair AND Remplissage)
#5 Recurrence* OR Reoperation
#6 #1 AND #2 AND #3 AND #4AND #5

COCHRANE

#1 (Shoulder Joint) OR (Joint, Shoulder) OR (Joints, Shoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) OR (Glenohumeral Joints) OR (Joint, Glenohumeral) OR (Joints, Glenohumeral) OR (Glenoid Labrum) OR (Labrum, Glenoid) OR (Shoulder Dislocation) OR (Joint Instability)
#2 (Bankart Lesions) OR (Lesions, Bankart) OR (Bankart Lesion) OR (Lesion, Bankart) OR (Bankart Tears) OR (Tears, Bankart) OR (Hill-Sachs Lesion) OR (Hill Sachs Lesion) OR (Lesion, Hill-Sachs) OR (Hill-Sachs Lesions) OR (Hill Sachs Lesions) OR (Lesions, Hill-Sachs) OR (Bankart Fractures) OR (Fractures, Bankart) OR (Bony Bankart Lesion) OR (Bankart Lesion, Bony) OR (Lesion, Bony Bankart) OR (Bony) OR (Bankart Lesions) OR (Bankart Lesions) OR (, Bony) OR (Lesions, Bony Bankart) OR (Osseous) OR (Bankart Lesions) OR (Bankart Lesions) OR (, Osseous) OR (Lesions, Osseous Bankart) OR (Osseous Bankart Lesion) OR (Bankart Lesion, Osseous) OR (Lesion, Osseous Bankart)
#3(Arthroscopy) OR (Arthroscopies) OR (Arthroscopic Surgical Procedures) OR (Arthroscopic Surgical Procedure) OR (Procedure, Arthroscopic Surgical) OR (Procedures, Arthroscopic Surgical) OR (Surgical Procedure, Arthroscopic) OR (Arthroscopic Surgery) OR (Arthroscopic Surgeries) OR (Surgeries, Arthroscopic) OR (Surgery, Arthroscopic) OR (Surgical Procedures, Arthroscopic)
#4 (Repair Bankart) OR (Arthroscopic Bankart Repair) OR (Remplissage Procedure) OR (Arthroscopic Bankart Repair With Remplissage) OR (Bankart Repair MORE Remplissage) OR (Bankart Repair AND Remplissage)
#5 Recurrence* OR Reoperation
#6 #1 AND #2 AND #3 AND #4 AND #5

EMBASE

#1 'shoulder dislocation'/exp OR 'dislocation, shoulder' OR 'humeroscapular luxation' OR 'scapulohumeral luxation' OR 'shoulder dislocation' OR 'shoulder joint dislocation' OR 'shoulder luxation'
#2 'bankart lesion'/exp OR 'bankart fracture' OR 'bankart fractures' OR 'bankart lesion' OR 'bankart lesions' OR 'bankart tear' OR 'hill-sachs lesion' OR 'bony bankart lesion' OR 'osseous bankart lesion'
#3 'arthroscopy'/exp OR 'arthro-endoscopy' OR 'arthroendoscopy' OR 'arthroscopic exam' OR 'arthroscopic examination' OR 'arthroscopic procedure' OR 'arthroscopic procedures' OR 'arthroscopy'
#4 (Repair Bankart) OR (Arthroscopic Bankart Repair) OR (Remplissage Procedure) OR (Arthroscopic Bankart Repair With Remplissage) OR (Bankart Repair MORE Remplissage) OR (Bankart Repair AND Remplissage)
#5 Recurrence* OR Reoperation
#6 #1 AND #2 AND #3 AND #4 AND #5

PORTAL REGIONAL BVS

#1 MH:"Articulação do Ombro" OR (Shoulder Joint) OR (Articulação Glenoumeral) OR (Articulações dos Ombros) OR (Ligamento Glenoide Umeral) OR (Lábio Glenoidal) OR MH:A02.835.583.748$
#2MH:"Lesões de Bankart" OR (Bankart Lesions) OR (Fraturas Bankart) OR (Fraturas de Bankart) OR (Lacerações Bankart) OR (Lacerações de Bankart) OR (Lesão Bankart) OR (Lesão de Bankart) OR (Lesão de Hill-Sachs) OR (Lesão Ñssea de Bankart) OR (Hill-Sachs) OR (Lesões Ñsseas de Bankart) OR (Rupturas Bankart) OR (Rupturas de Bankart) OR MH:C26.404.625.500$ OR MH:C26.803.250.500$
#3MH:"Artroscopia" OR (Arthroscopy) OR (Procedimentos Cirúrgicos Artroscópicos) OR MH:E01.370.388.250.070$ OR MH:E04.502.250.070$ OR MH:E04.555.113$
#4 (Repair Bankart) OR (Arthroscopic Bankart Repair) OR (Remplissage Procedure) OR (Arthroscopic Bankart Repair With Remplissage) OR (Bankart Repair MORE Remplissage) OR (Bankart Repair AND Remplissage)
#5 #1 AND #2 AND #3 AND #4

DOI: http://dx.doi.org/10.1590/1413-785220263401e308954

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: BIOINDUCTIVE IMPLANT AUGMENTATION VERSUS CONVENTIONAL REPAIR FOR ROTATOR CUFF TEARS

REVISÕES E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIAS DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: AUMENTO COM IMPLANTE BIOINDUTIVO VERSUS REPARO CONVENCIONAL PARA LESÕES DO MANGUITO ROTADOR

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ABSTRACT

Introduction: Despite advances in arthroscopic techniques and tendon fixation methods, structural failure after rotator cuff repair remains a relevant clinical challenge, particularly in extensive and massive tears, poor tendon quality, and repairs performed under tension. In this context, tendon-bone healing is recognized as a key determinant of surgical success, driving interest in strategies to optimize the biological environment of the repair, such as bioinductive collagen implants (patches). Methods: A systematic review was conducted in PubMed, Embase, Cochrane Library, and the Virtual Health Library (VHL) up to March 2026, to evaluate whether rotator cuff repair augmented with a bioinductive implant (patch) is more effective than conventional rotator cuff repair for the treatment of rotator cuff tears. The certainty of evidence was assessed with the GRADE approach. Results: Four randomized controlled trials (288 participants) were included, with assessment of the re-tear rate and shoulder function. The results favored bioinductive implant augmentation, mainly through a lower re-tear rate and earlier functional recovery. Conclusion: To date, there is very low-quality evidence that rotator cuff repair augmented with a bioinductive implant (patch) is more effective than conventional repair for the treatment of rotator cuff tears (including complete and massive tears), with respect to the outcomes of re-tear and function. ***Level of evidence II; Systematic review.***

Keywords: Rotator Cuff Injuries; Bioprosthesis; Tissue Scaffolds; Collagen; Arthroscopy.

RESUMO

Introdução: Apesar dos avanços nas técnicas artroscópicas e nos métodos de fixação tendínea, a falha estrutural após o reparo do manguito rotador ainda é um desafio clínico relevante, especialmente em lesões extensas e maciças, em tendões de má qualidade e em reparos sob tensão. Nesse contexto, a cicatrização tendão-osso é reconhecida como um dos principais determinantes do sucesso cirúrgico, o que tem impulsionado o interesse por estratégias capazes de otimizar o ambiente biológico do reparo, como os implantes bioindutivos de colágeno (patches). Métodos: Realizou-se revisão sistemática da literatura nas bases PubMed, Embase, Cochrane Library e Biblioteca Virtual em Saúde (BVS) até março de 2026, para avaliar se o reparo do manguito rotador associado a reforço com implante bioindutivo (patch) é mais efetivo do que o reparo convencional para o tratamento das lesões do manguito rotador. A certeza da evidência foi avaliada pela abordagem GRADE. Resultados: Foram incluídos quatro ensaios clínicos randomizados (288 participantes), com avaliação da taxa de re-ruptura e da função do ombro. Os resultados favoreceram o reforço com implante bioindutivo, sobretudo por menor taxa de re-rruptura e recuperação funcional mais precoce. Conclusão: Até o momento, existe evidência de muito baixa qualidade de que o reparo do manguito rotador associado a reforço com implante bioindutivo (patch) é mais efetivo do que o reparo convencional para o tratamento das lesões do manguito rotador (incluindo lesões completas e maciças), em relação aos desfechos re-rruptura e função. ***Nível de evidência II; Revisão sistemática.***

Descritores: *Lesões do Manguito Rotador; Bioprótese; Alicerces Teciduais; Colágeno; Artroscopia.*

Citation: Lara PHS, Belangero PS, Schiefer M, Zanesco L, Fernandes MR, Murachovsky J, Medeiros Filho JF, Malavolta EA. Evidence-Based Reviews & Recommendations from the Brazilian Society of Shoulder and Elbow Surgery: Bioinductive Implant Augmentation versus Conventional Repair for Rotator Cuff Tears. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 4. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 05/21/2026 approved on 06/08/2026.
Handling Editor: Marco Demange

INTRODUCTION

Rotator cuff tears are among the most frequent causes of shoulder pain and dysfunction, with a substantial impact on functional capacity, quality of life, and occupational performance. Despite advances in arthroscopic techniques and tendon fixation methods, structural failure after rotator cuff repair remains a relevant clinical challenge, particularly in extensive and massive tears, poor tendon quality, and repairs performed under tension. In this context, tendon-bone healing has been recognized as one of the main determinants of surgical success, which has driven interest in strategies capable of optimizing the biological environment of the repair.[1-3]

Traditionally, surgical treatment of rotator cuff tears has focused on the mechanical restoration of tendon continuity through suturing and fixation to the footprint. However, evidence accumulated over recent decades shows that anatomical restoration alone is not always sufficient to ensure durable healing, especially in patients with advanced tendon degeneration, muscle atrophy, fatty infiltration, and/or previous surgery. The concept of biological augmentation has therefore gained prominence, aiming to promote tissue integration, improve repair quality, and reduce the incidence of re-tear.[2,4,5]

Among the currently available strategies, bioinductive collagen implants (patches) have received increasing attention as a promising alternative for rotator cuff repair. These devices, generally composed of a resorbable collagen matrix, are applied to the bursal surface of the tendon to act as a biological scaffold, stimulating the formation of new tendon tissue and contributing to the thickening and maturation of the repair. Unlike structural grafts used for mechanical supplementation, the bioinductive patch follows a predominantly biological approach aimed at modulating local healing.[3,5-7]

Although initial results have been encouraging, especially regarding the structural integrity of the repair and the increase in tendon thickness on imaging, uncertainties persist regarding the magnitude of the clinical benefit, the ideal indications, and the real impact on long-term functional outcomes. Moreover, the methodological heterogeneity of the published studies and the lack of standardization regarding the profile of treated lesions and patients hinder the consolidation of definitive recommendations for routine use.[6,7]

Given this context, this consensus was developed to critically analyze the role of bioinductive implants as an augmentation method in rotator cuff repair and to evaluate whether this technique is more effective than conventional repair for the treatment of rotator cuff tears.[6-8]

This study was conducted at the initiative of the Brazilian Society of Shoulder and Elbow Surgery with the participation of Cochrane Brazil.

Research Question

Is rotator cuff repair augmented with a bioinductive implant (patch) more effective than conventional rotator cuff repair for the treatment of rotator cuff tears?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and the Virtual Health Library (VHL).
- Descriptors: As described in Appendix 1.
- Search period: Until March 2026.
- Study selection: Updated systematic reviews (SRs) with adequate methodological quality were prioritized. In the absence of suitable SRs, randomized controlled trials (RCTs) were considered, provided that their methodological quality had been assessed.

RESULTS

The search retrieved 84 references (26 in PubMed, 41 in Embase, 17 in the Cochrane Library, and 0 in the Regional Portal BVS). After the initial assessment, 45 duplicate records were removed. Following abstract screening, 33 studies were excluded, leaving six studies for full-text evaluation. Two systematic reviews on the topic were assessed but not included.

Warren et al.,[2] in a systematic review, included 13 studies (retrospective cohort studies, case series, and case reports) evaluating partial- and full-thickness rotator cuff tears. The outcomes assessed included the American Shoulder and Elbow Surgeons (ASES) score, the Constant-Murley score, the visual analog scale (VAS) for pain, the minimal clinically important difference, tendon thickness, complication and re-tear rates, and implant-related adverse events. The authors concluded that the bioinductive collagen patch appears to be a safe and promising strategy for augmenting rotator cuff repair—associated with significant clinical improvement, increased tendon thickness, and a possible reduction in the re-tear rate—while emphasizing that higher-quality comparative studies are still needed to define its role relative to conventional repair. This review was not included in the present consensus because it pooled several study types (retrospective cohorts, case series, and case reports).

Longo et al.,[4] in a systematic review, comprehensively reviewed the literature on bioinductive collagen implants in rotator cuff tears, including partial and complete tears, isolated implant use, use combined with repair, histological data, and healthcare costs, totaling 25 primary studies of various designs. The review reported overall clinical improvement, increased tendon thickness, reduced defect size, and histological findings consistent with favorable tissue remodeling, supporting the biological rationale of the implant. However, the heterogeneity of the studies and the predominance of observational evidence limit definitive conclusions about its clinical superiority over conventional repair. This review was also not included because it combined different types of primary studies (Figure 1).

Included studies

No systematic review restricted to randomized controlled trials was found; therefore, four randomized controlled trials were included.

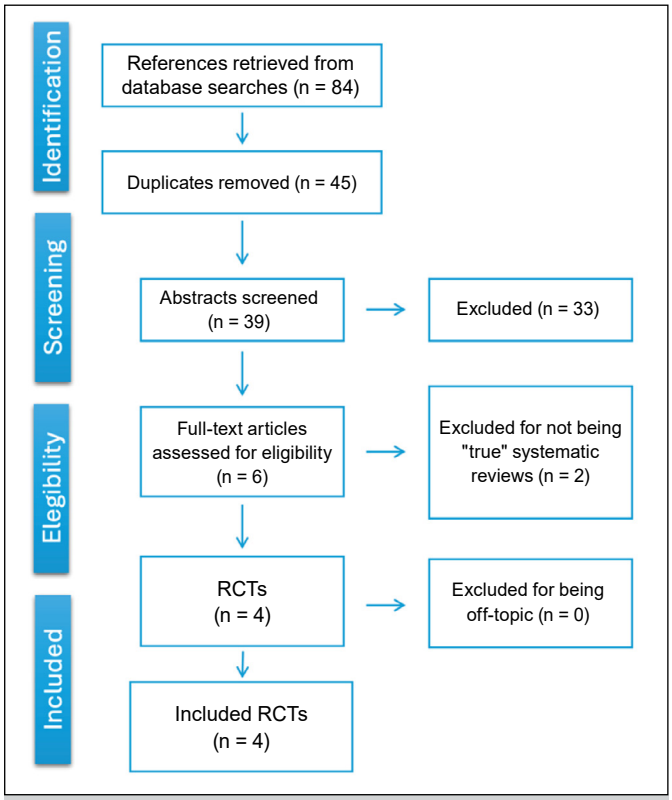

Figure 1. Flow diagram of the literature search.

Barros et al.,[8] in a randomized controlled trial, compared the clinical and radiological outcomes and re-tear rates of massive rotator cuff repair using a standard technique versus augmentation with a bioinductive collagen scaffold, with 12-month follow-up. Sixty-three patients were included: 29 in the augmented-repair (AR) group and 34 in the standard-repair (SR) group. In the AR group (median age 64 years), the mean Constant score (CS) improved from 49 preoperatively to 70, 86, and 89 at 3, 6, and 12 months, and the mean VAS improved from 7.5 to 2.9, 1.5, and 0.7. In the SR group (mean age 67 years), the mean CS improved from 52 to 62, 78, and 82, and the mean VAS from 7.2 to 4.5, 2.1, and 1.0. There were 2 re-tears (7%) and 2 cases of adhesive capsulitis in the AR group, versus 4 re-tears (13%) and 1 case of adhesive capsulitis in the SR group. The authors concluded that, at 12 months, augmented repair resulted in less pain, better functional scores, and a lower re-tear rate than standard repair, with the difference most evident at 3 and 6 months.

Ruiz Ibán et al.,[5] in a randomized controlled trial, included 124 participants with complete posterosuperior rotator cuff tears, allocated to transosseous-equivalent repair alone (control) or with a bioinductive collagen patch applied over the repair (intervention). Of the 124 randomized patients (mean age 58.1 years), 114 (91.9%) underwent MRI at a mean of 25.4 months. The re-tear rate was lower in the intervention group (12.3%; 7 of 57) than in the control group (35.1%; 20 of 57) ($P = 0.004$; relative risk 0.35; 95% CI 0.16–0.76). Clinical scores improved in both groups ($P < 0.001$), with 87% achieving the minimal clinically important difference for the CMS and 90% for the ASES score, without significant between-group differences. The authors concluded that augmentation of a transosseous-equivalent repair in posterosuperior tears clearly reduces the re-tear rate at two years without increasing complications and with comparable clinical outcomes.

Chacón et al.,[9] in a prospective, double-blind, single-center randomized controlled trial, evaluated 60 patients with small to medium (≤ 2.5 cm) full-thickness supraspinatus tears, allocated to transosseous-equivalent arthroscopic repair (control, n = 30) or isolated bioinductive repair (intervention, n = 30). The primary outcome was tendon quality on biopsy at 6 months; secondary outcomes included patient-reported outcomes (ASES and CMS scores, VAS), tendon thickness and healing on MRI at 6, 12, and 24 months, satisfaction, and time to return to work. Histology at 6 months showed highly organized, parallel collagen bundles without inflammation in all intervention patients, versus poorly organized fibers in 24 of 30 (80%) controls ($P < 0.0001$). The increase in tendon thickness on MRI at 6 months was greater in the intervention group (2.0 mm vs 0.8 mm; $P < 0.0001$), which also showed higher ASES and CMS scores, less pain, greater satisfaction, and a faster return to work (median 90 vs 163.5 days; $P < 0.0001$). The authors concluded that, compared with conventional repair, bioinductive repair resulted in superior tendon quality, better patient outcomes, and earlier return to work.

Wang et al.,[10] in a 2026 randomized controlled trial, compared conventional arthroscopic repair after completion of the tear with bioinductive collagen implant augmentation for high-grade partial-thickness supraspinatus tears. Forty-one patients (aged 35 to 75 years) refractory to conservative treatment were included. The primary outcome was the Western Ontario Rotator Cuff Index (WORC) score at 3 months; secondary outcomes included the ASES and Constant scores, return to activities, and tendon integrity on MRI. The implant group showed statistically superior early functional recovery, with better WORC scores at 6 weeks and 3 months and better ASES scores at 6 weeks, as well as earlier return to work and sport. This advantage was predominantly observed early, with no significant between-group differences at 6 and 12 months, and structural healing on MRI at 12 months was comparable between techniques. The authors concluded that bioinductive collagen implantation may accelerate early functional recovery in high-grade partial-thickness tears, without demonstrating sustained structural or functional superiority at one year.

The general characteristics of the included studies and the certainty of evidence according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach are presented in Tables 1 and 2, respectively.[11,12]

Table 1. Characteristics of the included studies.

Included study	Study design	Sample size	Lesion type / follow-up
Ferreira de Barros et al.[8]	RCT	63 (29 AR vs 34 SR)	Complete / massive tears; 12 months
Ruiz Ibán et al.[5]	RCT	124 (57 vs 57 analyzed)	Complete posterosuperior tears; ~25 months (2 years)
Chacón et al.[9]	RCT (double-blind)	60 (30 vs 30)	Small/medium (≤ 2.5 cm) full-thickness tears; 24 months
Wang et al.[10]	RCT	41	High-grade partial-thickness tears; 12 months

AR: augmented repair (bioinductive implant); SR: standard/conventional repair; RCT: randomized controlled trial.

Table 2. Quality of evidence (GRADE): bioinductive implant augmentation versus conventional repair.

Outcome	Studies (N)	Certainty of evidence
Re-tear (re-rupture)	4 RCTs (288)	Very low[1,2,3]
Function (functional scores)	4 RCTs (288)	Very low[1,2,3]

1: Risk of bias of the included studies; 2: Imprecision (small samples; wide confidence intervals); 3: Inconsistency/indirectness (heterogeneous tear types and follow-up periods). Note: GRADE (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to assess and grade the certainty of evidence, based on five domains: risk of bias, imprecision, inconsistency, indirectness, and publication bias. The certainty of evidence is classified as very low, low, moderate, or high.

Study Limitations

Future research should prioritize randomized, multicenter clinical trials with rigorous methodology, standardized lesion and patient profiles, and longer follow-up. Studies with this design are essential to more precisely define the long-term clinical and functional benefit of bioinductive augmentation relative to conventional repair, since the current evidence is limited and heterogeneous.

CONCLUSION

There is very low-quality evidence that rotator cuff repair augmented with a bioinductive implant (patch) is more effective than conventional rotator cuff repair for the treatment of rotator cuff tears (including complete and massive tears), with respect to the outcomes of re-tear and function.

Recommendation

Regarding the outcomes of re-tear and function, there is evidence, albeit of very low quality, that rotator cuff repair augmented with a bioinductive implant is superior to conventional repair for the treatment of rotator cuff tears.

Therefore, the Brazilian Society of Shoulder and Elbow Surgery (SBCOC) Consensus Project recommends that the surgeon individually assess patient- and disease-related characteristics to reach the best treatment decision. With respect to re-tear and function, this project suggests that, in selected cases, bioinductive implant augmentation may be preferred over conventional repair.

CONTRIBUTIONS OF THE AUTHORS

Each author made substantial individual contributions to the development of this article. PHSL: writing and review; PSB: conceptualization and review; MS: conceptualization and review; LZ: conceptualization and review; MRF: conceptualization and review; JM: writing and review; JFMF: conceptualization and review; EAM: conceptualization and review.

DATA AVAILABILITY DECLARATION

The contents underlying the research are available in the manuscript.

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Appendix 1. Database search strategy.

PUBMED

#1 "Rotator Cuff Injuries"[Mesh] OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral)
#2 (bioinductive) OR (bioinductive patch) OR (bioinductive implant) OR (bioinductive collagen implant) OR (collagen patch) OR (collagen scaffold)
#3 #1 AND #2

COCHRANE LIBRARY

#1 (Rotator Cuff Injuries) OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral)
#2 (bioinductive) OR (bioinductive patch) OR (bioinductive implant) OR (bioinductive collagen implant) OR (collagen patch) OR (collagen scaffold)
#3 #1 AND #2

EMBASE

#1 'rotator cuff injury'/exp OR 'cuff injury' OR 'cuff lesion' OR 'rotator cuff disease' OR 'rotator cuff disorder' OR 'rotator cuff disorders' OR 'rotator cuff injuries' OR 'rotator cuff injury' OR 'rotator cuff lesion' OR 'rotator cuff lesions' OR 'rotator cuff pathology' OR 'rotator cuff tendinopathies' OR 'rotator cuff tendinopathy' OR 'shoulder rotator cuff degeneration' OR 'shoulder rotator cuff lesion'
#2 (bioinductive) OR (bioinductive patch) OR (bioinductive implant) OR (bioinductive collagen implant) OR (collagen patch) OR (collagen scaffold)
#3 #1 AND #2

REGIONAL PORTAL (BVS)

#1 Mh:"Lesões do Manguito Rotador" OR (Lesões do Manguito Rotador) OR (Lesões do Ligamento Glenoidal) OR (Lesões do Ligamento Glenoídeo) OR (Lesões do Ligamento Glenóideo) OR (Roturas da Coifa dos Rotadores) OR (Roturas do Ligamento Glenoidal) OR (Roturas do Ligamento Glenoídeo) OR (Roturas do Manguito Rotador) OR (Ruptura do Manguito Rotador) OR (Rupturas da Coifa dos Rotadores) OR (Rupturas do Ligamento Glenoidal) OR (Rupturas do Ligamento Glenoídeo) OR (Rupturas do Ligamento Glenóideo) OR (Rupturas do Manguito Rotador) OR (Tendinite da Coifa dos Rotadores) OR (Tendinite do Manguito Rotador) OR (Tendinose da Coifa dos Rotadores) OR (Tendinose do Manguito Rotador) OR MH:C26.761.340$ OR MH:C26.803.063$ OR MH:C26.874.400$
#2 (bioinductive) OR (bioinductive patch) OR (bioinductive implant) OR (bioindutivo) OR (implante bioindutivo) OR (patch bioindutivo) OR (bioinductivo) OR (parche bioinductivo) OR (implante de colágeno)
#3 #1 AND #2

DOI: http://dx.doi.org/10.1590/1413-785220263401e303241

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: DOUBLE-ROW REPAIR FOR LARGE ROTATOR CUFF TEARS

REVISÕES BASEADAS EM EVIDÊNCIAS E RECOMENDAÇÕES DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: REPARO EM FILEIRA DUPLA PARA ROTURAS GRANDES DO MANGUITO ROTADOR

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ABSTRACT

Introduction: Large (≥ 3 cm) rotator cuff tears have a poorer prognosis, and the optimal arthroscopic repair configuration (single-row vs double-row) remains controversial. Methods: We performed an evidence-based review of systematic reviews and randomized controlled trials comparing arthroscopic double-row and single-row repair for tears ≥ 3 cm. PubMed, Embase, the Cochrane Library, and BVS were searched through May 2025. Only studies reporting size-stratified outcomes were included. Methodological quality was assessed, and the certainty of evidence was graded using the GRADE approach. Results: Two high-quality systematic reviews and five randomized trials provided separate data for tears ≥ 3 cm. Double-row repair showed better functional outcomes than single-row repair, with improved ASES (MD –3.09; 95% CI –6.19 to 0.02) and UCLA scores (MD –1.47; 95% CI –2.21 to –0.72) (moderate-quality evidence). Limited randomized data suggested higher healing rates with double-row repair (OR 3.44; 95% CI 1.09–10.88; low-quality evidence). Pain alone did not differ meaningfully beyond the immediate postoperative period. Conclusions: For rotator cuff tears ≥ 3 cm, arthroscopic double-row repair provides superior functional outcomes and likely higher structural healing versus single-row repair, supporting its preferential use in large and massive tears, with decisions individualized to patient and lesion characteristics. ***Level of evidence II; Systematic review.***

Keywords: Rotator Cuff Injuries; Arthroscopy; Suture Techniques; Shoulder Joint; Treatment Outcome; Evidence-Based Practice.

RESUMO

Introdução: As roturas do manguito rotador de grande tamanho (≥ 3 cm) apresentam pior prognóstico, e a configuração ideal de reparo artroscópico (fileira simples vs fileira dupla) permanece controversa. Métodos: Realizou-se uma revisão baseada em evidências de revisões sistemáticas e ensaios clínicos randomizados que compararam o reparo artroscópico em fileira dupla e em fileira simples para roturas ≥ 3 cm. As bases de dados PubMed, Embase, Cochrane Library e BVS foram pesquisadas até maio de 2025. Foram incluídos apenas estudos que relataram desfechos estratificados pelo tamanho da lesão. A qualidade metodológica foi avaliada, e a certeza da evidência foi graduada segundo a abordagem GRADE. Resultados: Duas revisões sistemáticas de alta qualidade e cinco ensaios randomizados forneceram dados específicos sobre roturas ≥ 3 cm. O reparo em fileira dupla apresentou melhores desfechos funcionais do que o reparo em fileira simples, com escores superiores de ASES (DM –3,09; IC95% –6,19 a 0,02) e UCLA (DM –1,47; IC95% –2,21 a –0,72) (evidência de qualidade moderada). Dados randomizados limitados sugerem maior taxa de cicatrização com a fileira dupla (OR 3,44; IC95% 1,09–10,88; evidência de baixa qualidade). A dor, isoladamente, não diferiu de forma clinicamente relevante após o período pós-operatório imediato. Conclusão: Para roturas do manguito rotador ≥ 3 cm, o reparo artroscópico em fileira dupla oferece melhores desfechos funcionais e provavelmente maior cicatrização estrutural em comparação ao reparo em fileira simples, o que apoia sua preferência em lesões grandes e maciças, com decisões individualizadas às características do paciente e da própria lesão. ***Nível de Evidência II; Revisão sistemática.***

Descritores: *Lesões do Manguito Rotador; Artroscopia; Técnicas de Sutura; Articulação do Ombro; Resultado do Tratamento; Prática Clínica Baseada em Evidência.*

Citation: Malavolta EA, Zanesco L, Pinto GMR, Amaral MVG, Caixeta TB, Simmer Filho J, Silva LA, Campos MCO. Evidence-based reviews & recommendations from the Brazilian Society of shoulder and elbow surgery: double-row repair for large rotator cuff tears. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 5. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 11/28/2025 approved on 05/06/2026.
Handling Editor: Américo Zoppi Filho

RECOMMENDATION

There is moderate-quality evidence demonstrating that double-row repair of rotator cuff tears ≥ 3 cm is superior to single-row repair in terms of shoulder function and pain, as assessed by the ASES and UCLA shoulder scales (Level of Evidence I). There is low-quality evidence indicating that the healing rate of the rotator cuff after surgery is higher among patients who underwent double-row repair (Level of Evidence I).

The SBCOC Consensus Project recommends that surgeons should individually assess the patient- and lesion-specific characteristics to make the best treatment decision. According to current evidence, double-row rotator cuff repair provides superior clinical and structural outcomes in large and massive tears (≥ 3 cm) and should therefore be preferred in these cases.

INTRODUCTION

Rotator cuff tears are the most common cause of shoulder disability and are possibly the most frequent tendon disorder in the human body. The prevalence of this condition has increased proportionally with the aging of the population.[1]

Tear size is commonly classified in the literature as small, medium, large, or massive (small: <1 cm; medium: 1–3 cm; large: 3–5 cm; massive: >5 cm). Massive tears generally involve multiple tendons.[2]

Arthroscopic single-row rotator cuff repair has traditionally been considered the standard technique, although several clinical studies have reported significant retear rates following this approach.[3]

Recent studies have shown that double-row repair can improve the anatomical footprint restoration, increase tendon strength, expand the acromiohumeral distance, enhance postoperative function, and reduce retear rates.[4] On the other hand, the double-row technique is technically more demanding, involves a longer surgical time, and consequently increases the cost of the procedure compared with single-row repair. Nevertheless, the cost-effectiveness ratio remains favorable for the double-row technique.[5]

The optimal technique for rotator cuff repair remains controversial in the literature, as many studies have not found substantial differences in clinical outcomes when comparing single- and double-row repairs. However, it is essential to assess outcomes according to tear size, since large and massive tears are associated with worse prognoses.[6]

This evidence review was developed within a collaborative initiative between Cochrane and the Brazilian Society of Shoulder and Elbow Surgery (SBCOC). The aim of this partnership is to synthesize the best available evidence using rigorous, transparent methods and to translate it into clear, practical recommendations for clinical practice.

Research Question

Is double-row repair more effective than single-row repair for rotator cuff tears ≥ 3 cm?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and BVS.
- Descriptors: "Rotator Cuff Injuries" [Mesh]; "Arthroscopy" [Mesh]; "single row"; "double row" or "dual-row"; Systematic Review [Publication Type]; Randomized Controlled Trial [Publication Type] (see Appendix 1).
- Search period: Up to May 2025.
- Included studies: Systematic reviews (SRs) of the literature with good methodological quality and up-to-date evidence were prioritized. In the absence of systematic reviews, randomized controlled trials (RCTs) with adequate methodological quality were also considered.

RESULTS

The search identified 98 references (61 in PubMed, 25 in Embase, and 12 in the Cochrane Library). Among these, 22 were systematic reviews[4, 7-27] — the prioritized study type for this assessment — and 15 were randomized controlled trials (RCTs).[28-42]

After screening the systematic reviews, 20 were excluded for including rotator cuff tears smaller than 3 cm without stratification by tear size. Among the 16 RCTs, only five presented separate results for tears ≥ 3.0 cm.[28, 30, 31, 34, 38] (Figure 1).

Included studies

Of the 22 systematic reviews identified, only two analyzed tears ≥ 3 cm separately.[7-12] The most recent review assessing outcomes by tear size was published by Gu et al. (2023) [12]. This systematic review with meta-analysis compared clinical outcomes after single-row and double-row rotator cuff repair for tears of different sizes. The methodological quality was assessed using the Joanna Briggs Institute (JBI) critical appraisal tool for systematic reviews and evidence syntheses,[43] concluding that the review had good methodological quality.

The review included 10 controlled studies (7 RCTs, 1 prospective cohort, and 2 retrospective studies), comprising 404 double-row and 387 single-row repairs in total.The mean follow-up was 55.1 months (range 24–168), and the included studies were judged to be of high quality by the authors. For functional outcomes, shoulder pain, and disability measured by the American Shoulder and Elbow Surgeons (ASES) score, double-row repair for tears ≥ 3 cm yielded better ASES scores than single-row repair: mean difference (MD) = –3.09 (95% CI: –6.19 to 0.02; p = 0.05; 3 studies; 99 patients). Using the University of California Los Angeles (UCLA) shoulder scale, which assesses pain, function, and patient satisfaction, a significant difference favored the double-row technique over single-row: MD = –1.47 (95% CI: –2.21 to –0.72; p < 0.01; 4 studies; 143 patients).

For the retear outcome, the review identified only one randomized study, in which significantly more retear events occurred among

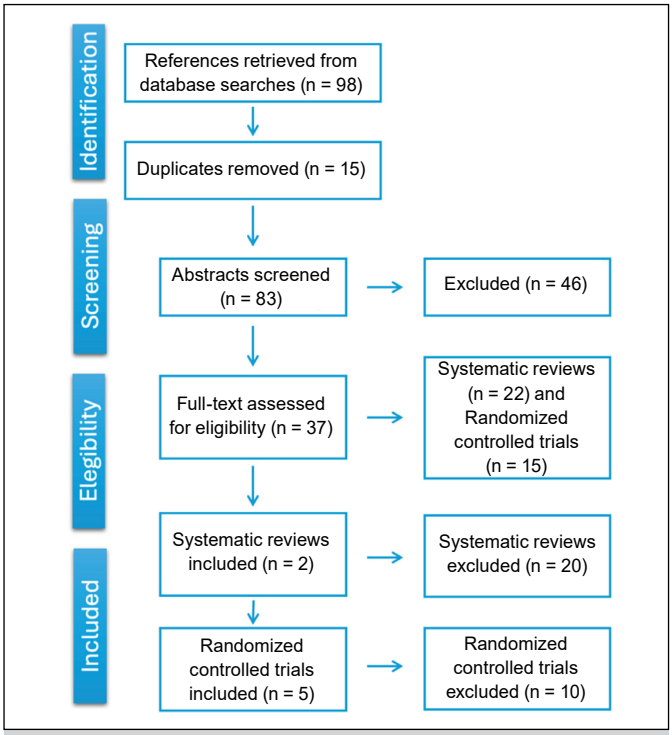

Figure 1. Flow diagram of the literature search.

patients who underwent single-row repair (6/12) compared with those who underwent double-row repair (1/14) (OR = 13.00 [95% CI, 1.27 to 133.28]; P = .03). The only review that specifically evaluated the healing rate after rotator cuff repair was conducted by Chen et al (2013).[7] This systematic review included 12 studies, of which six were RCTs. The authors found that participants who underwent double-row repair demonstrated higher healing rates compared with those who received single-row repair (OR = 3.44; 95% CI: 1.09–10.88; p = 0.035; 3 studies; 87 patients). No additional randomized studies assessing this outcome were identified after the publication of this review.

Pain is one of the domains assessed by the UCLA shoulder scale and the ASES instruments; therefore, few studies analyzed this outcome separately. In the review by Gu et al.[12], among the included randomized trials, only two reported specific results for pain. Imam et al.[34] observed a significant early difference 24 hours after surgery in VAS pain scores between the single-row and double-row groups ($p < 0.01$), favoring single-row repair. However, at six weeks postoperatively, this difference was no longer observed. Li et al.[37] reported that both groups showed postoperative pain improvement with no significant difference between them (p = 0.56).

The general characteristics of the evaluated studies and the quality of evidence according to the GRADE system[44, 45] are presented in Tables 1 and 2, respectively.

Table 1. Characteristics of the included studies.

Included Studies	Type of Study	Studies Included (Study Design)	Sample Size	Previously Published Protocol
Gu et al. (2023)	Systematic review	10 (7 RCTs, 3 cohorts)	791	No
Krogh et al. (2012)	Systematic review	12 (6 RCTs, 6 cohorts)	476*	No

RCTs :randomized clinical trials; * reported only from randomized trials

Table 2. Quality of evidence (GRADE).

Outcome	Studies (N)	Relative effect (95% CI)	Quality of evidence
Function, Pain, Disability - ASES	3 studies (99)	DM -3.09 (IC 95%: -6.19 a 0.02)	Moderate[1]
Function, Pain, and Satisfaction - UCLA	4 studies (143)	DM= -1.47 (IC 95%: -2.21 a -0.72)	Moderate[1]
Healing	3 studies (87)	OR= 3.44 (IC 95%: 1.09 a 10.88)	Low[1,3]

1: Limited sample size; 2: Imprecision (large confidence interval); 3: Bias risk of the included studies. Note: GRADE (Grading of Recommendations Assessment, Development, and Evaluation) is a tool used to assess and measure the quality of evidence. It is based on five pillars: Risk of Bias, Imprecision, Inconsistency, Indirect Assessment of Outcomes, and Publication Bias. Thus, the quality of evidence is classified as very low, low, moderate, or high quality[44, 45].

CONCLUSION

There is moderate-quality evidence indicating that double-row repair of rotator cuff tears ≥ 3 cm is superior to single-row repair in terms of function and pain, as assessed by the ASES and UCLA shoulder scales. There is low-quality evidence suggesting that the healing rate after surgery is higher in patients who underwent double-row repair.

CONTRIBUTIONS OF THE AUTHORS

Each author contributed individually and significantly to the development of this article. EAM: study conception and design, data acquisition, data analysis and interpretation, and manuscript drafting; LZ: data acquisition, data analysis and interpretation, and manuscript drafting and revision; GMRP: data acquisition and critical revision of the intellectual content; MVGA: data acquisition and critical revision of the intellectual content; TBC: data acquisition and critical revision of the intellectual content; JSF: data acquisition and critical revision of the intellectual content; LAS: study conception and design, critical revision of the intellectual content, and final approval of the version to be published; MCOC: study conception and design, critical revision of the intellectual content, and final approval of the version to be published. All authors approved the final version of the manuscript to be published.

DATA AVAILABILITY DECLARATION

The data underlying the research text are contained in the manuscript.

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Appendix 1. Database search strategies.

PUBMED

#1 "Rotator Cuff Injuries"[Mesh] OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral)
#2 "Arthroscopy"[Mesh] OR (Arthroscopies) OR (Arthroscopic Surgical Procedures) OR (Arthroscopic Surgical Procedure) OR (Procedure, Arthroscopic Surgical) OR (Procedures, Arthroscopic Surgical) OR (Surgical Procedure, Arthroscopic) OR (Arthroscopic Surgery) OR (Arthroscopic Surgeries) OR (Surgeries, Arthroscopic) OR (Surgery, Arthroscopic) OR (Surgical Procedures, Arthroscopic)
#3 ("single row" AND "double row")
#4 #4 #1 AND #2 AND #3
Filters applied: Clinical Trial; Meta-Analysis; Randomized Controlled Trial; Review; Systematic Review = 61

COCHRANE

#1 “Rotator Cuff Injuries” OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral)
#2 “Arthroscopy” OR (Arthroscopies) OR (Arthroscopic Surgical Procedures) OR (Arthroscopic Surgical Procedure) OR (Procedure, Arthroscopic Surgical) OR (Procedures, Arthroscopic Surgical) OR (Surgical Procedure, Arthroscopic) OR (Arthroscopic Surgery) OR (Arthroscopic Surgeries) OR (Surgeries, Arthroscopic) OR (Surgery, Arthroscopic) OR (Surgical Procedures, Arthroscopic)
#3 (“single row” AND “double row”)
#4 #1 AND #2 AND #3 = 12

EMBASE

#1 ‘rotator cuff injury’/exp OR ‘cuff injury’ OR ‘cuff lesion’ OR ‘rotator cuff disease’ OR ‘rotator cuff disorder’ OR ‘rotator cuff disorders’ OR ‘rotator cuff injuries’ OR ‘rotator cuff injury’ OR ‘rotator cuff lesion’ OR ‘rotator cuff lesions’ OR ‘rotator cuff pathology’ OR ‘rotator cuff tendinopathies’ OR ‘rotator cuff tendinopathy’ OR ‘shoulder rotator cuff degeneration’ OR ‘shoulder rotator cuff lesion’
#2 ‘arthroscopy’/exp OR ‘arthro-endoscopy’ OR ‘arthroendoscopy’ OR ‘arthroscopic exam’ OR ‘arthroscopic examination’ OR ‘arthroscopic procedure’ OR ‘arthroscopic procedures’ OR ‘arthroscopy’
#3 (“single row” AND “double row”)
#4 #1 AND #2 AND #3 = 189
#4 AND ([embase]/lim NOT ([embase]/lim AND [medline]/lim) OR ([medline]/lim NOT ([embase]/lim AND [medline]/lim) NOT ([embase classic]/lim AND [medline]/lim))) AND ([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim OR [controlled clinical trial]/lim OR [randomized controlled trial]/lim) = 25

PORTAL REGIONAL BVS

#1 Mh:”Lesões do Manguito Rotador” OR (Lesões do Manguito Rotador) OR (Lesões do Ligamento Glenoidal) OR (Lesões do Ligamento Glenoídeo) OR (Lesões do Ligamento Glenóideo) OR (Roturas da Coifa dos Rotadores) OR (Roturas do Ligamento Glenoidal) OR (Roturas do Ligamento Glenoídeo) OR (Roturas do Ligamento Glenóideo) OR (Roturas do Manguito Rotador) OR (Ruptura do Manguito Rotador) OR (Rupturas da Coifa dos Rotadores) OR (Rupturas do Ligamento Glenoidal) OR (Rupturas do Ligamento Glenoídeo) OR (Rupturas do Ligamento Glenóideo) OR (Rupturas do Manguito Rotador) OR (Tendinite da Coifa dos Rotadores) OR (Tendinite do Manguito Rotador) OR (Tendinose da Coifa dos Rotadores) OR (Tendinose do Manguito Rotador) OR MH:C26.761.340$ OR MH:C26.803.063$ OR MH:C26.874.400$
#2 MH:Artroscopia OR Artroscopia OR ARTHROSCOPY OR (Procedimentos Cirúrgicos Artroscópicos) OR MH:E01.370.388.250.070$ OR MH:E04.502.250.070$ OR MH:E04.555.113$
#3 (((single row) AND (double row)) OR ((Reparo fileira simples) AND (Reparo fileira dupla)) OR ((Sutura fileira simples) AND (Sutura fileira dupla)))
#4 #1 AND #2 AND #3 = 0

DOI: http://dx.doi.org/10.1590/1413-785220263401e308952

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: EARLY VERSUS LATE REPAIR FOR TRAUMATIC ROTATOR CUFF TEARS

REVISÕES E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIAS DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: REPARO PRECOCE VERSUS REPARO TARDIO DE RUPTURAS TRAUMÁTICAS DO MANGUITO ROTADOR

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ABSTRACT

Introduction: Traumatic rotator cuff tears are acute structural injuries to one or more rotator cuff tendons caused by an identifiable trauma, generally associated with the abrupt onset of pain, weakness, and shoulder dysfunction. They must be distinguished from chronic degenerative tears and from acute injuries superimposed on previously degenerated tendons. The optimal timing of surgical repair remains debated. Methods: A systematic review was conducted in PubMed, Embase, Cochrane Library, and the Virtual Health Library (VHL) up to March 2026 to evaluate whether early repair is more effective than late repair for the treatment of traumatic rotator cuff tears, with respect to clinical and functional outcomes, retear, and return to pre-injury activities. The certainty of evidence was assessed with the GRADE approach. Results: Three cohort studies were included. The definition of "early" repair is not standardized in the literature – some authors consider it up to 3 weeks and others up to 6 months – so studies defining "early" as up to 3–4 months were included, which represents a potential source of bias. Functional outcomes were similar between early and late repair, whereas early repair was associated with and a lower likelihood of requiring tendon grafting in larger tears. The certainty of evidence was very low. Conclusion: The surgeon should individually assess patient- and disease-related characteristics to make the best treatment decision. Given the risk of irreparability and longer rehabilitation, the project recommends that, after a traumatic tear, repair be performed as early as possible. ***Level of evidence II; Systematic review.***

Keywords: Rotator Cuff Tear; Trauma; Operative Time; Tendon Injuries; Shoulder.

RESUMO

Introdução: A ruptura traumática do manguito rotador consiste na lesão estrutural aguda de um ou mais tendões do manguito, ocasionada por trauma identificável, em geral associada ao início abrupto de dor, fraqueza e disfunção do ombro, devendo ser distinguida das rupturas degenerativas crônicas e das lesões agudas sobre tendões previamente degenerados. O momento ideal do reparo cirúrgico permanece controverso. Métodos: Realizou-se revisão sistemática da literatura nas bases de dados PubMed, Embase, Cochrane Library e Biblioteca Virtual em Saúde (BVS) até março de 2026, para avaliar se o reparo precoce é mais efetivo do que o reparo tardio no tratamento das lesões traumáticas do manguito rotador, em relação aos desfechos clínico-funcionais, rerruptura e retorno às atividades pré-lesão. A certeza da evidência foi avaliada pela abordagem GRADE. Resultados: Foram incluídos três estudos de coorte. O termo "precoce" não está padronizado na literatura – alguns autores consideram até 3 semanas e outros até 6 meses – de modo que foram incluídos estudos que definiram "precoce" como até 3 a 4 meses, o que representa potencial fonte de viés. Os desfechos funcionais foram semelhantes entre reparo precoce e tardio, enquanto o reparo precoce associou-se a recuperação mais rápida e menor necessidade de enxertia tendínea nas lesões maiores. A certeza da evidência foi muito baixa. Conclusão: O cirurgião deve avaliar, de maneira individualizada, as características do paciente e da enfermidade para a tomada da melhor decisão de tratamento. Devido ao risco de irreparabilidade e ao maior tempo de reabilitação, este projeto recomenda que, após uma ruptura traumática, o reparo seja realizado o mais brevemente possível. ***Nível de evidência II; Revisão sistemática.***

Descritores: *Ruptura do Manguito Rotador; Trauma; Duração da Cirurgia; Traumatismos dos Tendões; Ombro.*

Citation: Lara PHS, Belangero PS, Schiefer M, Zanesco L, Fernandes MR, Murachovsky J, Medeiros Filho JF, Malavolta EA. Evidence-Based Reviews & Recommendations from the Brazilian Society of Shoulder and Elbow Surgery: Early versus Late Repair for Traumatic Rotator Cuff Tears. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 4. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

The study was conducted at Hospital das Clinicas da Faculdade de Medicina da Universidade de Sao Paulo, Sao Paulo, SP, Brazil.
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Article received on 05/21/2026 approved on 06/07/2026.
Handling Editor: Jorge Henrique Assunção

INTRODUCTION

Traumatic rotator cuff tear is an acute structural injury to one or more rotator cuff tendons, caused by an identifiable trauma and generally associated with the abrupt onset of pain, weakness, and shoulder dysfunction. It should be distinguished from chronic degenerative tears and from acute injuries superimposed on previously degenerated tendons.[1-3]

Treatment may be conservative or surgical. Surgical treatment is generally indicated for complete tears, for symptomatic and functionally disabling lesions, and for potentially repairable tears.[4-5]

Currently, the most commonly used surgical treatment is arthroscopic repair with suture anchors; however, the repair may also be performed through open or combined (open and arthroscopic) approaches.[6-7]

There is considerable controversy regarding the "ideal timing" for surgery. Many surgeons argue that early surgery (before 3 months after injury) offers advantages such as less tendon retraction, a better chance of anatomical reduction, less progression of fatty degeneration, and lower surgical complexity. Surgeons who favor delayed surgery (3 months or more after injury) argue that this interval allows assessment of whether surgery is truly necessary and whether conservative treatment has succeeded, and they report that the functional outcome of late surgery is comparable to that of early surgery.[6,7]

Accordingly, this consensus was developed to evaluate whether early repair is more effective than late repair for the treatment of traumatic rotator cuff tears, with respect to clinical-functional outcomes, re-tear, and return to pre-injury activities.

This study was conducted at the initiative of the Brazilian Society of Shoulder and Elbow Surgery with the participation of Cochrane Brazil.

Research Question

Is early repair more effective than late repair for the treatment of traumatic rotator cuff tears?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and the Virtual Health Library (VHL).
- Descriptors: As described in Appendix 1.
- Search period: Until March 2026.
- Study selection: Updated systematic reviews (SRs) with adequate methodological quality were prioritized. In the absence of suitable SRs, randomized controlled trials (RCTs) and observational studies were considered.

RESULTS

The search retrieved 74 references (27 in PubMed, 17 in Embase, 30 in the Cochrane Library, and 0 in the Regional Portal BVS). After the initial assessment, 43 duplicate records were removed. Following abstract screening, 26 studies were excluded, leaving five studies for full-text evaluation. Two systematic reviews on the topic were assessed but not included (Figure 1).

Pinto et al.,[8] in a systematic review, included 20 studies (cohort studies, case reports, case series, and prospective and retrospective studies) and reported that the literature is heterogeneous and that the existing evidence is low, being based on low-quality clinical and observational studies. This review was not included in the present consensus because the authors pooled several different study types.

Baur et al.,[9] in a very low-quality systematic review, included 13 studies and 871 participants (retrospective and prospective studies, cohorts, case series, and case reports) and performed a meta-analysis combining markedly heterogeneous designs. The authors concluded that early repair is associated with a lower re-tear rate and better functional outcomes. This review was also not included, for the same reason.

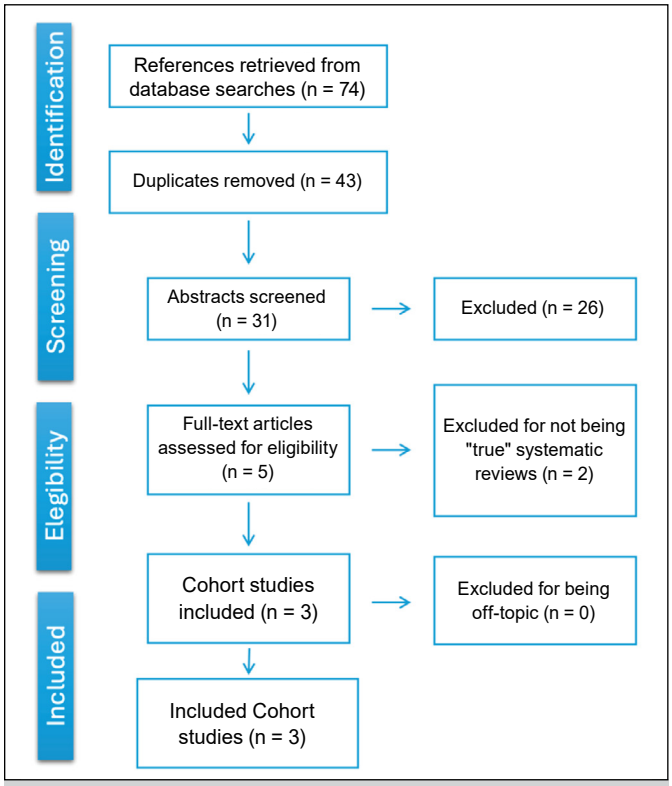

Figure 1. Flow diagram of the literature search.

Included studies

Three cohort studies were ultimately included. It should be noted that the term "early" is not fully defined in the literature: some authors consider it up to 3 weeks and others up to 6 months.[7,10,11] To avoid omitting the scarce available evidence, studies defining "early" as up to 3 to 4 months were included, which is acknowledged as a source of bias in this consensus.

Patel et al.,[7] in a retrospective cohort study, evaluated 40 patients to determine whether the time to surgery influenced outcomes in symptomatic traumatic rotator cuff tears. Patients were divided into an early-repair group (surgery within 4 months of injury) and a late-repair group (surgery after 4 months). The outcomes analyzed were functional scores (Oxford Shoulder Score, Constant Score, and EQ-5D), time to full recovery, re-tear rate, and the need for interpositional grafting when the tendon could not be directly repaired. There was no significant difference in functional outcomes between groups; however, the late-repair group had a longer recovery time (early: approximately 14 months; late: approximately 33.8 months). For tears ≥ 3 cm, interpositional grafting was required in 44% of cases in the late group and in none in the early group. Only one symptomatic re-tear occurred in the series, in the early group.

The authors concluded that early repair was associated with faster recovery and a lower need for grafting in larger tears, although no difference in final functional scores between early and late repair was observed at intermediate follow-up.[7]

Zhaeentan et al.,[10] in a prospective cohort study, evaluated 75 shoulders from 58 male patients operated on for traumatic rotator cuff tears between 1999 and 2011. The authors compared open repair performed early (< 3 months after injury; 39 shoulders) versus late (> 3 months after injury; 36 shoulders). The mean follow-up was 56 months, and the mean time from injury to repair was 16 weeks (range 3 to 104 weeks). The outcomes evaluated were the Western Ontario Rotator Cuff Index (WORC), the Oxford Shoulder Score,

the Constant Score, the EQ-5D, patient satisfaction, repair integrity on MRI, re-tear, muscle atrophy, fatty infiltration, and osteoarthritis. No significant difference was found between groups in any of the main scores. The re-tear rate was 24%, with 9 cases in each group. The authors concluded that surgical treatment of symptomatic traumatic rotator cuff tears, even when performed more than 3 months after injury, can provide good functional results and high satisfaction, provided that the tendon remains technically repairable.[10]

Petersen et al.[11], in a prospective cohort study, evaluated 36 patients with traumatic rotator cuff tears, with a minimum follow-up of 9 months (mean 31 months; range 9 to 71 months). The outcomes assessed were the UCLA End-Result and ASES functional scores, the time between injury and repair, lesion size, preoperative fatty infiltration, patient satisfaction, and pain improvement. The time to repair was categorized as 0–2 months, 2–4 months, and more than 4 months. Pain scores improved from 7 to 1.4 ($P < 0.01$) and active elevation from 55° to 133° ($P < 0.01$); UCLA and ASES scores improved from 8 to 26 and from 30 to 79, respectively ($P < 0.01$). All but 2 of the 36 patients were satisfied with the outcome. Preoperative fatty atrophy did not correlate with postoperative function, and tear size did not influence the outcome when repair was performed before 4 months.

Petersen et al. concluded that surgical repair of traumatic rotator cuff tears with associated weakness provided substantial improvement in pain and function, without apparent compromise of results when performed up to 4 months after injury; however, massive tears repaired after this period showed worse outcomes, suggesting greater sensitivity of these lesions to surgical delay.[11]

The general characteristics of the included studies and the certainty of evidence according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach are presented in Tables 1 and 2, respectively.[12,13]

Table 1. Characteristics of the included studies.

Included study	Study design	Sample size	Definition of early vs late repair / follow-up
Patel V. et al.[7]	Retrospective cohort	40 patients	Early < 4 months vs late > 4 months; intermediate follow-up
Zhaeentan S. et al.[10]	Prospective cohort	75 shoulders (58 patients)	Early < 3 months (39) vs late > 3 months (36); mean follow-up 56 months
Petersen S.A. et al.[11]	Prospective cohort	36 patients	Timing 0–2, 2–4, and > 4 months; minimum follow-up 9 months (mean 31)

Follow-up and timing thresholds as reported by each study.

Table 2. Quality of evidence (GRADE): early versus late repair.

Outcome	Studies	Certainty of evidence
Clinical-functional outcomes	3 cohort studies	Very low[1,2,3]
Re-tear	2 cohort studies	Very low[1,2,3]
Recovery time / return to pre-injury activities	2 cohort studies	Very low[1,2,3]

1: Risk of bias (observational design; non-standardized definition of "early" repair); 2: Imprecision; 3: Small sample sizes. A total of 134 patients (151 shoulders) across the three included cohort studies. Note: GRADE (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to assess and grade the certainty of evidence, based on five domains: risk of bias, imprecision, inconsistency, indirectness, and publication bias. The certainty of evidence is classified as very low, low, moderate, or high.

Study Limitations

Future research should prioritize randomized, multicenter clinical trials with rigorous methodology and a standardized definition of "early" repair. Studies with this design are essential to more precisely define the long-term clinical and functional outcomes associated with each strategy, since no studies with high methodological rigor on this topic were identified.

Recommendation

Regarding rehabilitation time and the risk of irreparability, there is evidence that early repair (within 3 months of injury) of the rotator cuff is more effective than late repair (after 3 months) for the treatment of traumatic rotator cuff tears.

Therefore, the Brazilian Society of Shoulder and Elbow Surgery (SBCOC) Consensus Project recommends that the surgeon individually assess patient- and disease-related characteristics to reach the best treatment decision. Given the risk of irreparability and longer rehabilitation, this project recommends that, after a traumatic tear, repair be performed as early as possible.

CONCLUSION

Regarding rehabilitation time and the risk of irreparability, there is evidence that early repair (within 3 months of injury) of the rotator cuff is more effective than late repair (after 3 months) for the treatment of traumatic rotator cuff tears.

CONTRIBUTIONS OF THE AUTHORS

Each author made substantial individual contributions to the development of this article. PHSL: writing and review; PSB: conceptualization and review; MS: conceptualization and review; LZ: conceptualization and review; MRF: conceptualization and review; JM: writing and review; JFMF: conceptualization and review; EAM: conceptualization and review.

DATA AVAILABILITY DECLARATION

The contents underlying the research are available in the manuscript.

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Appendix 1. Database search strategy.

PUBMED

#1 "Rotator Cuff Injuries"[Mesh] OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral)
#2 (Early Rotator Cuff Repair) OR (Early Repair)
#3 (Delayed Rotator Cuff Repair) OR 3 (Delayed Repair)
#4 #1 AND #2 AND #3

COCHRANE LIBRARY

#1 (Rotator Cuff Injuries) OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral)
#2 (Early Rotator Cuff Repair) OR (Early Repair)
#3 (Delayed Rotator Cuff Repair) OR 3 (Delayed Repair)
#4 #1 AND #2 AND #3

EMBASE

#1 'rotator cuff injury'/exp OR 'cuff injury' OR 'cuff lesion' OR 'rotator cuff disease' OR 'rotator cuff disorder' OR 'rotator cuff disorders' OR 'rotator cuff injuries' OR 'rotator cuff injury' OR 'rotator cuff lesion' OR 'rotator cuff lesions' OR 'rotator cuff pathology' OR 'rotator cuff tendinopathies' OR 'rotator cuff tendinopathy' OR 'shoulder rotator cuff degeneration' OR 'shoulder rotator cuff lesion'
#2 (Early Rotator Cuff Repair) OR (Early Repair)
#3 (Delayed Rotator Cuff Repair) OR 3 (Delayed Repair)
#4 #1 AND #2 AND #3

REGIONAL PORTAL (BVS)

#1 Mh:"Lesões do Manguito Rotador" OR (Lesões do Manguito Rotador) OR (Lesões do Ligamento Glenoidal) OR (Lesões do Ligamento Glenoídeo) OR (Lesões do Ligamento Glenóideo) OR (Roturas da Coifa dos Rotadores) OR (Roturas do Ligamento Glenoidal) OR (Roturas do Ligamento Glenoídeo) OR (Roturas do Ligamento Glenóideo) OR (Roturas do Manguito Rotador) OR (Ruptura do Manguito Rotador) OR (Rupturas da Coifa dos Rotadores) OR (Rupturas do Ligamento Glenoidal) OR (Rupturas do Ligamento Glenoídeo) OR (Rupturas do Ligamento Glenóideo) OR (Rupturas do Manguito Rotador) OR (Tendinite da Coifa dos Rotadores) OR (Tendinite do Manguito Rotador) OR (Tendinose da Coifa dos Rotadores) OR (Tendinose do Manguito Rotador) OR MH:C26.761.340$ OR MH:C26.803.063$ OR MH:C26.874.400$
#2 (Early Rotator Cuff Repair) OR (Reparo Precoce) OR (Reparación Precoz)
#3 (Delayed Rotator Cuff Repair) OR (Reparo Tardio) OR (Reparación Tardía)
#4 #1 AND #2 AND #3

DOI: http://dx.doi.org/10.1590/1413-785220263401e303257

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: HYALURONIC ACID INFILTRATION FOR ELBOW EPICONDYLITIS IN ADULTS

REVISÕES BASEADAS EM EVIDÊNCIAS E RECOMENDAÇÕES DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: INFILTRAÇÃO DE ÁCIDO HIALURÔNICO NA EPICONDILITE DO COTOVELO EM ADULTOS

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ABSTRACT

Introduction: Elbow epicondylitis is a common tendinopathy in adults, and infiltration is frequently used when initial conservative treatment fails. Hyaluronic acid and corticosteroids are among the most widely used injectable agents, but their comparative effectiveness remains uncertain. Methods: We performed an evidence-based review of randomized controlled trials and systematic reviews comparing hyaluronic acid with corticosteroid injections for adult elbow epicondylitis. PubMed, Embase, the Cochrane Library, and BVS were searched through August 2025. Main outcomes were pain and elbow function; risk of bias and certainty of evidence were assessed using Cochrane and GRADE approaches. Results: Of 94 records, three studies met the eligibility criteria (one systematic review and two randomized trials), all focused on lateral epicondylitis. Very low-quality evidence suggests that hyaluronic acid provides greater improvement in pain and function than corticosteroids from 8 weeks to 6 months in acute cases, whereas in chronic lateral epicondylitis, corticosteroid injections appear more effective than hyaluronic acid for pain relief and functional recovery up to 6 weeks. Conclusions: Current evidence, though very limited and at high risk of bias, supports preferential use of corticosteroids for short-term symptom control and hyaluronic acid for medium- to long-term pain and functional improvement in adult lateral epicondylitis. ***Level of evidence II; Systematic review.***

Keywords: Lateral Epicondylitis; Tennis Elbow; Hyaluronic Acid; Corticosteroid; Injections; Elbow.

RESUMO

Introdução: A epicondilite do cotovelo é uma tendinopatia frequente em adultos, e infiltrações são frequentemente utilizadas quando o tratamento conservador inicial falha. Ácido hialurônico e corticosteroides estão entre os agentes injetáveis mais utilizados, porém sua efetividade comparativa permanece incerta. Métodos: Foi realizada uma revisão baseada em evidências de ensaios clínicos randomizados e revisões sistemáticas que compararam infiltrações de ácido hialurônico com corticosteroides em adultos com epicondilite do cotovelo. As bases de dados PubMed, Embase, Cochrane Library e BVS foram pesquisadas até agosto de 2025. Os principais desfechos foram a dor e a função do cotovelo; o risco de viés e a certeza da evidência foram avaliados segundo a metodologia Cochrane e a abordagem GRADE. Resultados: Dos 94 registros, três estudos preencheram os critérios de elegibilidade (uma revisão sistemática e dois ensaios randomizados), todos focados em epicondilite lateral. Evidência de qualidade muito baixa sugere que o ácido hialurônico proporciona maior melhora da dor e da função do que os corticosteroides entre 8 semanas e 6 meses em casos agudos, enquanto, na epicondilite lateral crônica, as infiltrações com corticosteroides parecem mais eficazes do que o ácido hialurônico para alívio da dor e recuperação funcional até 6 semanas. Conclusão: A evidência disponível, embora muito limitada e com alto risco de viés, apoia o uso preferencial de corticosteroides para controle sintomático em curto prazo e do ácido hialurônico para melhora da dor e da função em médio e longo prazos na epicondilite lateral em adultos. ***Nível de Evidência II; Revisão sistemática.***

Descritores: *Epicondilite Lateral; Cotovelo de Tenista; Ácido Hialurônico; Corticosteroide; Injeções; Cotovelo.*

Citation: Pinto GMR, Zanesco L, Amaral MVG, Matsunaga FT, Bonadiman JA, Medeiros Filho JF, Campos MCO, Malavolta EA. Evidence-based reviews & recommendations from the brazilian society of shoulder and elbow surgery: hyaluronic acid infiltration for elbow epicondylitis in adults. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 5. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 11/28/2025 approved on 05/06/2026.
Handling Editor: Marco Demange

RECOMMENDATION

There is evidence, although of very low quality, that hyaluronic acid infiltration is more effective than corticosteroid infiltration for the treatment of acute lateral epicondylitis of the elbow in adults regarding pain and functional outcomes between 8 weeks and 6 months after infiltration (Level of Evidence I–II).

There is also evidence, although of very low quality, that corticosteroid infiltration is more effective than hyaluronic acid infiltration for the treatment of chronic lateral epicondylitis of the elbow in adults, regarding pain and function up to 6 weeks after infiltration (Level of Evidence I–II). However, studies with greater methodological precision are still needed to clarify this issue.

The SBCOC Consensus Project recommends that, when conventional conservative treatment for epicondylitis fails, hyaluronic acid infiltration may be performed to improve pain and function in the medium and long term, while corticosteroids should be used to improve these outcomes in the short term, in cases of acute pain. Additionally, attention should be given to local and systemic complications associated with corticosteroid use, which represent a disadvantage compared to hyaluronic acid.

INTRODUCTION

Elbow epicondylitis is a degenerative inflammatory disorder caused by repetitive overload (microtrauma) of the tendons originating from the medial and lateral epicondyles of the humerus, leading to collagen degeneration, neovascularization, and pain. It is divided into lateral epicondylitis (tennis elbow), which mainly affects the extensor carpi radialis brevis tendon and is the most common type; and medial epicondylitis (golfer's elbow), which affects the origin of the wrist flexor tendons. The estimated annual incidence is 5 to 7 cases per 1000 people.[1-3]

Conservative treatment is effective in most cases. Among therapeutic options are physical therapy, analgesic and anti-inflammatory medications, activity modification, immobilization, acupuncture, stretching, shock wave therapy, and infiltrations.[3-6]

By all of the available infiltration options, corticosteroids and hyaluronic acid are the most commonly used. Corticosteroid infiltration has a theoretical anti-inflammatory and analgesic effect, improving pain and function in the short term (up to 8 weeks); however, these effects are not maintained in the medium and long term (beyond 3–6 months). The main complications of corticosteroid use are post-infiltration pain, skin atrophy, tendon degeneration, risk of tendon rupture, and systemic complications.[6-9]

Hyaluronic acid infiltration, in theory, improves local viscoelasticity, and also has analgesic and tissue repair stimulation effects. Literature reports demonstrate improvement in pain and function in the short and medium term (up to 12 months), even showing superiority over corticosteroids in some studies. Potential complications include infection, foreign body reaction, and allergy. On the other hand, it reduces the need for repeated infiltrations and has fewer local adverse effects compared to corticosteroids, and no known systemic reactions.[7,9-11]

For these reasons, hyaluronic acid infiltration is increasingly used by physicians in the treatment of epicondylitis. The present consensus aims to review current literature to assess whether hyaluronic acid infiltration is more effective than corticosteroid infiltration in terms of pain and functional outcomes.[10-15]

This evidence review was developed within a collaborative initiative between Cochrane and the Brazilian Society of Shoulder and Elbow Surgery (SBCOC). The aim of this partnership is to synthesize the best available evidence using rigorous, transparent methods and to translate it into clear, practical recommendations for clinical practice.

Research Question

Is hyaluronic acid infiltration more effective than corticosteroid infiltration for the treatment of elbow epicondylitis in adults?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and BVS.
- Descriptors: As described in Appendix 1.
- Search period: Until August 2025.
- Included studies: according to the highest level of evidence, prioritizing systematic reviews (SRs) with high methodological quality and recency. In the absence of SRs, randomized controlled trials (RCTs) were included, followed by observational studies and, lastly, case series.

RESULTS

The search found 94 references (33 PubMed, 23 Embase, 34 Cochrane Library, 4 BVS). Nine full-text articles were selected for evaluation, of which three were excluded for not including both comparisons.[18-20] Three others[21-23] were excluded for not being RCTs or SRs, leaving three studies included in this review.[6,14,15] (Figure 1).

Included studies

In a systematic review, Krogh et al. (2012) analyzed the effectiveness of infiltrations in lateral elbow epicondylitis regarding pain outcomes and adverse effects. A total of 1381 participants (17 RCTs) were included, evaluating injections of corticosteroids, botulinum toxin, platelet-rich plasma, autologous blood, hyaluronic acid, prolotherapy, polidocanol, glycosaminoglycan polysulfate, and placebo. In an indirect meta-analysis, corticosteroids (8 trials; 464 participants) were not more effective than placebo in pain reduction after 8 weeks (SMD -0.04; 95% CI -0.45 to 0.35). Hyaluronic acid

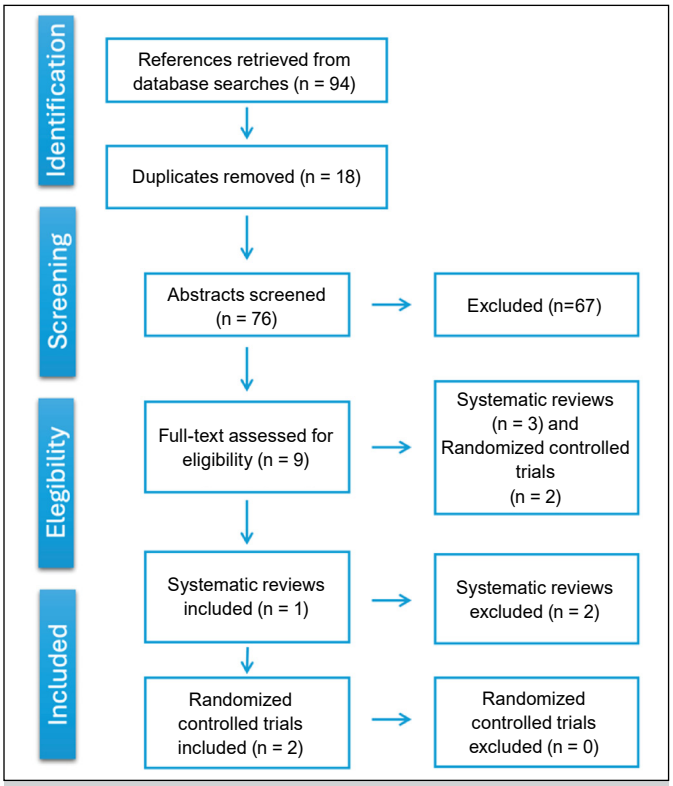

Figure 1. Flow diagram of the literature search.

was assessed in one study (331 participants) and was considered more effective than placebo (SMD -5.58; 95% CI -6.35 to -4.82) after 8 weeks for pain. The authors noted that most studies had high risk of bias thereby the results should be interpreted cautiously, and also the outcomes were not evaluated before 8 weeks[6].

Tosun et al. (2015) conducted an RCT (57 participants) comparing a single infiltration with hyaluronic acid with chondroitin sulfate (25 participants) versus a single corticosteroid infiltration (32 participants). The study concluded that hyaluronic acid with chondroitin sulfate infiltration was more effective (clinically and statistically) regarding functional outcomes at 3 and 6 months after the injection, and for pain at 6 months. The main limitations were small sample size, lack of control group, short follow-up, and absence of cost-effectiveness analysis[14].

Yalcin et al. (2022) conducted an RCT with 80 participants with chronic lateral epicondylitis, in which 40 participants received hyaluronic acid infiltration and 40 received triamcinolone infiltration—assessed at 6 and 12 weeks after the procedure. Outcomes included pain and function according to the Q-DASH questionnaire, visual analog scale (VAS), and handgrip strength measured by dynamometry. The authors concluded that hyaluronic acid did not demonstrate superiority over the corticosteroids, and corticosteroid infiltration was more effective for pain control and function recovery at 6 weeks in chronic cases[15].

The general characteristics of the evaluated studies and the quality of evidence according to the GRADE system[16,17] are presented in Tables 1 and 2, respectively.

Table 1. Characteristics of the included studies.

Included papers	Methods	Included papers characteristics	Sample size	Protocol previous published
Krogh et al. (2012)	Systematic Review	17 (RCT) 8 with corticosteroid 1 with hyaluronic acid	1381	No
Tosun et al. (2015)	Randomized clinical trial	--	57	No
Yalcin et al. (2022)	Randomized clinical trial	- -	80	No

Table 2. Quality of evidence of the included studies (GRADE).

Outcome	Number of studies	Quality of evidence
Pain	3 studies	Very low[1,2,3,4]
Elbow function (different scores)	2 studies	Very low[1,2,3,4]

1: Limited sample size; 2: Imprecision (Large CI) 3: Risk of bias of the included study 4. No previous protocol. Note: GRADE (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to evaluate and measure the quality of evidence. It is based in 5 pillars: risk of bias, imprecision, inconsistency, direct evaluation of the outcome and publication bias. Being so the quality if evidence is classified in very low, low, moderate and high quality[16,17].

CONCLUSION

There is very low-quality evidence showing that hyaluronic acid infiltration is more effective than corticosteroid infiltration for treating acute elbow epicondylitis in adults, regarding pain and function up to 6 months. There is very low-quality evidence showing that corticosteroid infiltration is more effective than hyaluronic acid infiltration for treating elbow epicondylitis in adults, regarding pain and function up to 6 weeks. In summary, corticosteroid use appears more effective for early outcomes (up to 6 weeks), while hyaluronic acid demonstrates greater effectiveness for pain and function after 8 weeks.

CONTRIBUTIONS OF THE AUTHORS

Each author contributed individually and significantly to the development of this article. GMRP: study conception and design, data acquisition, data analysis and interpretation, and manuscript drafting; LZ: data acquisition, data analysis and interpretation, and manuscript drafting and revision; MVGA: data acquisition and critical revision of the intellectual content; FTM: data acquisition and critical revision of the intellectual content; JAB: data acquisition and critical revision of the intellectual content; JFMF: data acquisition and critical revision of the intellectual content; MCOC: study conception and design, critical revision of the intellectual content, and final approval of the version to be published; EAM: study conception and design, critical revision of the intellectual content, and final approval of the version to be published. All authors approved the final version of the manuscript to be published.

DATA AVAILABILITY DECLARATION

The data underlying the research text are contained in the manuscript.

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Appendix 1. Database search strategies.

PUBMED

#1 "Tennis Elbow"[Mesh] OR (Elbow, Tennis) OR (Tennis Elbows) OR (Lateral Epicondylitis) OR (Epicondylitides, Lateral) OR (Epicondylitis, Lateral) OR (Lateral Epicondylitides) OR (Epicondylitis, Lateral Humeral) OR (Epicondylitides, Lateral Humeral) OR (Humeral Epicondylitides, Lateral) OR (Humeral Epicondylitis, Lateral) OR (Lateral Humeral Epicondylitides) OR (Lateral Humeral Epicondylitis) OR "Elbow Tendinopathy"[Mesh] OR (Elbow Tendinopathies) OR (Tendinopathies, Elbow) OR (Tendinopathy, Elbow) OR (Medial Epicondylitis) OR (Epicondylitis, Medial) OR (Medial Epicondylitides) OR (Golfer's Elbow) OR (Golfers Elbow)
#2 "Injections, Intra-Articular"[Mesh] OR (Injection, Intra-Articular) OR (Intra-Articular Injection) OR (Intra Articular Injection) OR (Articular Injection, Intra) OR (Articular Injections, Intra) OR (Injection, Intra Articular) OR (Injections, Intra Articular) OR (Intra Articular Injections) OR (Intraarticular Injection) OR (Injection, Intraarticular)
#3 "Hyaluronic Acid"[Mesh] OR (Acid, Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) OR (Sodium Hyaluronate) OR (Hyaluronate, Sodium) OR (Hyaluronate Sodium) OR (Healon) OR (Etamucine) OR (Amo Vitrax) OR (Vitrax, Amo) OR (Biolon)
#4 "Adrenal Cortex Hormones"[Mesh] OR (Hormones, Adrenal Cortex) OR (Corticoid) OR (Adrenal Cortex Hormone) OR (Cortex Hormone, Adrenal) OR (Hormone, Adrenal Cortex) OR (Corticosteroid) OR (Corticoids) OR (Corticosteroids)
#5 #3 OR #4
#6 #1 AND #2 AND #5
Filters applied: Randomized Controlled Trial, Systematic Review = 33

COCHRANE

#1 (Tennis Elbow) OR (Elbow, Tennis) OR (Tennis Elbows) OR (Lateral Epicondylitis) OR (Epicondylitides, Lateral) OR (Epicondylitis, Lateral) OR (Lateral Epicondylitides) OR (Epicondylitis, Lateral Humeral) OR (Epicondylitides, Lateral Humeral) OR (Humeral Epicondylitides, Lateral) OR (Humeral Epicondylitis, Lateral) OR (Lateral Humeral Epicondylitides) OR (Lateral Humeral Epicondylitis) OR (Elbow Tendinopathy) OR (Elbow Tendinopathies) OR (Tendinopathies, Elbow) OR (Tendinopathy, Elbow) OR (Medial Epicondylitis) OR (Epicondylitis, Medial) OR (Medial Epicondylitides) OR (Golfer's Elbow) OR (Golfers Elbow).
#2 (Injections, Intra-Articular) OR (Injeção Intra-Articular) OR (Injeção Intra-Articular) OR (Injeção Intra-Articular) OR (Injeção Articular, Intra) OR (Injeções Articulares, Intra) OR (Injeção Intra-Articular) OR (Injeções Intra-Articulares) OR (Injeções Intra-Articulares) OR (Injeção intra-articular) OR (Injeção Intra-articular) OR (Injeções Intra-Articulares) OR (Injeções Intra-articulares) OR (Injeções intra-articulares).
#3 (Hyaluronic Acid) OR (Acid, Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) OR (Sodium Hyaluronate) OR (Hyaluronate, Sodium) OR (Hyaluronate Sodium) OR (Healon) OR (Etamucine) OR (Amo Vitrax) OR (Vitrax, Amo) OR (Biolon).
#4 (Adrenal Cortex Hormones) OR (Hormones, Adrenal Cortex) OR (Corticoid) OR (Adrenal Cortex Hormone) OR (Cortex Hormone, Adrenal) OR (Hormone, Adrenal Cortex) OR (Corticosteroid) OR (Corticoids) OR (Corticosteroids).
#5 #3 OR #4.
#6 #1 AND #2 AND #5 = 34

EMBASE

#1 'tennis elbow'/exp OR 'bursitis, radiohumeral' OR 'elbow, tennis' OR 'epicondylatgia humeri' OR 'epicondylitis humeri' OR 'epicondylitis lateralis' OR 'epicondylitis, external humeral' OR 'epicondylitis, radiohumeral' OR 'epycondylitis humeri' OR 'external humeral epicondylitis' OR 'humeral epicondylitis' OR 'humerus epicondylitis' OR 'lateral elbow tendinopathy' OR 'lateral elbow tendinosis' OR 'lateral elbow tendonopathy' OR 'lateral epicondylitis' OR 'lateral humeral epicondylitis' OR 'radiohumeral bursitis' OR 'radiohumeral epicondylitis' OR 'tennis arm' OR 'tennis elbow' OR 'medial epicondylitis'/exp OR 'epicondylitis medialis' OR 'golfer arm' OR 'golfer elbow' OR 'medial elbow tendinopathy' OR 'medial elbow tendinosis' OR 'medial epicondylitis' OR 'medial humeral epicondylitis'.
#2 'intraarticular drug administration'/exp OR 'drug administration, intraarticular' OR 'injection, intraarticular' OR 'injections, intra-articular' OR 'intra-articular administration' OR 'intra-articular delivery' OR 'intra-articular drug administration' OR 'intra-articular drug delivery' OR 'intra-articular infusion' OR 'intra-articular injection' OR 'intra-articular injections' OR 'intra-articular medication' OR 'intra-articular treatment' OR 'intraarticular administration' OR 'intraarticular delivery' OR 'intraarticular drug administration' OR 'intraarticular infusion' OR 'intraarticular injection' OR 'intraarticular medication' OR 'intraarticular treatment' OR 'intracoxal drug administration' OR 'joint infusion' OR 'joint injection' OR 'treatment, intraarticular'.
#3 'hyaluronic acid'/exp OR 'adant' OR 'adant dispo' OR 'amo vitrax' OR 'amvisc' OR 'amvisc plus' OR 'arthrease' OR 'artz' OR 'biolon' OR 'bionect' OR 'clearvisc' OR 'duovisc' OR 'durolane' OR 'eyecon' OR 'go-on (drug)' OR 'halonix' OR 'healon' OR 'healon gv' OR 'healon yellow' OR 'healon5' OR 'healonid' OR 'hialid' OR 'hyalcon' OR 'hyalein' OR 'hyalgal' OR 'hyalgan' OR 'hyalovet' OR 'hyalubrix' OR 'hyaluronan' OR 'hyaluronate' OR 'hyaluronate sodium' OR 'hyaluronic acid' OR 'hyaluronic acid component' OR 'hyladerm' OR 'hylaform' OR 'hylan g f 20' OR 'hylan g-f 20' OR 'hylartin v' OR 'hylo-comod' OR 'hylumed' OR 'hyruan' OR 'ialugen' OR 'juvederm' OR 'lagricel ofteno' OR 'laservis' OR 'me 3710' OR 'monovisc' OR 'na hylan' OR 'na-hylan' OR 'nrd 101' OR 'nrd101' OR 'ophthalin' OR 'ophthalin plus' OR 'orthovisc' OR 'ostenil' OR 'perlane' OR 'potassium hyaluronate' OR 'provisc' OR 'radiaplexrx'. OR 'restylane' OR 'restylane lyft' OR 'si 4402' OR 'sinovial' OR 'sl 1010' OR 'sodium hyaluronate' OR 'sperm select' OR 'supartz' OR 'suplasyn' OR 'synocrom' OR 'synojoynt' OR 'synvisc' OR 'teosyal' OR 'triluron' OR 'unihylon' OR 'viscoseal' OR 'vismed' OR 'vitrax'.
#4 'corticosteroid'/exp OR 'adrenal cortex hormone' OR 'adrenal cortex hormones' OR 'adrenal cortical hormone' OR 'adrenal cortical hormones' OR 'adrenal cortical steroid' OR 'adrenal steroid' OR 'adrenal steroid hormone' OR 'adreno cortical steroid' OR 'adreno corticosteroid' OR 'adrenocortical hormone' OR 'adrenocortical steroid' OR 'adrenocorticosteroid' OR 'cortical steroid' OR 'cortico steroid' OR 'corticoid' OR 'corticosteroid' OR 'corticosteroid agent' OR 'corticosteroid calcium' OR 'corticosteroid hormone' OR 'corticosteroids' OR 'corticosteroids, inhalation' OR 'corticosteroids, ophthalmic' OR 'corticosteroids, otic' OR 'corticosteroids, systemic' OR 'corticosteroids, topical' OR 'dermocorticosteroid' OR 'fluorinated corticosteroid'.
#5 #3 OR #4.
#6 #1 AND #2 AND #5 = #6 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) = 23

<< SUMÁRIO

PORTAL REGIONAL BVS

#1 MH:"Cotovelo de Tenista" OR (Tennis Elbow) OR (Epicondilite Lateral) OR (Epicondilite Lateral do Úmero) OR MH:C05.651.869.435.500$ OR MH:C26.088.134.750$ OR MH:C26.874.800.500.500$ OR MH:»Tendinopatia do Cotovelo» OR (Elbow Tendinopathy) OR (Cotovelo de Golfista) OR (Epicondilite Medial) OR MH:C05.651.869.435$ OR MH:C26.088.134.625$ OR MH:C26.874.800.500$
#2 MH:"Injeções Intra-Articulares" OR (Injections, Intra-Articular) OR (Injeção Intra-Articular) OR MH:E02.319.267.530.380$
#3 MH:"Ácido Hialurônico" OR (Hyaluronic Acid) OR (Hialuronan) OR MH:D09.698.373.475$
#4 MH:"Corticosteroides" OR (Adrenal Cortex Hormones) OR (Corticoesteroides) OR (corticoide) OR (corticoides) OR (Corticosteroide) OR (Hormônio Adrenocortical) OR (Hormônio Córtico-Adrenal) OR (Hormônio do Córtex Ad-Renal) OR (Hormônio do Córtex Adrenal) OR (Hormônio do Córtex das Ad-Renais) OR (Hormônio do Córtex das Glândulas Ad-Renais) OR (Hormônio do Córtex das Glândulas Suprarrenais) OR (Hormônios Adrenocorticais) OR (Hormônios Córtico-Adrenais) OR (Hormônios do Córtex Ad-Renal) OR (Hormônios do Córtex Suprarrenal) OR (Hormônios do Córtex das Ad-Renais) OR (Hormônios do Córtex das Glândulas Ad-Renais) OR (Hormônios do Córtex das Glândulas Suprarrenais) OR (Hormônios do Córtex das Suprarrenais) OR MH:D06.472.040$
#5 #3 OR #4
#6 #1 AND #2 AND #5 = 4

DOI: http://dx.doi.org/10.1590/1413-785220263401e308948

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: HYALURONIC ACID INJECTION VERSUS PHYSIOTHERAPY FOR ROTATOR CUFF TENDINOPATHY IN ADULTS

REVISÕES E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIAS DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: INFILTRAÇÃO COM ÁCIDO HIALURÔNICO VERSUS FISIOTERAPIA PARA TENDINOPATIA DO MANGUITO ROTADOR EM ADULTOS

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ABSTRACT

Introduction: Rotator cuff tendinopathy is a common cause of shoulder pain and disability, and the optimal nonoperative strategy remains debated. Physiotherapy is the mainstay of initial management, whereas hyaluronic acid injection has been proposed as an alternative or adjunct; their comparative effectiveness is uncertain. Methods: An evidence-based systematic review was conducted in PubMed, Embase, Cochrane Library, and the Regional Portal of the Virtual Health Library (BVS) up to February 2026. Randomized controlled trials comparing hyaluronic acid injection with physiotherapy in adults with rotator cuff tendinopathy were included. Outcomes were pain, function, range of motion, and quality of life. Certainty of evidence was assessed with the GRADE approach. Results: Two randomized controlled trials (130 participants) met the eligibility criteria. Hyaluronic acid injection was associated with greater short-term improvement in pain, range of motion, and quality of life than physiotherapy, particularly within the first three months. Functional outcomes were inconsistent: one trial reported comparable improvement between groups, whereas the other favored hyaluronic acid. Certainty of evidence was very low because of small sample sizes, risk of bias, and imprecision. Conclusion: Very low-quality evidence suggests that hyaluronic acid injection may provide superior short-term benefits over physiotherapy for rotator cuff tendinopathy, mainly up to three months. The available evidence remains limited and at high risk of bias; further high-quality studies are required. ***Level of evidence II; Systematic review.***

Keywords: Rotator Cuff Tendinopathy; Injections, Intra-articular; Physiotherapy; Shoulder Pain; Randomized Controlled Trials; Systematic Review.

RESUMO

*Introdução: A tendinopatia do manguito rotador é causa frequente de dor e incapacidade do ombro, e o tratamento não operatório ideal permanece controverso. A fisioterapia é o pilar do manejo inicial, enquanto a infiltração com ácido hialurônico tem sido proposta como alternativa ou adjuvante; sua efetividade comparativa é incerta. Métodos: Foi realizada revisão sistemática baseada em evidências nas bases PubMed, Embase, Cochrane Library e Portal Regional da Biblioteca Virtual em Saúde (BVS) até fevereiro de 2026. Foram incluídos ensaios clínicos randomizados que compararam a infiltração com ácido hialurônico e a fisioterapia em adultos com tendinopatia do manguito rotador. Os desfechos avaliados foram dor, função, amplitude de movimento e qualidade de vida. A certeza da evidência foi avaliada por meio da abordagem GRADE. Resultados: Dois ensaios clínicos randomizados (130 participantes) preencheram os critérios de elegibilidade. A infiltração com ácido hialurônico associou-se a maior melhora de curto prazo da dor, da amplitude de movimento e da qualidade de vida em comparação com a fisioterapia, especialmente até três meses. Os desfechos funcionais foram inconsistentes: um ensaio relatou melhora semelhante entre os grupos, enquanto o outro favoreceu o ácido hialurônico. A certeza da evidência foi muito baixa em razão do reduzido tamanho amostral, do risco de viés e da imprecisão. Conclusão: Evidência de muito baixa qualidade sugere que a infiltração com ácido hialurônico pode oferecer benefícios superiores no curto prazo em relação à fisioterapia para a tendinopatia do manguito rotador, sobretudo até três meses. A evidência disponível é limitada e de alto risco de viés, sendo necessários estudos de melhor qualidade. **Nível de evidência II; Revisão sistemática.***

Descritores: *Tendinopatia do Manguito Rotador; Injeções Intra-articulares; Fisioterapia; Dor no Ombro; Ensaios Clínicos Randomizados; Revisão Sistemática.*

Citation: Fernandes MR, Zanesco L, Murachovsky J, Mouraria GG, Lara PHS, Belangero PS, Medeiros Filho JF, Malavolta EA. Evidence-Based Reviews & Recommendations from the Brazilian Society of Shoulder and Elbow Surgery: Hyaluronic Acid Injection versus Physiotherapy for Rotator Cuff Tendinopathy in Adults. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 4. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

The study was conducted at Sociedade Brasileira de Cirurgia de Ombro e Cotovelo, Sao Paulo, Brazil.

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Article received on 05/21/2026 approved on 06/02/2026.
Handling Editor: Ricardo Gobbi

INTRODUCTION

Rotator cuff tendinopathy is a broad term describing degenerative or inflammatory changes of the rotator cuff tendons that do not necessarily involve a full-thickness tear. It may present with degeneration of the tendon fibers, collagen disorganization, tendon thickening or edema, and inflammation.[1,2]

Management of rotator cuff tendinopathy depends on the intensity of symptoms, the thickness of the tendon lesion, and the patient's age and functional demand. Physiotherapy is the most widely used treatment for patients with tendinopathy or partial-thickness rotator cuff tears involving less than 50% of the tendon thickness.[3,4]

Subacromial, peritendinous, or intratendinous injection of hyaluronic acid (HA) may be used in the management of rotator cuff tendinopathy. The proposed effects of this agent include improvement of the viscoelasticity of the synovial fluid, reduction of friction between the tendon and adjacent structures, decreased inflammatory mediators, inhibition of metalloproteinases, possible stimulation of tenocyte proliferation, and reduction of local sensitivity and pain.[5,6]

Some adverse effects of HA injection have been reported, including transient local pain, foreign-body reaction, pyarthritis, cellulitis, mild inflammatory reaction, and infection.[5,7] Given these considerations, a direct comparison of functional and pain outcomes between HA injection and conventional physiotherapy is warranted.

This evidence-based review was developed within a collaborative initiative of the Brazilian Society of Shoulder and Elbow Surgery (SBCOC) Consensus Project, which aims to synthesize the best available evidence using rigorous, transparent methods and to translate it into clear, practical recommendations for clinical practice. This study was conducted at the initiative of the Brazilian Society of Shoulder and Elbow Surgery with the participation of Cochrane Brazil.

Research Question

Is hyaluronic acid injection more effective than physiotherapy for the treatment of rotator cuff tendinopathy in adults?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and BVS.
- Descriptors: As described in Appendix 1.
- Search period: Until February 2026.
- Study selection: Updated systematic reviews (SRs) with adequate methodological quality were prioritized. In the absence of SRs, randomized controlled trials (RCTs) and cohort studies were considered.

RESULTS

The search retrieved 97 references (22 in PubMed, 7 in Embase, 53 in the Cochrane Library, and 15 in the Regional Portal BVS). Thirty-six records were removed as duplicates. After screening the abstracts of the remaining 61 studies, 55 were excluded. Of the six retained for full assessment, two were discarded for not being SRs or RCTs. Two systematic reviews were subsequently excluded: the study by Goulart et al.[8], which evaluated only comparisons between injection types or placebo, and that by Giovannetti de Sanctis et al.[9], in which the injected agent was a corticosteroid and no comparison with physiotherapy was included. Two RCTs therefore remained (Figure 1).

Included studies

Few studies in the literature directly compared the effectiveness of HA injection with physiotherapy. No systematic review performed this direct comparison; only two RCTs were identified.

Rezasoltani et al.[10] evaluated 51 participants aged 20 to 55 years with supraspinatus tendinopathy, randomized to subacromial HA injection (n = 28) or physiotherapy (n = 23). The HA used had a molecular weight of 500–700 kDa, and the rehabilitation protocol comprised three physiotherapy sessions per week for three months—a total of 36 sessions of rotator cuff strengthening exercises. The outcomes assessed were pain (Visual Analogue Scale, VAS), range of motion, shoulder functional disability, and quality of life (World Health Organization questionnaire), evaluated at one, four, and twelve weeks. The authors concluded that HA was more effective than physiotherapy for pain control and for improvement of range of motion and quality of life up to three months of follow-up, whereas both approaches reduced functional disability to a similar degree.

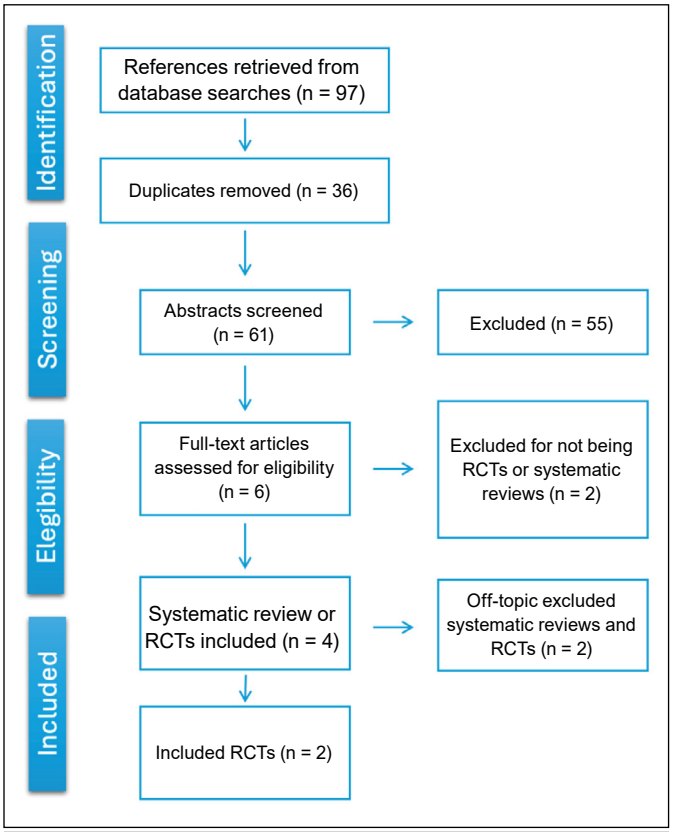

Figure 1. Flow diagram of the literature search.

Esmaily et al.[11], in an RCT including 79 participants with rotator cuff tendinopathy, compared low- and high-molecular-weight HA with physiotherapy. Participants were allocated to three groups: low-molecular-weight HA (n = 28), high-molecular-weight HA (n = 27), and physiotherapy (n = 24). The injections were administered into the subacromial space at a dose of 20 mg, and the physiotherapy group performed 10 exercise-based sessions. The primary outcome was shoulder pain; secondary outcomes were the DASH score, range of motion, and quality of life, assessed at baseline and after one and three months, with pain additionally evaluated at six months. The authors concluded that HA injections were more effective in controlling pain, reducing disability, increasing range of motion, and improving quality of life. No difference in effectiveness was found between the two molecular weights; however, the low-molecular-weight group reported less intense local pain than the high-molecular-weight group. The clinical benefits of HA persisted for at least three months, and pain relief was partially maintained up to six months.

The general characteristics of the included studies and the certainty of evidence according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach are presented in Tables 1 and 2, respectively.[12,13]

<< SUMÁRIO

Table 1. Characteristics of the included studies.

Included studies	Study design	Sample size	Previously published protocol
Rezasoltani Z. et al.[10]	RCT	51	Not published
Esmaily H. et al.[11]	RCT	79	Not published

RCT: randomized controlled trial.

Table 2. Quality of evidence (GRADE): hyaluronic acid injection versus physiotherapy.

Outcome	Studies (N)	Certainty of evidence
Pain	2 studies (130)	Very low[1,2,3]
Shoulder function (various scores)	2 studies (130)	Very low[1,2,3]

1: Limited sample size; 2: Imprecision (wide confidence interval); 3: Risk of bias of the included studies; 4: Lack of a prior protocol. Note: GRADE (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to assess and grade the certainty of evidence. It is based on five domains: risk of bias, imprecision, inconsistency, indirectness, and publication bias. The certainty of evidence is classified as very low, low, moderate, or high.

Study Limitations

Further RCTs of higher methodological quality are needed to compare HA injection with physiotherapy for the treatment of rotator cuff tendinopathy. Such studies should be multicenter, include a larger number of physiotherapy sessions, enroll larger samples, and provide a minimum follow-up of two years.

Recommendation

There is evidence, although of very low quality, that hyaluronic acid injection in the shoulder is more effective than physiotherapy in the short term for the treatment of rotator cuff tendinopathy in adults, with respect to pain and function. This benefit is most evident within the first three months of treatment.

The SBCOC Consensus Project recommends that the surgeon individually assess the indication for hyaluronic acid treatment in patients with rotator cuff tendinopathy. Physiotherapy remains the initial treatment of choice. Factors such as functional demand, rehabilitation time, and the expected time to return to work and/or sport should be considered when indicating hyaluronic acid treatment and its combination with physiotherapy.

CONCLUSION

There is very low-quality evidence demonstrating that hyaluronic acid injection is more effective than physiotherapy for the treatment of rotator cuff tendinopathy in adults, particularly for short-term pain and function up to three months.

CONTRIBUTIONS OF THE AUTHORS

Each author contributed individually and significantly to the development of this article. MRF: manuscript writing and revision; LZ: conception and revision; JM: conception and revision; GGM: conception and revision; PHSL: conception and revision; PSB: manuscript writing and revision; JFMF: conception and revision; EAM: conception and revision.

DATA AVAILABILITY DECLARATION

The contents underlying the research are available in the manuscript.

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Appendix 1. Database search strategies

PUBMED

#1 "Rotator Cuff Injuries"[Mesh] OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral).
#2 "Hyaluronic Acid"[Mesh] OR (Acid, Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) OR (Sodium Hyaluronate) OR (Hyaluronate, Sodium) OR (Hyaluronate Sodium) OR (Healon) OR (Etamucine) OR (Amo Vitrax) OR (Vitrax, Amo) OR (Biolon).
#3 "Injections, Intra-Articular"[Mesh] OR (Injection, Intra-Articular) OR (Intra-Articular Injection) OR (Intra Articular Injection) OR (Articular Injection, Intra) OR (Articular Injections, Intra) OR (Injection, Intra Articular) OR (Injections, Intra Articular) OR (Intra Articular Injections) OR (Intraarticular Injection) OR (Injection, Intraarticular) OR (Intra-Articular Injections) OR (Injections, Intraarticular) OR (Intraarticular Injections).
#4 "Physical Therapy Modalities"[Mesh] OR (Modalities, Physical Therapy) OR (Modality, Physical Therapy) OR (Physical Therapy Modality) OR (Physical Therapy Techniques) OR (Physical Therapy Technique) OR (Techniques, Physical Therapy) OR (Physiotherapy (Techniques)) OR (Physiotherapies (Techniques)) OR (Neurological Physiotherapy) OR (Physiotherapy, Neurological) OR (Neurophysiotherapy) OR (Group Physiotherapy) OR (Group Physiotherapies) OR (Physiotherapies, Group) OR (Physiotherapy, Group) OR (Physical Therapy) OR (Physical Therapies) OR (Therapy, Physical).
#5 #2 AND #3.
#6 #1 AND #5 AND #4 — 22 records.

COCHRANE LIBRARY

#1 (Rotator Cuff Injuries) OR (Cuff Injury, Rotator) OR (Injury, Rotator Cuff) OR (Rotator Cuff Injury) OR (Rotator Cuff Tears) OR (Rotator Cuff Tear) OR (Tear, Rotator Cuff) OR (Tears, Rotator Cuff) OR (Rotator Cuff Tendinitis) OR (Rotator Cuff Tendinitides) OR (Tendinitis, Rotator Cuff) OR (Rotator Cuff Tendinosis) OR (Rotator Cuff Tendinoses) OR (Tendinoses, Rotator Cuff) OR (Tendinosis, Rotator Cuff) OR (Glenoid Labral Tears) OR (Glenoid Labral Tear) OR (Labral Tear, Glenoid) OR (Labral Tears, Glenoid) OR (Tear, Glenoid Labral).
#2 (Hyaluronic Acid) OR (Acid, Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) OR (Sodium Hyaluronate) OR (Hyaluronate, Sodium) OR (Hyaluronate Sodium) OR (Healon) OR (Etamucine) OR (Amo Vitrax) OR (Vitrax, Amo) OR (Biolon).
#3 (Injections, Intra-Articular) OR (Injection, Intra-Articular) OR (Intra-Articular Injection) OR (Intra Articular Injection) OR (Articular Injection, Intra) OR (Articular Injections, Intra) OR (Injection, Intra Articular) OR (Injections, Intra Articular) OR (Intra Articular Injections) OR (Intraarticular Injection) OR (Injection, Intraarticular) OR (Intra-Articular Injections) OR (Injections, Intraarticular) OR (Intraarticular Injections).
#4 (Physical Therapy Modalities) OR (Modalities, Physical Therapy) OR (Modality, Physical Therapy) OR (Physical Therapy Modality) OR (Physical Therapy Techniques) OR (Physical Therapy Technique) OR (Techniques, Physical Therapy) OR (Physiotherapy (Techniques)) OR (Physiotherapies (Techniques)) OR (Neurological Physiotherapy) OR (Physiotherapy, Neurological) OR (Neurophysiotherapy) OR (Group Physiotherapy) OR (Group Physiotherapies) OR (Physiotherapies, Group) OR (Physiotherapy, Group) OR (Physical Therapy) OR (Physical Therapies) OR (Therapy, Physical).
#5 #2 AND #3.
#6 #1 AND #5 AND #4 — 53 records.

EMBASE

#1 'rotator cuff injury'/exp OR 'cuff injury' OR 'cuff lesion' OR 'rotator cuff disease' OR 'rotator cuff disorder' OR 'rotator cuff disorders' OR 'rotator cuff injuries' OR 'rotator cuff injury' OR 'rotator cuff lesion' OR 'rotator cuff lesions' OR 'rotator cuff pathology' OR 'rotator cuff tendinopathies' OR 'rotator cuff tendinopathy' OR 'shoulder rotator cuff degeneration' OR 'shoulder rotator cuff lesion'.
#2 'intraarticular drug administration'/exp OR 'drug administration, intraarticular' OR 'injection, intraarticular' OR 'injections, intra-articular' OR 'intra-articular administration' OR 'intra-articular delivery' OR 'intra-articular drug administration' OR 'intra-articular drug delivery' OR 'intra-articular infusion' OR 'intra-articular injection' OR 'intra-articular injections' OR 'intra-articular medication' OR 'intra-articular treatment' OR 'intraarticular administration' OR 'intraarticular delivery' OR 'intraarticular drug administration' OR 'intraarticular infusion' OR 'intraarticular injection' OR 'intraarticular medication' OR 'intraarticular treatment' OR 'intracoxal drug administration' OR 'joint infusion' OR 'joint injection' OR 'treatment, intraarticular'.
#3 'hyaluronic acid'/exp OR 'adant' OR 'amo vitrax' OR 'amvisc' OR 'artz' OR 'biolon' OR 'durolane' OR 'healon' OR 'hyalgan' OR 'hyaluronan' OR 'hyaluronate' OR 'hyaluronate sodium' OR 'hyaluronic acid' OR 'hylan g-f 20' OR 'monovisc' OR 'orthovisc' OR 'ostenil' OR 'sodium hyaluronate' OR 'supartz' OR 'suplasyn' OR 'synvisc' (and related brand-name terms).
#4 'physiotherapy'/exp OR 'physical therapy' OR 'physical therapy service' OR 'physical therapy techniques' OR 'physical treatment' OR 'physiotherapy' OR 'therapy, physical'.
#5 #2 AND #3.
#6 #1 AND #5 AND #4 — 27 records.
#7 #6 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) — 7 records.

REGIONAL PORTAL (BVS)

#1 MH:"Lesões do Manguito Rotador" OR (Rotator Cuff Injuries) OR (Roturas do Manguito Rotador) OR (Ruptura do Manguito Rotador) OR (Tendinite do Manguito Rotador) OR (Tendinose do Manguito Rotador) OR MH:C26.761.340$ OR MH:C26.803.063$ OR MH:C26.874.400$.
#2 MH:"Ácido Hialurônico" OR (Hyaluronic Acid) OR (Hialuronan) OR MH:D09.698.373.475$.
#3 MH:"Injeções Intra-Articulares" OR (Injections, Intra-Articular) OR (Injeção Intra-Articular) OR MH:E02.319.267.530.380$.
#4 MH:"Modalidades de Fisioterapia" OR (Physical Therapy Modalities) OR (Fisioterapia) OR (Técnicas de Fisioterapia) OR MH:E02.779$ OR MH:E02.831.535$.
#5 #1 AND #2 AND #3 AND #4 — 15 records.

DOI: http://dx.doi.org/10.1590/1413-785220263401e306100

EVIDENCE-BASED REVIEW & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: HYALURONIC ACID VERSUS CORTICOSTEROID INJECTIONS FOR SHOULDER OSTEOARTHRITIS

REVISÃO E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIA DA SOCIEDADE BRASILEIRA DE CIRURGIA DE OMBRO E COTOVELO: INFILTRAÇÃO COM ÁCIDO HIALURÔNICO VERSUS CORTICOIDE NA ARTROSE DO OMBRO

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ABSTRACT

Introduction: Shoulder osteoarthritis is an inflammatory and degenerative condition affecting the joint between the humeral head and the glenoid. It is estimated to affect up to 20% of patients aged 60 or older. In our setting, the use of hyaluronic acid is becoming increasingly employed for the treatment of shoulder osteoarthritis. Therefore, this consensus aims to review the current literature to determine whether treatment with hyaluronic acid infiltration is more effective than corticosteroid infiltration in terms of pain outcome for the treatment of shoulder osteoarthritis in adults. Methods: A systematic review of the literature was conducted in the Pubmed, Embase, Cochrane Library and BVS databases up to November 2025, aiming to evaluate whether intra-articular injection with hyaluronic acid is more effective than with corticosteroids for the treatment of shoulder osteoarthritis in adults. Results: The systematic review concluded that hyaluronic acid infiltration is more effective than corticosteroid infiltration for pain and function outcomes, mainly after six months post-infiltration. Conclusion: There is evidence, albeit of very low quality, demonstrating that hyaluronic acid injections are more effective than corticosteroid injections for the treatment of shoulder osteoarthritis, with the best results for both treatment modalities occurring in mild to moderate cases of shoulder osteoarthritis. ***Level of evidence II; Systematic Review.***

Keywords: Osteoarthritis; Shoulder; Corticosteroid; Hyaluronic Acid.

RESUMO

Introdução: A osteoartrose do ombro é uma condição inflamatória e degenerativa que acomete a articulação entre a cabeça umeral e a glenoide. Estima-se que afete até 20% dos pacientes com 60 anos ou mais. Em nosso meio, o uso do ácido hialurônico tem se tornado cada vez mais frequente no tratamento da osteoartrose do ombro. Assim, o presente consenso tem como objetivo revisar a literatura atual para avaliar se a infiltração com ácido hialurônico é mais efetiva do que a infiltração com corticosteroide em termos de desfecho de dor no tratamento da osteoartrose do ombro em adultos. Métodos: Foi realizada uma revisão sistemática da literatura nas bases de dados PubMed, Embase, Cochrane Library e BVS até novembro de 2025, com o objetivo de avaliar se a injeção intra-articular de ácido hialurônico é mais eficaz do que a de corticosteroide para o tratamento da osteoartrose do ombro em adultos. Resultados: A revisão sistemática concluiu que a infiltração com ácido hialurônico é mais efetiva do que a infiltração com corticosteroide para os desfechos de dor e função, principalmente após seis meses da infiltração. Conclusão: Existe evidência, embora de muito baixa qualidade, de que a infiltração com ácido hialurônico é mais efetiva do que a infiltração com corticosteroide para o tratamento da osteoartrose do ombro, sendo que os melhores resultados para ambas as modalidades ocorrem em casos leves a moderados. ***Nível de evidência II; Revisão sistemática.***

Descritores: *Osteoartrite; Ombro; Corticoide; Ácido Hialurônico.*

Citation: Lara PHS, Belangero PS, Schiefer M, Zanesco L, Fernandes MR, Murachovsky J, Medeiros Filho JF, Malavolta EA. Evidence-based review and recommendations from the brazilian society of shoulder and elbow surgery: hyaluronic acid versus corticosteroid injections for shoulder osteoarthritis. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 4. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 03/08/2026 approved on 04/15/2026.
Handling Editor: Olavo Pires de Camargo

<< SUMÁRIO

RECOMMENDATION

Regarding the outcome of pain, there is very low-quality evidence demonstrating that intra-articular injection with hyaluronic acid is more effective than intra-articular injection with corticosteroids for the treatment of shoulder osteoarthritis in adults. This effectiveness is greater after 3 months of treatment.

The SBCOC Consensus Project recommends that surgeons individually assess the characteristics of each patient and their condition to make the best treatment decision. Due to the potential superiority of hyaluronic acid in terms of duration and pain control, especially in mild to moderate cases, we recommend hyaluronic acid as the preferred alternative.

INTRODUCTION

Shoulder osteoarthritis is an inflammatory and degenerative disease that affects the joint between the humeral head and the glenoid.[1,2] It is estimated to affect between 16% and 20% of patients aged 60 or older, although only 5% to 7% are clinically symptomatic.[3] Some prevalence studies have indicated that this disease affects more women than men.[4]

Medical literature states that we should use injections to treat shoulder osteoarthritis only when conservative treatment (analgesics, anti-inflammatories, physiotherapy, acupuncture, among others) has failed and when shoulder pain and functional deficit are of moderate to high intensity. The main objectives of this treatment are to improve pain, function, and the possible postponement of glenohumeral arthroplasty.[2,5]

Corticosteroid infiltration theoretically has an anti-inflammatory and analgesic effect, improving symptoms in the short term (up to 8 weeks); however, these effects are not maintained in the short, medium, and long term (above 3 to 6 months). The main complications of this treatment include pain after infiltration, skin atrophy, tendon degeneration and risk of rupture, as well as possible systemic complications.[6,7]

In theory, hyaluronic acid infiltration improves local viscoelasticity, has an analgesic effect, and can stimulate tissue repair and healing. According to the literature, it improves function and pain in the short and medium term (up to 12 months), being reported as superior to corticosteroids in some studies. Complications may include foreign body reactions, infections, allergies, increased pain, among others. However, its theoretical advantages include: fewer local adverse effects compared to corticosteroids, no known systemic reactions, and reduced need for repeated infiltrations.[7-10]

In our setting, the use of hyaluronic acid is becoming increasingly frequent and increasingly employed for the treatment of shoulder osteoarthritis. Therefore, this consensus aims to review the current literature to assess whether treatment with hyaluronic acid infiltration is more effective than corticosteroid infiltration in terms of pain outcome for the treatment of shoulder osteoarthritis in adults.[1,2,10]

Research Question

Is intra-articular injection with hyaluronic acid more effective than intra-articular injection with corticosteroids for the treatment of shoulder osteoarthritis in adults?

METHODS

- Databases searched: Pubmed, Embase, Cochrane Library and BVS.
- Descriptors: "Shoulder Joint" [Mesh] OR (Joint, Shoulder) OR (Joints, Shoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) AND "Hyaluronic Acid" [Mesh] OR (Acid, Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) AND "Adrenal Cortex Hormones" [Mesh] OR (Hormones, Adrenal Cortex) OR (Corticoid) OR (Adrenal Cortex Hormone) OR (Cortex Hormone, Adrenal) AND "Injections, Intra-Articular" [Mesh] OR (Injection, Intra-Articular) OR (Intra-Articular Injection) OR (Intra Articular Injection) OR (Articular Injection, Intra) OR (Articular Injections, Intra) OR (Injection, Intra Articular) OR (Injections, Intra Articular) OR (Intra Articular Injections) OR (Intraarticular Injection) OR (Injection, Intraarticular) (Appendix 1).
- Search period: up to November 2025
- Study selection: updated systematic reviews (SRs) with adequate methodological quality were prioritized. In the absence of SRs, randomized clinical trials (RCTs) were considered, provided that methodological quality had been assessed.

RESULTS

Search and study selection

The search located 160 references (56 PubMed, 37 Embase, 41 Cochrane Library, and 26 BVS Regional Portal). Of these, two studies were considered systematic reviews by their primary authors, but both had biases that made their conclusions unsuitable for this consensus.

The review by Colen et al.[11] (which included any infiltration performed for the treatment of shoulder osteoarthritis) included several types of primary studies (prospective, retrospective, case series, among others) and, therefore, was not considered for our evaluation, as it was a literature review and not a level 1 systematic review.[11]

In November 2025, Migliorini et al.[12] published a work also titled as a systematic review that included any type of infiltration for the treatment of shoulder osteoarthritis; however, it included several types of primary studies (retrospective cohorts, cohorts, randomized clinical trials), which also prevented our inclusion of this study in our consensus.[12]

Other studies were also excluded because they were not systematic reviews, randomized clinical trials, or did not address the topic of shoulder osteoarthritis.[13,14] (Figure 1)

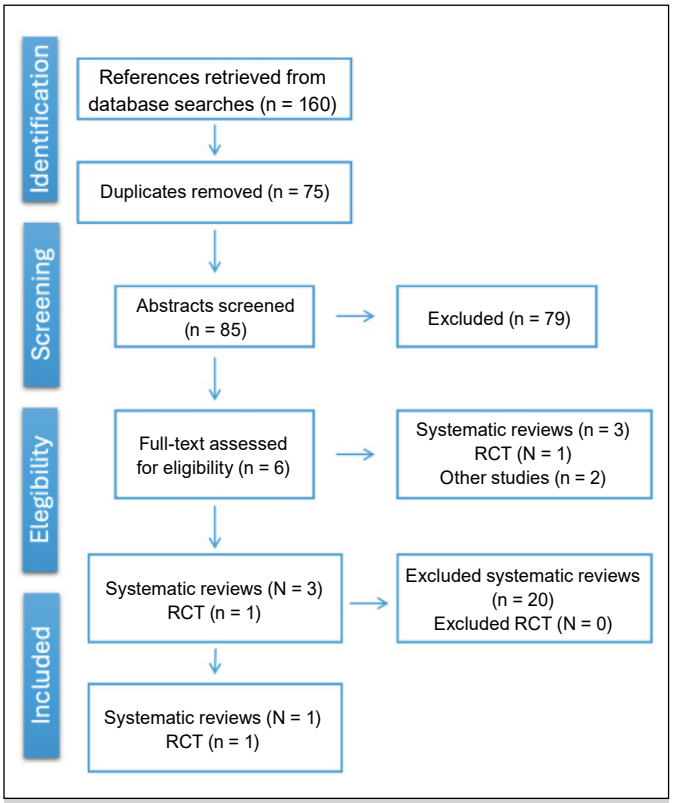

Figure 1. Flowchart of the literature search.

<< SUMÁRIO

Included Studies

1 systematic review and 1 randomized clinical trial were included. The systematic review by Familiari et al.[15] included only 2 randomized clinical trials that compared hyaluronic acid infiltration with corticosteroids. Thus, with a small sample of 154 participants, the systematic review concluded that hyaluronic acid infiltration is more effective than corticosteroid infiltration for pain and function outcomes, mainly after 6 months post-infiltration. This review included 2 studies: Merolla et al.[16] and Tortato et al.[17], which were supposedly randomized clinical trials, but after reading, it was found that the work by Merolla et al.[16] was a retrospective cohort study, which caused a significant bias in the systematic review.

The randomized clinical trial by Tortato et al.[17] was conducted in Brazil and compared the use of hyaluronate GF 20 with triamcinolone. In a sample of 77 patients, the outcomes pain, range of motion, Constant score, modified UCLA score, and SPADI index were evaluated. Regarding the outcome pain, it was assessed using the VAS (Visual Analogue Scale), and it was reported that 76% of patients who received hyaluronic acid injections showed improvement in pain after 1 month, and 63% showed improvement after 6 months compared to the initial assessment. Patients classified as having "non-severe" arthritis obtained better results than those classified as having "severe" arthritis. And, the hyaluronic acid group had better results mainly after the third month. The authors concluded that: "Both injections reduced pain and increased patient satisfaction. Results tend to be better and more lasting in patients receiving hyaluronic acid."

The general characteristics of the evaluated studies and the quality of evidence according to GRADE[18,19] can be observed in Tables 1 and 2, respectively.

Table 1. Characteristics of the included studies.

Included studies	Type of study	Included studies (types of study)	Casuistry	Previously published protocol
Familiari et al. (2023)	Systematic review	2 (1 RCT, 1 cohort)	154	Yes
Tortato et al.[17] (2022)	Randomized clinical trial (RCT)	---	77	No, but it was registered

Table 2. Quality of evidence (GRADE): Hyaluronic acid infiltration versus corticosteroid.

Outcome	Studies (n)	Evidence quality
Pain	2 studies (154)	Very low[1,2,3]
Shoulder function (varied scores)	2 studies (143)	Very low[1,2,3]

1: Limited sample size; 2: Imprecision (large confidence interval); 3: Risk of bias in included studies. 4: Lack of prior protocol. Note: GRADE (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to assess and measure the quality of evidence. It is based on 5 pillars: Risk of bias, Imprecision, Inconsistency, Indirect assessment of outcomes, and Publication bias. With this, the quality of evidence is classified as: very low, low, moderate, and high quality.[18,19]

CONCLUSIONS

There is evidence, albeit of very low quality, demonstrating that hyaluronic acid injections are more effective than corticosteroid injections for the treatment of shoulder osteoarthritis, with the best results for both treatment modalities occurring in mild to moderate cases of shoulder osteoarthritis.

Implications for Research

More randomized clinical trials with improved methodological quality are needed to compare hyaluronic acid injections versus corticosteroid injections for the treatment of shoulder osteoarthritis.

CONTRIBUTIONS OF THE AUTHORS

Each author contributed individually and significantly to the development of this article. PHSL, PSB, MS: writing and review; LZ, MRF, JM, JFMF, EAM: conception and review.

DATA AVAILABILITY DECLARATION

The data underlying this study are available within the article.

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Appendix 1. Search Strategies Across Databases.

PUBMED

#1"Shoulder Joint"[Mesh] OR (Joint, Shoulder) OR (Joints, Shoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) OR (Glenohumeral Joints) OR (Joint, Glenohumeral) OR (Joints, Glenohumeral) OR (Glenoid Labrum) OR (Labrum, Glenoid)OR (Glenohumeral Joint) OR (Shoulder Arthritis) OR (Glenohumeral Arthritis)
#2 "Hyaluronic Acid"[Mesh] OR (Acid, Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) OR (Sodium Hyaluronate) OR (Hyaluronate, Sodium) OR (Hyaluronate Sodium) OR (Healon) OR (Etamucine) OR (Amo Vitrax) OR (Vitrax, Amo) OR (Biolon) OR Hyaluronate OR (Sodium Hyaluronate) OR Viscosupplementation
#3 "Adrenal Cortex Hormones"[Mesh] OR (Hormones, Adrenal Cortex) OR (Corticoid) OR (Adrenal Cortex Hormone) OR (Cortex Hormone, Adrenal) OR (Hormone, Adrenal Cortex) OR (Corticosteroid) OR (Corticoids) OR (Corticosteroids) OR Corticosteroids OR (Steroid Injections) OR Triamcinolone OR Methylprednisolone
#4 "Injections, Intra-Articular"[Mesh] OR (Injection, Intra-Articular) OR (Intra-Articular Injection) OR (Intra Articular Injection) OR (Articular Injection, Intra) OR (Articular Injections, Intra) OR (Injection, Intra Articular) OR (Injections, Intra Articular) OR (Intra Articular Injections) OR (Intraarticular Injection) OR (Injection, Intraarticular) OR (Intra-Articular Injections) OR (Injections, Intraarticular) OR (Intraarticular Injections) OR (Intra-articular Injection) OR (Joint Injection)
#5"Pain"[MeSH] OR (Pain Management) OR (Pain Relief) OR (Pain Measurement)
#5 #1 AND #2 AND #3 AND #4
Filters applied: Clinical Trial; Meta-Analysis; Randomized Controlled Trial; Review; Systematic Review = 56

COCHRANE

#1(Shoulder Joint) OR (Joint Shoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) OR (Glenohumeral Joints) OR (Joint Glenohumeral) OR (Joints Glenohumeral) OR (Glenoid Labrum) OR (Labrum Glenoid) OR (Glenohumeral Joint) OR (Shoulder Arthritis) OR (Glenohumeral Arthritis)
#2 (Hyaluronic Acid) OR (Acid Hyaluronic) OR (Amvisc) OR (Luronit) OR (Hyvisc) OR (Hyaluronan) OR (Sodium Hyaluronate) OR (Hyaluronate Sodium) OR (Hyaluronate Sodium) OR (Healon) OR (Etamucine) OR (Amo Vitrax) OR (Vitrax Amo) OR (Biolon) OR Hyaluronate OR (Sodium Hyaluronate) OR Viscosupplementation
#3 (Adrenal Cortex Hormones) OR (Hormones Adrenal Cortex) OR (Corticoid) OR (Adrenal Cortex Hormone) OR (Cortex Hormone Adrenal) OR (Hormone Adrenal Cortex) OR (Corticosteroid) OR (Corticoids) OR (Corticosteroids) OR Corticosteroids OR (Steroid Injections) OR Triamcinolone OR Methylprednisolone
#4 (Injections Intra-Articular) OR (Injection Intra-Articular) OR (Intra-Articular Injection) OR (Intra Articular Injection) OR (Articular Injection Intra) OR (Articular Injections Intra) OR (Injection Intra Articular) OR (Injections Intra Articular) OR (Intra Articular Injections) OR (Intraarticular Injection) OR (Injection Intraarticular) OR (Intra-Articular Injections) OR (Injections, Intraarticular) OR (Intraarticular Injections) OR (Intra-articular Injection) OR (Joint Injection)
#5 #1 AND #2 AND #3 AND #4 = 41

EMBASE

#1 'shoulder joint'/exp OR 'articulatio glenohumeralis' OR 'articulatio humeri' OR 'gleno-humeral joint' OR 'glenohumeral joint' OR 'humeral joint' OR 'humero-scapular joint' OR 'humeroscapular joint' OR 'joint, glenohumeral' OR 'joint, humeroscapular' OR 'scapulo humeral joint' OR 'scapulohumeral joint' OR 'shoulder (joint)' OR 'shoulder joint'
#2 'hyaluronic acid'/exp OR 'adant' OR 'adant dispo' OR 'amo vitrax' OR 'amvisc' OR 'amvisc plus' OR 'arthrease' OR 'artz' OR 'biolon' OR 'bionect' OR 'clearvisc' OR 'duovisc' OR 'durolane' OR 'eyecon' OR 'go-on (drug)' OR 'halonix' OR 'healon' OR 'healon gv' OR 'healon yellow' OR 'healon5' OR 'healonid' OR 'hialid' OR 'hyalcon' OR 'hyalein' OR 'hyalgal' OR 'hyalgan' OR 'hyalovet' OR 'hyalubrix' OR 'hyaluronan' OR 'hyaluronate' OR 'hyaluronate sodium' OR 'hyaluronic acid' OR 'hyaluronic acid component' OR 'hyladerm' OR 'hylaform' OR 'hylan g f 20' OR 'hylan g-f 20' OR 'hylartin v' OR 'hylo-comod' OR 'hylumed' OR 'hyruan' OR 'ialugen' OR 'juvederm' OR 'lagricel ofteno' OR 'laservis' OR 'me 3710' OR 'monovisc' OR 'na hylan' OR 'na-hylan' OR 'nrd 101' OR 'nrd101' OR 'ophthalin' OR 'ophthalin plus' OR 'orthovisc' OR 'ostenil' OR 'perlane' OR 'potassium hyaluronate' OR 'provisc' OR 'radiaplexrx' OR 'restylane' OR 'restylane lyft' OR 'si 4402' OR 'sinovial' OR 'sl 1010' OR 'sodium hyaluronate' OR 'sperm select' OR 'supartz' OR 'suplasyn' OR 'synocrom' OR 'synojoynt' OR 'synvisc' OR 'teosyal' OR 'triluron' OR 'unihylon' OR 'viscoseal' OR 'vismed' OR 'vitrax'
#3 'corticosteroid'/exp OR 'adrenal cortex hormone' OR 'adrenal cortex hormones' OR 'adrenal cortical hormone' OR 'adrenal cortical hormones' OR 'adrenal cortical steroid' OR 'adrenal steroid' OR 'adrenal steroid hormone' OR 'adreno cortical steroid' OR 'adreno corticosteroid' OR 'adrenocortical hormone' OR 'adrenocortical steroid' OR 'adrenocorticosteroid' OR 'cortical steroid' OR 'cortico steroid' OR 'corticoid' OR 'corticosteroid' OR 'corticosteroid agent' OR 'corticosteroid calcium' OR 'corticosteroid hormone' OR 'corticosteroids' OR 'corticosteroids, inhalation' OR 'corticosteroids, ophthalmic' OR 'corticosteroids, otic' OR 'corticosteroids, systemic' OR 'corticosteroids, topical' OR 'dermocorticosteroid' OR 'fluorinated corticosteroid'
#4 'intraarticular drug administration'/exp OR 'drug administration, intraarticular' OR 'injection, intraarticular' OR 'injections, intra-articular' OR 'intra-articular administration' OR 'intra-articular delivery' OR 'intra-articular drug administration' OR 'intra-articular drug delivery' OR 'intra-articular infusion' OR 'intra-articular injection' OR 'intra-articular injections' OR 'intra-articular medication' OR 'intra-articular treatment' OR 'intraarticular administration' OR 'intraarticular delivery' OR 'intraarticular drug administration' OR 'intraarticular infusion' OR 'intraarticular injection' OR 'intraarticular medication' OR 'intraarticular treatment' OR 'intracoxal drug administration' OR 'joint infusion' OR 'joint injection' OR 'treatment, intraarticular'
#5 #1 AND #2 AND #3 AND #4 = 37

PORTAL REGIONAL BVS

#1 MH:"Articulação do Ombro" OR (Shoulder Joint) OR (Articulação Glenoumeral) OR (Articulações dos Ombros) OR (Ligamento Glenoide Umeral) OR (Lábio Glenoidal) OR MH:A02.835.583.748$ OR (Articulação do Ombro) OR (Artrite Glenoumeral)
#2 MH:"Ácido Hialurônico" OR (Hyaluronic Acid) OR (Hialuronan) OR MH:D09.698.373.475$ OR (Ácido Hialurônico) OR (Hialuronato de Sódio) OR (Viscossuplementação)
#3 MH:"Corticosteroides" OR (Adrenal Cortex Hormones) OR (Corticoesteroides) OR (Corticoide) OR (Corticoides) OR (Corticosteroide) OR (Hormônio Adrenocortical) OR (Hormônio Córtico-Adrenal) OR (Hormônio do Córtex Ad-Renal) OR (Hormônio do Córtex Adrenal) OR (Hormônio do Córtex das Ad-Renais) OR (Hormônio do Córtex das Glândulas Ad-Renais) OR (Hormônio do Córtex das Glândulas Suprarrenais) OR (Hormônios Adrenocorticais) OR (Hormônios Córtico-Adrenais) OR (Hormônios do Córtex Ad-Renal) OR (Hormônios do Córtex Suprarrenal) OR (Hormônios do Córtex das Ad-Renais) OR (Hormônios do Córtex das Glândulas Ad-Renais) OR (Hormônios do Córtex das Glândulas Suprarrenais) OR (Hormônios do Córtex das Suprarrenais) OR MH:D06.472.040$ OR(Hormônios do Córtex Adrenal) OR Corticosteroides OR (Triancinolona) OR (Metilprednisolona)
#4 MH:"Injeções Intra-Articulares" OR (Injections, Intra-Articular) OR (Injeção Intra-Articular) OR MH:E02.319.267.530.380$ OR (Injeções IntraArticulares) OR (Infiltração articular)
#5 #1 AND #2 AND #3 AND #4 = 26
MEDLINE (22)
WPRIM (Pacífico Ocidental) (2)
IBECS (1)
LILACS (1)

DOI: http://dx.doi.org/10.1590/1413-785220263401e308949

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: LABRAL REPAIR FOR ANTERIOR SHOULDER INSTABILITY — MORE THAN TWO ANCHORS VERSUS UP TO TWO ANCHORS

REVISÕES E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIAS DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: REPARO LABRAL PARA INSTABILIDADE ANTERIOR DO OMBRO — MAIS DE DUAS ÂNCORAS VERSUS ATÉ DUAS ÂNCORAS

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ABSTRACT

Introduction: Anterior shoulder instability is a common condition that mainly affects young adults. It is most often traumatic and is frequently associated with a Bankart lesion, characterized by detachment of the anteroinferior glenoid labrum. When conservative treatment fails, surgical repair is usually indicated. Biomechanical studies suggest that a greater number of anchors may increase the contact area and provide greater stability between the labrum and the glenoid, promoting a more stable reconstruction of the capsulolabral complex. Methods: A systematic review was conducted in PubMed, Embase, Cochrane Library, and the Virtual Health Library (VHL) up to March 2026 to evaluate whether the use of more than two anchors is more effective than the use of up to two anchors for the arthroscopic treatment of anterior shoulder instability in adults. The certainty of the evidence was assessed with the GRADE approach. Results: One randomized controlled trial and two cohort studies were included. For function and complications, there was no evidence showing that the use of three or more anchors was more effective than the use of two anchors. For recurrence, there was evidence, although the certainty of the evidence was very low, that the use of three or more anchors was more effective than the use of up to two anchors. Conclusion: The surgeon should individually assess patient- and disease-related characteristics to make the best treatment decision. Regarding recurrence, the SBCOC Consensus Project suggests a preference for three or more anchors, given a trend toward a lower recurrence rate. ***Level of evidence II; Systematic review.***

Keywords: Joint Instability; Shoulder Dislocation; Bankart Lesions; Suture Anchors; Arthroscopy.

RESUMO

Introdução: A instabilidade anterior do ombro é uma condição comum, que acomete principalmente adultos jovens. Na maioria das vezes, é de causa traumática e está frequentemente associada à lesão de Bankart, caracterizada pelo descolamento do lábio glenoidal anteroinferior. Quando o tratamento conservador falha, o tratamento cirúrgico é geralmente indicado. Estudos biomecânicos sugerem que um maior número de âncoras pode aumentar a área de contato e oferecer maior estabilidade entre o lábio e a glenoide, promovendo uma reconstrução mais estável do complexo capsulolabial. Métodos: Realizou-se revisão sistemática da literatura nas bases de dados PubMed, Embase, Cochrane Library e Biblioteca Virtual em Saúde (BVS) até março de 2026, com o objetivo de avaliar se a utilização de mais de duas âncoras é mais efetiva do que a utilização de até duas âncoras para o tratamento artroscópico da instabilidade anterior do ombro em adultos. A certeza da evidência foi avaliada pela abordagem GRADE. Resultados: Foram incluídos um ensaio clínico randomizado e dois estudos de coorte. Em relação aos desfechos de função e complicações, não foram encontradas evidências de que a utilização de três ou mais âncoras seja mais efetiva do que a utilização de duas âncoras. Em relação ao desfecho recidiva, existe evidência, ainda que de muito baixa qualidade, de que a utilização de três ou mais âncoras é mais efetiva do que a utilização de até duas âncoras. Conclusão: O cirurgião deve avaliar, de maneira individualizada, as características do paciente e da enfermidade para a tomada da melhor decisão de tratamento. Em relação ao desfecho recidiva, o Projeto Consensos SBCOC sugere preferência pela utilização de três ou mais âncoras, pois há tendência a uma menor taxa de recidiva. ***Nível de evidência II; Revisão sistemática.***

Descritores: *Instabilidade Articular; Luxação do Ombro; Lesões de Bankart; Âncoras de Sutura; Artroscopia.*

Citation: Lara PHS, Belangero PS, Schiefer M, Zanesco L, Fernandes MR, Murachovsky J, Medeiros Filho JF, Malavolta EA. Evidence-Based Reviews & Recommendations from the Brazilian Society of Shoulder and Elbow Surgery: Labral Repair for Anterior Shoulder Instability — More Than Two Anchors versus Up to Two Anchors. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 4. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 05/21/2026 approved on 06/02/2026.
Handling Editor: Olavo Pires de Camargo

INTRODUCTION

Anterior shoulder instability is a common condition that mainly affects young adults. It is most often traumatic and is frequently associated with a Bankart lesion, characterized by detachment of the anteroinferior glenoid labrum. When conservative treatment fails, surgical treatment is usually indicated. Currently, the most commonly used procedure is arthroscopic Bankart repair, which provides good clinical and functional results and lower morbidity when compared with open techniques.[1,2]

Arthroscopic repair of the glenoid labrum is based on reinsertion of the capsulolabral complex onto the glenoid rim using suture anchors. Several technical factors may influence the results of the procedure, including the position of the anchors, the tensioning of the joint capsule, the number of fixation points, and the number of anchors used. Among these, the number of anchors is considered potentially relevant because, in theory, a greater number of fixation points would provide better anatomical restoration and greater stability of the capsulolabral complex.[2-4]

Biomechanical studies suggest that a greater number of anchors can increase the contact area and offer greater stability between the labrum and the glenoid, promoting a more stable reconstruction of the glenoid labrum. For this reason, many surgeons have adopted the routine use of three or more anchors during arthroscopic repair. However, this approach may also increase the cost of the procedure, the operative time, and the potential risk of complications related to anchor placement, such as tunnel confluence or glenoid bone compromise.[3-5]

Despite these theoretical considerations, the available scientific evidence remains limited and shows inconsistent and conflicting results. Some clinical studies suggest that the use of three or more anchors may be associated with a lower rate of instability recurrence, whereas others demonstrate no significant difference in clinical outcomes compared with the use of two anchors. Moreover, most studies on the subject are observational, with relatively small sample sizes, which hinders a definitive interpretation of the results.[4-6]

Given these uncertainties, a critical synthesis of the available evidence on the impact of the number of anchors on the outcomes of arthroscopic repair for anterior shoulder instability is warranted. Therefore, the objective of this consensus is to evaluate whether the use of more than two anchors in labral repair is associated with better clinical outcomes and a lower recurrence rate when compared with the use of up to two anchors in adults undergoing arthroscopic repair of Bankart lesions.[2,4-7]

This study was conducted at the initiative of the Brazilian Society of Shoulder and Elbow Surgery with the participation of Cochrane Brazil.

Research Question

Is the use of more than two anchors more effective than the use of two anchors for the arthroscopic treatment of anterior shoulder instability in adults?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and the Virtual Health Library (VHL).
- Descriptors: As described in Appendix 1.
- Search period: Until March 2026.
- Study selection: Updated systematic reviews (SRs) with adequate methodological quality were prioritized. In the absence of SRs, randomized controlled trials (RCTs) were considered, followed by observational studies.

RESULTS

The search retrieved 604 references (279 in PubMed, 262 in Embase, 53 in the Cochrane Library, and 10 in the Regional Portal BVS). After an initial assessment, 43 duplicate records were removed. Following abstract screening, 555 studies were excluded, leaving six studies for full-text evaluation. Three systematic reviews on the topic were assessed but not included, as they did not provide a direct comparison through randomized or comparative cohort data.[8-10] One randomized controlled trial and two cohort studies were ultimately included (Figure 1).

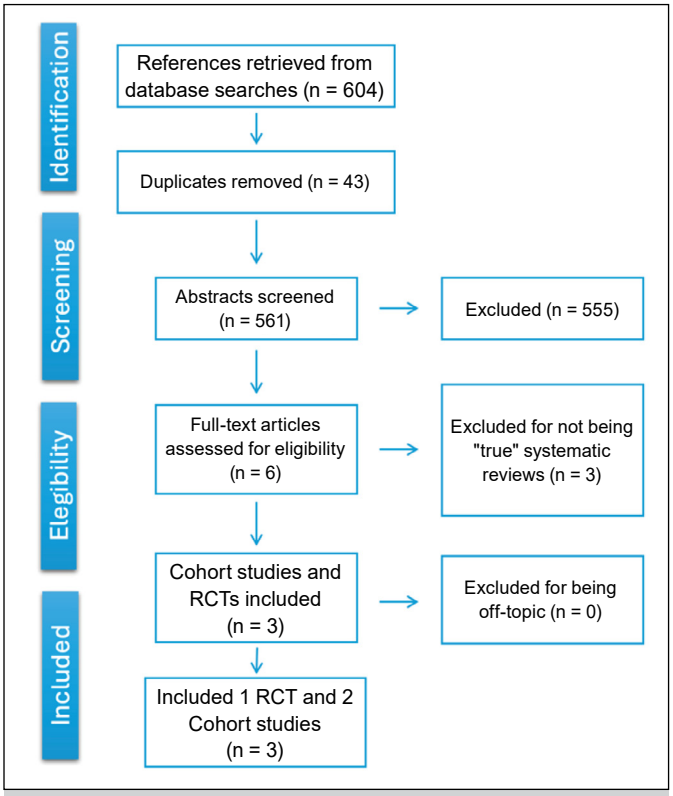

Figure 1. Flow diagram of the literature search.

INCLUDED STUDIES

Buckup et al.[5], in a randomized controlled trial, evaluated whether the use of three anchors would result in better anatomical reconstruction and better clinical outcomes than the use of two anchors in arthroscopic Bankart repair in patients with anterior shoulder instability. Two groups of 20 participants each were randomized, with a minimum follow-up of 12 months by magnetic resonance imaging (MRI) and 24 months by clinical evaluation. Group 1 received two double-loaded knotless anchors (3.5 mm), and Group 2 received three single-loaded knotless anchors (2.9 mm). On MRI, the three-anchor group showed anterior glenoid reconstruction closer to normal anatomy than the two-anchor group. For shoulder function, pain, range of motion, and functional scores, both groups achieved excellent clinical results, with no significant difference between them. Regarding recurrence, there was no statistical difference between the groups (two-anchor group: 2 recurrences; three-anchor group: 1 recurrence).

The authors concluded that both techniques provide good clinical results and that three anchors restore labral anatomy more closely, although this difference did not translate into a significant clinical benefit at two-year follow-up. The main reported limitations were the small sample size, single-center design, relatively short follow-up, and a technical difference between the implants used (anchor size).[5]

Vermeulen et al.,[11] in a retrospective cohort study, included 147 participants operated on between 2002 and 2011. The aim was to evaluate the long-term clinical outcomes after arthroscopic

<< SUMÁRIO

Bankart repair, assess the rate of instability recurrence, and identify factors associated with surgical failure—among them, the number of anchors used. The mean follow-up was six years. Most patients were men, with a mean age of 26 years, and the most frequent cause of the lesions was trauma. The surgical technique consisted of mobilizing the capsulolabral complex, reinserting the labrum onto the anterior glenoid rim, and fixation with suture anchors, grouped as two anchors, three anchors, and four or more anchors. The primary outcome was instability recurrence, defined as a new dislocation or recurrent subluxation; secondary outcomes included the Western Ontario Shoulder Instability Index (WOSI), the Simple Shoulder Test, and the SF-12.

The authors observed an overall recurrence rate of 22% and reported that patients treated with fewer than three anchors had a higher recurrence rate. Despite this association, the study emphasized that the number of anchors is not the sole determinant of failure; other relevant factors included young age, contact sports, the number of previous dislocations, and possible glenoid bone loss.[11]

Özdemir et al.,[12] in a retrospective cohort study, evaluated 40 patients (38 men and 2 women; mean age 31.6 ± 8.1 years; range 17–47) who underwent arthroscopic Bankart repair and were followed for a minimum of two years. Group 1 (n = 17) underwent repair with two suture anchors and Group 2 (n = 23) with three suture anchors. A significant improvement in functional outcomes was observed in all patients at final follow-up. No statistically significant difference ($p > 0.05$) was found between groups in the mean Constant Shoulder Score (Group 1: 94.2 ± 7.8; Group 2: 95.4 ± 4.1), the mean Rowe score (Group 1: 95.6 ± 4.6; Group 2: 96.3 ± 3.8), or the loss of external rotation in neutral position (Group 1: 1.9°; Group 2: 2.2°). Recurrent dislocation occurred in three patients (n = 2 in Group 1 and n = 1 in Group 2). The authors concluded that glenohumeral stability was not correlated with the use of two or three anchors in arthroscopic Bankart repair.

The general characteristics of the included studies and the certainty of evidence according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach are presented in Tables 1 and 2, respectively.[13,14]

Study Limitations

Future research should prioritize randomized, multicenter clinical trials with rigorous methodology. Studies with this design are essential to more precisely define the long-term clinical and functional outcomes associated with each technique, since no studies with high methodological rigor on this topic were identified.

Table 1. Characteristics of the included studies.

Included study	Study design	Sample size (n)	Follow-up
Buckup J. et al.[5]	Randomized controlled trial	40 (20 vs 20)	12 months (MRI); 24 months (clinical)
Vermeulen A.E. et al.[11]	Retrospective cohort	147	Mean 6 years
Özdemir B. et al.[12]	Retrospective cohort	40 (17 vs 23)	Minimum 2 years

MRI: magnetic resonance imaging.

Table 2. Quality of evidence (GRADE): three or more anchors versus up to two anchors.

Outcome	Studies (N)	Certainty of evidence
Recurrence of instability	3 studies (227)	Very low[1,2,3]
Function (functional scores)	3 studies (227)	Very low[1,2,3]
Complications	2 studies (80)	Very low[1,2,3]

1: Limited sample size; 2: Imprecision (wide confidence interval); 3: Risk of bias of the included studies (predominantly observational design). Note: GRADE (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to assess and grade the certainty of evidence, based on five domains: risk of bias, imprecision, inconsistency, indirectness, and publication bias. The certainty of evidence is classified as very low, low, moderate, or high.

Recommendation

Regarding functional outcomes and complications, there is no evidence demonstrating that the use of three or more anchors is more effective than the use of two anchors for the arthroscopic treatment of anterior shoulder instability in adults. However, regarding the outcome of recurrence, there is evidence, albeit of very low quality, that the use of three or more anchors is more effective than the use of up to two anchors.

Therefore, the Brazilian Society of Shoulder and Elbow Surgery (SBCOC) Consensus Project recommends that the surgeon individually assess patient- and disease-related characteristics to reach the best treatment decision. With respect to recurrence, this project recommends that the surgeon give preference to the use of three or more anchors for the treatment of anterior shoulder instability, given the trend toward a lower recurrence rate.

CONCLUSION

Regarding functional outcomes and complications, there is no evidence demonstrating that the use of three or more anchors is more effective than the use of two anchors for the arthroscopic treatment of anterior shoulder instability in adults. However, regarding recurrence, there is evidence, albeit of very low quality, that the use of three or more anchors is more effective than the use of up to two anchors.

CONTRIBUTIONS OF THE AUTHORS

Each author made substantial individual contributions to the development of this article. PHSL: writing and review; PSB: conceptualization and review; MS: conceptualization and review; LZ: conceptualization and review; MRF: conceptualization and review; JM: writing and review; JFMF: conceptualization and review; EAM: conceptualization and review.

DATA AVAILABILITY DECLARATION

The contents underlying the research are available in the manuscript.

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Appendix 1. Database search strategy.

PUBMED

#1 "Shoulder Dislocation"[Mesh] OR (Dislocation, Shoulder) OR (Dislocations, Shoulder) OR (Shoulder Dislocations) OR (Glenohumeral Dislocation) OR (Dislocation, Glenohumeral) OR (Dislocations, Glenohumeral) OR (Glenohumeral Dislocations) OR (Glenohumeral Subluxation) OR (Glenohumeral Subluxations) OR (Subluxation, Glenohumeral) OR (Subluxations, Glenohumeral)
#2 "Joint Instability"[Mesh] OR (Instability, Joint) OR (Instabilities, Joint) OR (Joint Instabilities) OR (Hypermobility, Joint) OR (Hypermobilities, Joint) OR (Joint Hypermobilities) OR (Joint Hypermobility) OR (Laxity, Joint) OR (Joint Laxities) OR (Joint Laxity) OR (Laxities, Joint)
#3 "Arthroscopy"[Mesh] OR (Arthroscopies) OR (Arthroscopic Surgical Procedures) OR (Arthroscopic Surgical Procedure) OR (Procedure, Arthroscopic Surgical) OR (Procedures, Arthroscopic Surgical) OR (Surgical Procedure, Arthroscopic) OR (Arthroscopic Surgery) OR (Arthroscopic Surgeries) OR (Surgeries, Arthroscopic) OR (Surgery, Arthroscopic) OR (Surgical Procedures, Arthroscopic)
#4 "Tissue Fixation"[Mesh] OR (Fixation, Tissue)
#5 "Suture Anchors"[Mesh] OR (Anchors, Suture) OR (Anchor, Suture) OR (Suture Anchor) OR (Bone Anchors) OR (Anchor, Bone) OR (Anchors, Bone) OR (Bone Anchor)
#6 "Recovery of Function"[Mesh] OR (Function Recoveries) OR (Function Recovery) OR "Postoperative Complications"[Mesh] OR (Complication, Postoperative) OR (Complications, Postoperative) OR (Postoperative Complication) OR "Recurrence"[Mesh] OR (Recurrences) OR (Relapse) OR (Relapses) OR (Recrudescence) OR (Recrudescences)
#7 #1 OR #2
#8 #3 OR #4
#9 #7 AND #8 AND #5 AND #6 - 279

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#1 (Shoulder Dislocation) OR (Dislocation, Shoulder) OR (Dislocations, Shoulder) OR (Shoulder Dislocations) OR (Glenohumeral Dislocation) OR (Dislocation, Glenohumeral) OR (Dislocations, Glenohumeral) OR (Glenohumeral Dislocations) OR (Glenohumeral Subluxation) OR (Glenohumeral Subluxations) OR (Subluxation, Glenohumeral) OR (Subluxations, Glenohumeral)
#2 (Joint Instability) OR (Instability, Joint) OR (Instabilities, Joint) OR (Joint Instabilities) OR (Hypermobility, Joint) OR (Hypermobilities, Joint) OR (Joint Hypermobilities) OR (Joint Hypermobility) OR (Laxity, Joint) OR (Joint Laxities) OR (Joint Laxity) OR (Laxities, Joint)
#3 (Arthroscopy) OR (Arthroscopies) OR (Arthroscopic Surgical Procedures) OR (Arthroscopic Surgical Procedure) OR (Procedure, Arthroscopic Surgical) OR (Procedures, Arthroscopic Surgical) OR (Surgical Procedure, Arthroscopic) OR (Arthroscopic Surgery) OR (Arthroscopic Surgeries) OR (Surgeries, Arthroscopic) OR (Surgery, Arthroscopic) OR (Surgical Procedures, Arthroscopic)
#4 (Tissue Fixation) OR (Fixation, Tissue)
#5 (Suture Anchors) OR (Anchors, Suture) OR (Anchor, Suture) OR (Suture Anchor) OR (Bone Anchors) OR (Anchor, Bone) OR (Anchors, Bone) OR (Bone Anchor)
#6 #1 OR #2
#7 #3 OR #4
#8 #6 AND #7 AND #5

EMBASE

#1 'shoulder dislocation'/exp OR 'dislocation, shoulder' OR 'humeroscapular luxation' OR 'scapulohumeral luxation' OR 'shoulder dislocation' OR 'shoulder joint dislocation' OR 'shoulder luxation'
#2 'joint instability'/exp OR 'instability, joint' OR 'joint instability'
#3 'arthroscopy'/exp OR 'arthro-endoscopy' OR 'arthroendoscopy' OR 'arthroscopic exam' OR 'arthroscopic examination' OR 'arthroscopic procedure' OR 'arthroscopic procedures' OR 'arthroscopy'
#4 'tissue fixation'/exp OR 'tissue fixation'
#5 'suture anchor'/exp OR 'bioraptor' OR 'betta link' OR 'bio-corkscrew' OR 'bio-suture tak' OR 'bio-sutureta k' OR 'biocorkscrew' OR 'biowick' OR 'bioplug nt' OR 'biosteon intraline' OR 'chait (suture anchor)' OR 'compositcp (suture anchor)' OR 'cope (suture anchor)' OR 'corkscrew (suture anchor)' OR 'crossft bc' OR 'fastak' OR 'fiberstitch' OR 'fibertak' OR 'fibulink' OR 'footprint pk' OR 'gii' OR 'graftrope' OR 'gravity (suture anchor)' OR 'gryphon' OR 'gryphon proknot' OR 'healicoil (suture anchor)' OR 'healicoil pk' OR 'healicoil' OR 'healix (suture anchor)' OR 'healix advance' OR 'healix ti' OR 'healix transtend' OR 'iconix' OR 'iconix speed' OR 'insite ft' OR 'juggerknot' OR 'juggerknotless' OR 'juggerstitch' OR 'knotilus' OR 'lupine (suture anchor)' OR 'memofix' OR 'memosorb' OR 'micro quickanchor' OR 'microfix' OR 'mini quickanchor' OR 'minilok' OR 'morphix' OR 'nanotack tt' OR 'omega (suture anchor)' OR 'omnispan' OR 'peek intraline' OR 'peek zip' OR 'piton (suture anchor)' OR 'poplok' OR 'pressft' OR 'procinch' OR 'pushlock' OR 'q-fix' OR 'quattro (suture anchor)' OR 'quattro gl' OR 'rigidfix' OR 'reelx' OR 'reelx stt' OR 'retrobutton' OR 'rigidloop' OR 'speedlock (suture anchor)' OR 'speedscrew' OR 'suturefix ultra' OR 'suturefix ultra xl' OR 'sonicanchor' OR 'sonicpin' OR 'surelock' OR 'sututetak' OR 'swivelock' OR 'swivelock c' OR 'swivelock sp' OR 'swivelock tenodesis' OR 'twinfix ultra ha' OR 'twinfix ultra pk' OR 'tacit' OR 'tensionloc' OR 'truespan' OR 'twinfix' OR 'twinloop flex' OR 'ventix' OR 'versalok' OR 'versaloop' OR 'y-knot' OR 'ziptight' OR 'bioabsorbable soft tissue anchor' OR 'bioabsorbable soft-tissue anchor' OR 'bioabsorbable suture anchor' OR 'bone anchor' OR 'bone anchors' OR 'ibalance' OR 'non-bioabsorbable soft-tissue anchor' OR 'soft-tissue anchor, bioabsorbable' OR 'soft-tissue anchor, non-bioabsorbable' OR 'surgical binding material anchor' OR 'surgical binding material anchor set' OR 'suture anchor' OR 'suture anchors'
#6 'orthopedic fixation device'/exp OR 'acumed' OR 'biofoam (orthopedic fixation device)' OR 'tunneloc' OR 'veptr' OR 'veptr ii' OR 'fixation device' OR 'fixation device (attribute)' OR 'fixation devices' OR 'fixator' OR 'fixator (physical object)' OR 'fixators' OR 'immobiliser (orthopaedic)' OR 'immobilizer (orthopedic)' OR 'metallic osteotomy fusion cage' OR 'orthopaedic fixation device' OR 'orthopaedic fixation devices' OR 'orthopaedic fixation systems' OR 'orthopaedic immobiliser' OR 'orthopedic fixation device' OR 'orthopedic fixation devices' OR 'orthopedic immobilizer' OR 'surgical fixation devices'
#7 #1 OR #2
#8 #3 OR #4
#9 #5 OR #6
#10 #7 AND #8 AND #9 - 1875
#11 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) - 791
#12 'convalescence'/exp OR 'convalescence' OR 'convalescence cure' OR 'convalescent' OR 'cure, convalescence' OR 'recovery of function' OR 'postoperative complication'/exp OR 'complication after operation' OR 'complication after surgery' OR 'complication, postoperative' OR 'complication, surgical' OR 'post-operation complication' OR 'post-operative complication' OR 'post-operative complications' OR 'post-surgery complication' OR 'post-surgical complication' OR 'postoperation complication' OR 'postoperative complication' OR 'postoperative complications' OR 'postsurgery complication' OR 'postsurgical complication' OR 'surgery complication' OR 'surgery complications' OR 'surgery-associated complication' OR 'surgery-derived complication' OR 'surgery-induced complication' OR 'surgery-related complication' OR 'surgical complication' OR 'recurrent disease'/exp OR 'disease recurrence' OR 'periodic disease' OR 'recurrence' OR 'recurrent disease' OR 'relapsing disease' OR 'symptom flare up'
#13 #11 AND #12

REGIONAL PORTAL (BVS)

#1 MH:"Luxação do Ombro" OR (Shoulder Dislocation) OR (Luxação Glenoumeral) OR MH:C05.550.518.750$ OR MH:C26.289.750$ OR MH:C26.803.125$ OR MH:"Instabilidade Articular" OR (Joint Instability) OR (Frouxidão Articular) OR (Frouxidão Ligamentar) OR (Frouxidão da Articulação) OR (Hiperfrouxidão Ligamentar Difusa) OR (Hipermobilidade Articular) OR (Hipermobilidade da Articulação) OR (Instabilidade da Articulação) OR MH:C05.550.521$
#2 MH:"Artroscopia" OR (Arthroscopy) OR (Procedimentos Cirúrgicos Artroscópicos) OR MH:E01.370.388.250.070$ OR MH:E04.502.250.070$ OR MH:E04.555.113$ OR MH:"Fixação de Tecidos" OR (Tissue Fixation) OR MH:E01.370.225.500.620.760.720$ OR MH:E01.370.225.750.600.760.720$ OR MH:E05.200.500.620.760.720$ OR MH:E05.200.750.600.760.720$
#3 MH:"Âncoras de Sutura" OR (Suture Anchors) OR (Ancoragem Ñssea) OR (Âncoras Ñsseas) OR MH:E07.695.370.734$ OR MH:E07.858.442.660.460.734$ OR MH:E07.858.690.725.460.734$
#4 #1 AND #2 AND #3

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DOI: http://dx.doi.org/10.1590/1413-785220263401e303258

EVIDENCE-BASED REVIEWS & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: REVERSE ARTHROPLASTY FOR COMPLEX PROXIMAL HUMERAL FRACTURES IN ELDERLY PATIENTS

REVISÕES BASEADAS EM EVIDÊNCIAS E RECOMENDAÇÕES DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: ARTROPLASTIA REVERSA NAS FRATURAS COMPLEXAS PROXIMAIS DO ÚMERO EM IDOSOS

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ABSTRACT

Introduction: Complex (Neer 3- or 4-part) proximal humeral fractures in elderly patients are associated with high complication and failure rates after open reduction and internal fixation with locking plates (ORIF-LP). Reverse shoulder arthroplasty (RSA) has emerged as an alternative, but its comparative effectiveness remains debated. Methods: We conducted an evidence-based review of systematic reviews and randomized controlled trials including elderly patients with Neer 3- or 4-part fractures, identified through PubMed, Embase, Cochrane Library, and BVS (search to August 2025). High-quality systematic reviews were prioritized, and individual RCTs were added when necessary. Risk of bias and certainty of evidence were assessed using Cochrane methods and the GRADE approach. Results: Four systematic reviews and three RCTs met the inclusion criteria. Across network meta-analyses and direct comparisons, RSA provided superior shoulder function, with higher Constant and Oxford scores at 2 and 5 years than ORIF-LP. RSA also tended to reduce complication and reoperation rates, although event numbers were small and confidence intervals were wide. Overall certainty was low for function and very low for complications and reoperations. Conclusions: In elderly patients with complex proximal humeral fractures requiring surgery, RSA appears to yield better functional outcomes and fewer reoperations than ORIF-LP, supporting its use as the preferred surgical option, while acknowledging the low certainty of evidence. ***Level of evidence II; Systematic review.***

Keywords: Humeral Fractures; Arthroplasty, Replacement, Shoulder; Reverse Shoulder Arthroplasty; Fracture Fixation, Internal; Treatment Outcome.

RESUMO

Introdução: Fraturas proximais complexas do úmero (Neer em 3 ou 4 partes) em pacientes idosos estão associadas a altas taxas de complicações e de falhas após redução aberta e fixação interna com placas bloqueadas (RAFI-PB). A artroplastia reversa do ombro (ARO) surgiu como alternativa, mas sua efetividade comparativa ainda é motivo de debate. Métodos: Foi realizada uma revisão baseada em evidências de revisões sistemáticas e ensaios clínicos randomizados que incluíram idosos com fraturas Neer em 3 ou 4 partes, identificados por meio das bases PubMed, Embase, Cochrane Library e BVS (busca até agosto de 2025). Revisões sistemáticas de alta qualidade foram priorizadas, e ensaios clínicos randomizados individuais foram acrescentados quando necessário. O risco de viés e a certeza da evidência foram avaliados segundo a metodologia Cochrane e a abordagem GRADE. Resultados: Quatro revisões sistemáticas e três ensaios clínicos randomizados preencheram os critérios de inclusão. Em meta-análises em rede e comparações diretas, a ARO apresentou melhor função do ombro, com escores de Constant e de Oxford superiores aos da RAFI-PB aos 2 e 5 anos. A ARO também tendeu a reduzir complicações e reoperações, embora com poucos eventos e amplos intervalos de confiança. A certeza global foi baixa para função e muito baixa para complicações e reoperações. Conclusão: Em idosos com fraturas proximais complexas do úmero que requerem tratamento cirúrgico, a ARO parece proporcionar melhores desfechos funcionais e menos reoperações do que a RAFI-PB, sustentando seu uso como opção cirúrgica preferencial, apesar da baixa certeza da evidência disponível. ***Nível de Evidência II; Revisão sistemática.***

Descritores: *Fraturas do Úmero; Artroplastia do Ombro; Artroplastia Reversa do Ombro; Fixação Interna de Fraturas; Resultado do Tratamento.*

Citation: Amaral MVG, Zanesco L, Pinto GMR, Rafaelli MP, Caixeta TB, Piluski PCF, Campos MCO, Malavolta EA. Evidence-based reviews & recommendations from the brazilian society of shoulder and elbow surgery: reverse arthroplasty for complex proximal humeral fractures in elderly patients. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 5. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 11/28/2025 approved on 05/05/2026.
Handling Editor: Marcia Uchoa

RECOMMENDATION

There is low-quality evidence showing that reverse shoulder arthroplasty (RSA) is more effective than open reduction and internal fixation (ORIF) with locking plates and screws for the treatment of complex proximal humeral fractures (defined as Neer 3- or 4-part fractures) regarding functional outcomes (Level of Evidence I and II). There is also very low-quality evidence suggesting that RSA is more effective than ORIF with plates and screws in reducing complications and reoperation rates (Level of Evidence I and II).
The SBCOC Consensus Project recommends that elderly patients diagnosed with complex proximal humeral fractures (Neer 3 or 4 parts) should be individually evaluated, considering both clinical and injury characteristics, to determine the most appropriate treatment method. When surgery is chosen as the treatment approach, reverse shoulder arthroplasty should be regarded as the preferred surgical option, since it provides better functional outcomes, fewer complications, and lower reoperation rates, according to the current evidence.

INTRODUCTION

Proximal humeral fractures (PHF) are highly prevalent, accounting for approximately 6% of all fractures,[1] and mainly affect elderly patients.[2] Although nonoperative management is frequently recommended in elderly patients[3], some studies suggest that, based on clinical and radiographic criteria, certain fractures should be treated surgically.[4,5] Among the surgical options, open reduction and internal fixation with locking plates and screws (ORIF-LP) has been widely used for the treatment of PHF.[6] However, this technique is associated with a high complication rate, including intra-articular screw penetration, loss of reduction, avascular necrosis, malunion, nonunion, and infection.[7] These complications are more common in elderly patients, resulting in revision rates of up to 29%.[8] As an alternative, reverse shoulder arthroplasty (RSA) has emerged as a treatment option for complex PHF.[9] Therefore, comparative studies between these surgical approaches, in terms of functional outcomes, complication rates, and reoperations, are crucial for optimizing management in elderly patients with complex PHF.
This evidence review was developed within a collaborative initiative between Cochrane and the Brazilian Society of Shoulder and Elbow Surgery (SBCOC). The aim of this partnership is to synthesize the best available evidence using rigorous, transparent methods and to translate it into clear, practical recommendations for clinical practice.

Research Question

In elderly patients with complex proximal humeral fractures, which treatment is more effective — reverse shoulder arthroplasty (RSA) or open reduction and internal fixation with locking plates and screws (ORIF-LP) — regarding functional outcomes, complication rates, and reoperation needs?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and BVS.
- Descriptors used:
- "Humeral Fractures"[Mesh]; "Reverse Shoulder Arthroplasty" OR "Arthroplasty, Replacement, Shoulder"[Mesh]; "Fracture Fixation, Internal"[Mesh]; "Systematic Review" [Publication Type]; "Randomized Controlled Trial" [Publication Type] (see Appendix 1).
- Search period: Up to August 2025.
- Systematic reviews (SRs) with high methodological quality and recent publication were prioritized. In the absence of high-quality SRs, randomized controlled trials (RCTs) with adequate methodological quality were included.

RESULTS

The search identified 100 references (40 PubMed, 36 Cochrane Library, 13 Embase, and 11 from the Regional BVS Portal). Among these, 14 were systematic reviews and 3 were randomized controlled trials.
After full-text analysis, 10 systematic reviews[9-18] were excluded for addressing 2-part fractures or for not focusing exclusively on elderly patients, and one systematic review[19] was excluded due to an updated version.
Thus, 4 systematic reviews[20-23] and 3 randomized controlled trials[24-26] were included in the final synthesis. One of these RCTs reported outcomes from the same sample at 5-year follow-up.[26] (Figure 1).

Included studies

The first review addressing the clinical question was conducted by Du et al.[20] (2017), which compared interventions for the treatment of 3- and 4-part proximal humeral fractures (PHF) in elderly patients. A total of 7 randomized controlled trials (RCTs) with 347 participants were included, comparing nonoperative treatment with sling (108 participants), hemiarthroplasty (93 participants), open reduction and internal fixation with locking plate (ORIF-LP; 76 participants), and reverse shoulder arthroplasty (RSA; 31 participants). None of the studies included a direct comparison between ORIF-LP and RSA. The authors performed a network meta-analysis to compare these interventions, using Constant scores and reoperation rates as primary outcomes, analyzed with Cochrane methodology.[27] They concluded that, for both functional outcomes and reoperation rates, RSA showed superior results compared with ORIF-LP.
Guo et al.[23] (2022) also conducted a network meta-analysis including only RCTs. Their comparisons were similar to those in Du et al.[20], but an additional group treated with intramedullary nailing was analyzed. Outcomes included the Constant score and reoperation rates. A total of 11 studies with 648 participants were included, and only one study directly compared RSA with ORIF-LP. According to the authors, all included studies presented a low risk of bias, as assessed by the Cochrane tool. The authors concluded that RSA

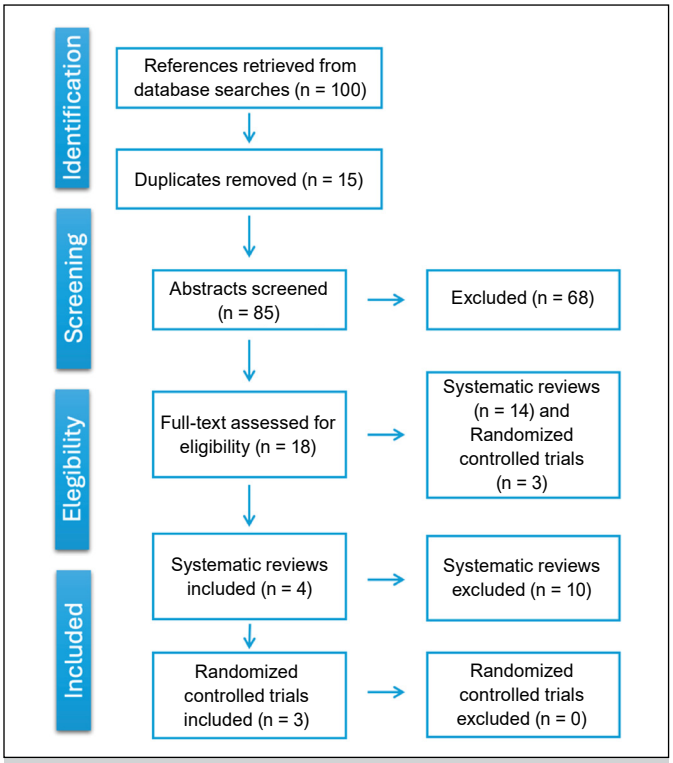

Figure 1. Flow diagram of the literature search.

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was the most effective intervention, demonstrating lower reoperation rates. In both Du et al.[20] and Guo et al.,[23] the follow-up period was less than 2 years.

Two additional systematic reviews compared ORIF-LP and RSA — one published in 2022[21] and the other in 2023.[22] However, like the previous review,[23] both included only one RCT[24] for data extraction and analysis.

That Fraser et al.[24] study was a multicenter RCT conducted in Norway, including 124 participants aged 65–85 years with complex PHF, recruited from seven public hospitals. A research protocol had been previously published.[29] Outcomes of interest included shoulder function (Constant and Oxford Shoulder Scores), adverse events, and revision surgery rates. The primary endpoint was the Constant score at 2 years, showing that patients who underwent RSA achieved a mean score of 68 points (95% CI, 63.7–72.4), whereas the ORIF-LP group achieved 54.6 (95% CI, 48.5–60.7) — a mean difference of 13.4 points (95% CI, 6.2–20.6; $p < 0.001$), which was both statistically and clinically significant in favor of RSA.

For the Oxford Shoulder Score, RSA patients achieved a mean of 40.8 (95% CI, 38.8–42.7), while the ORIF-LP group averaged 36.5 (95% CI, 34.0–39.0), corresponding to a mean difference of 4.3 points (95% CI, 1.2–7.4; $p = 0.007$), again favoring RSA.

Regarding complications, there were 7 events among 7 RSA patients versus 12 events among 11 ORIF-LP patients. Of these, reoperations occurred in 4 RSA patients (2 component exchanges, 2 others) and 8 ORIF-LP patients (4 conversions to RSA and 4 hardware removals or ORIF revisions). In a 2024 follow-up publication,[25] the same cohort was reassessed at 5 years postoperatively. Follow-up was available for 65 of the 124 patients, representing a substantial attrition that limits statistical power and generalizability. The mean Constant score was 71.7 (95% CI, 67.1–76.3) for RSA and 58.3 (95% CI, 50.6–65.9) for ORIF-LP, with a mean difference of 13.4 points (95% CI, 5.2–21.7; $p < 0.002$) in favor of RSA. The Oxford Shoulder Score averaged 43.0 (95% CI, 41.3–44.8) in the RSA group and 38.0 (95% CI, 34.8–41.3) in the ORIF-LP group, a mean difference of 5.0 points (95% CI, 1.7–8.3; $p = 0.003$), also favoring RSA. Over the 5-year period, 13 complications occurred among RSA patients and 17 among ORIF-LP patients. There were 6 reoperations in the RSA group and 11 in the ORIF-LP group.

Both studies concluded that RSA is superior to ORIF-LP for elderly patients regarding shoulder function, adverse events, and reoperation rates.

A recent publication by Yang et al.26 (2025) — not previously included in earlier systematic reviews — compared these two treatments in 68 patients aged ≥70 years with complex PHF. All surgeries were performed by the same surgeon. Outcomes included Constant and Oxford Shoulder Scores at 2 years, as well as complication and reoperation rates. The mean improvement in Constant score was 30.3 ± 8 for RSA and 22.6 ± 6.0 for ORIF-LP, with a mean difference of 7.7 points (95% CI, 4.0–11.3; $p < 0.001$). For the Oxford Shoulder Score, RSA patients scored 29.5 ± 4.3, while ORIF-LP patients scored 27.2 ± 4.4, a mean difference of 2.3 (95% CI, 0.2–4.4; $p = 0.032$). Complication rates did not differ significantly (RSA 9.4% [3/32] vs. ORIF-LP 16.7% [6/36]; OR = 0.828 [95% CI 0.171–4.014]; $p = 0.814$). However, no RSA patients required reoperation, whereas four ORIF-LP patients underwent additional surgery.

The general characteristics of the evaluated studies and the quality of evidence according to the GRADE system[30,31] are presented in Tables 1 and 2, respectively.

Table 1. Characteristics of the included studies.

Studies	Study type	Included studies (Designs)	Sample size	Published protocol
Du et al. (2017)	Systematic review	7 (RCTs)	347	No
Guo et al. (2023)	Randomized control trial (RCT)	11 (RCTs)	648	Yes
Handol et al. (2022)	Randomized control trial (RCT)	47 (RCTs)	3179	No
Lapner et al. (2023)	Randomized control trial (RCT)	15 (RCTs)	1146	Yes

Table 2. Quality of evidence (GRADE).

Outcome	Studies (n)	Evidence quality
Function (Constant score)	2 studies	Low
Complication rate	2 studies	Very low
Reoperation rate	2 studies	Very low

The GRADE tool (Grading of Recommendations Assessment, Development and Evaluation) is used to appraise and measure the quality of evidence. It is grounded in five domains: risk of bias, imprecision, inconsistency, indirectness of outcomes, and publication bias. Based on this framework, the quality of evidence is classified into four levels: very low, low, moderate, and high.[30,31]

CONCLUSION

For the outcome of shoulder function (measured by the Constant score), RSA is superior to ORIF-LP in the treatment of Neer 3- or 4-part proximal humeral fractures in elderly patients, with a low level of evidence. For the outcomes of complication rate and reoperation rate, RSA also shows better results than ORIF-LP, though the evidence quality is very low.

CONTRIBUTIONS OF THE AUTHORS

Each author contributed individually and significantly to the development of this article. MVGA: study conception and design, data acquisition, data analysis and interpretation, and manuscript drafting; LZ: data acquisition, data analysis and interpretation, and manuscript drafting and revision; GMRP: data acquisition and critical revision of the intellectual content; MPR: data acquisition and critical revision of the intellectual content; TBC: data acquisition and critical revision of the intellectual content; PCFP: data acquisition and critical revision of the intellectual content; MCOC: study conception and design, critical revision of the intellectual content, and final approval of the version to be published; EAM: study conception and design, critical revision of the intellectual content, and final approval of the version to be published. All authors approved the final version of the manuscript to be published.

DATA AVAILABILITY DECLARATION

The data underlying the research text are contained in the manuscript.

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Appendix 1. Database search strategies.

PUBMED

#1 "Humeral Fractures"[Mesh] OR (Fracture, Humeral) OR (Humeral Fracture) OR (Humeri Fractures) OR (Fracture, Humeri) OR (Humeri Fracture) OR (Humerus Fractures) OR (Fracture, Humerus) OR (Humerus Fracture)
#2 (Reverse Shoulder Arthroplasty) OR "Arthroplasty, Replacement, Shoulder"[Mesh] OR (Shoulder Replacement Arthroplasty) OR (Arthroplasties, Shoulder Replacement) OR (Arthroplasty, Shoulder Replacement) OR (Replacement Arthroplasties, Shoulder) OR (Replacement Arthroplasty, Shoulder) OR (Shoulder Replacement Arthroplasties) OR (Total Shoulder Replacement) OR (Replacements, Total Shoulder) OR (Replacement, Total Shoulder) OR (Shoulder Replacements, Total) OR (Shoulder Replacement, Total) OR (Total Shoulder Replacements)
#3 "Fracture Fixation, Internal"[Mesh] OR (Fixation, Internal Fracture) OR (Fixations, Internal Fracture) OR (Fracture Fixations, Internal) OR (Internal Fracture Fixation) OR (Internal Fracture Fixations) OR (Osteosynthesis, Fracture) OR (Fracture Osteosyntheses) OR (Fracture Osteosynthesis) OR (Osteosyntheses, Fracture)
#4 "Bone Plates"[Mesh] OR (Bone Plate) OR (Plate, Bone) OR (Plates, Bone)
#5 #3 OR #4
#6 #1 AND #2 AND #5
Filters applied: Randomized Controlled Trial, Systematic Review

COCHRANE

#1 (Humeral Fractures) OR (Fracture, Humeral) OR (Humeral Fracture) OR (Humeri Fractures) OR (Fracture, Humeri) OR (Humeri Fracture) OR (Humerus Fractures) OR (Fracture, Humerus) OR (Humerus Fracture)
#2 (Reverse Shoulder Arthroplasty) OR (Arthroplasty, Replacement, Shoulder) OR (Shoulder Replacement Arthroplasty) OR (Arthroplasties, Shoulder Replacement) OR (Arthroplasty, Shoulder Replacement) OR (Replacement Arthroplasties, Shoulder) OR (Replacement Arthroplasty, Shoulder) OR (Shoulder Replacement Arthroplasties) OR (Total Shoulder Replacement) OR (Replacements, Total Shoulder) OR (Replacement, Total Shoulder) OR (Shoulder Replacements, Total) OR (Shoulder Replacement, Total) OR (Total Shoulder Replacements)
#3 (Fracture Fixation, Internal) OR (Fixation, Internal Fracture) OR (Fixations, Internal Fracture) OR (Fracture Fixations, Internal) OR (Internal Fracture Fixation) OR (Internal Fracture Fixations) OR (Osteosynthesis, Fracture) OR (Fracture Osteosyntheses) OR (Fracture Osteosynthesis) OR (Osteosyntheses, Fracture)
#4 (Bone Plates) OR (Bone Plate) OR (Plate, Bone) OR (Plates, Bone)
#5 #3 OR #4
#6 #1 AND #2 AND #5

EMBASE

#1 'humerus fracture'/exp OR 'fracture, humerus' OR 'humeral fracture' OR 'humeral fractures' OR 'humerus fracture' OR 'humerus juxtaarticular fracture' OR 'humerus medial condyle fracture' OR 'humerus medial epicondyle fracture' OR 'upper arm fracture'
#2 'shoulder replacement'/exp OR 'arthroplasty, replacement, shoulder' OR 'shoulder replacement' OR 'shoulder replacement arthroplasty' OR 'shoulder replacements' OR (Reverse Shoulder Arthroplasty)
#3 'osteosynthesis'/exp OR 'fracture fixation, internal' OR 'gleitosteosynthesis' OR 'internal fixation' OR 'internal fracture fixation' OR 'osteo synthesis' OR 'osteosynthesis'
#4 'bone plate'/exp OR 'claw ii' OR 'integra (bone plate)' OR 'lcp (bone plate)' OR 'lcp distal ulna plate' OR 'marc k (bone plate)' OR 'ncb (bone plate)' OR 'pediatric lcp' OR 'rival reduce' OR 'rival view' OR 'sutureplate' OR 'tbfix' OR 'trumatch (bone plate)' OR 'valkyrie' OR 'visiofix' OR 'bone fixation plate' OR 'bone plate' OR 'bone plate, device' OR 'bone plates' OR 'fixation plate' OR 'fracture fixation plate' OR 'growth-correction orthopaedic fixation plate kit' OR 'growth-correction orthopedic fixation plate kit' OR 'non bioabsorbable orthopedic fixation plate' OR 'non-bioabsorbable bone plate' OR 'non-bioabsorbable fixation plate' OR 'non-bioabsorbable orthopaedic fixation plate' OR 'non-sterile non-bioabsorbable orthopaedic fixation plate' OR 'non-sterile nonbioabsorbable orthopedic fixation plate' OR 'orthopaedic fixation plate, non-bioabsorbable, non-sterile' OR 'orthopaedic fixation plate, non-bioabsorbable, sterile' OR 'orthopaedic fixation plates' OR 'orthopedic fixation plate, non bioabsorbable' OR 'orthopedic fixation plate, nonbioabsorbable, non-sterile' OR 'orthopedic fixation plates' OR 'rhead' OR 'semitubular plate' OR 'sterile non-bioabsorbable orthopaedic fixation plate' OR 'tubular plate'
#5 #3 OR #4
#6 #1 AND #2 AND #5
#7 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)
#8 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) AND ([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim OR [controlled clinical trial]/lim OR [randomized controlled trial]/lim)

PORTAL REGIONAL BVS

#1 MH:"Fraturas do Úmero" OR (Humeral Fractures) OR (Fratura do Úmero) OR (Fraturas dos Úmeros) OR MH:C26.088.390$ OR MH:C26.404.500$
#2 MH:"Artroplastia do Ombro" OR (Arthroplasty, Replacement, Shoulder) OR (Substituição Total do Ombro) OR MH:E04.555.110.110.299$ OR MH:E04.617.101.110.299$ OR MH:E04.650.110.299$
#3 MH:"Fixação Interna de Fraturas" OR (Fracture Fixation, Internal) OR (Osteossíntese) OR (Osteossíntese em Fratura Cirúrgica) OR MH:E02.718.472.300$ OR MH:E04.555.300.300$
#4 MH:"Placas Ñsseas" OR (Bone Plates) OR (Placas Ortopédicas) OR MH:E07.695.370.374$ OR MH:E07.858.442.660.460.374$ OR MH:E07.858.690.725.460.374$
#5 #3 OR #4
#6 #1 AND #2

DOI: http://dx.doi.org/10.1590/1413-785220263401e306296

EVIDENCE-BASED REVIEW & RECOMMENDATIONS FROM THE BRAZILIAN SOCIETY OF SHOULDER AND ELBOW SURGERY: REVERSE VERSUS ANATOMIC TOTAL ARTHROPLASTY FOR THE TREATMENT OF PRIMARY GLENOHUMERAL OSTEOARTHRITIS WITH AN INTACT ROTATOR CUFF IN PATIENTS AGED 70 YEARS OR OLDER

REVISÃO E RECOMENDAÇÕES BASEADAS EM EVIDÊNCIA DA SOCIEDADE BRASILEIRA DE CIRURGIA DO OMBRO E COTOVELO: ARTROPLASTIA REVERSA VERSUS TOTAL ANATÔMICA NO TRATAMENTO DA OSTEOARTRITE PRIMÁRIA GLENOUMERAL COM MANGUITO ROTADOR ÍNTEGRO EM PACIENTES COM 70 ANOS OU MAIS

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ABSTRACT

Introduction: Anatomic total shoulder arthroplasty (ATSA) has long been indicated for the treatment of degenerative joint diseases in patients with an intact rotator cuff. However, age-related rotator cuff degeneration may negatively impact outcomes. Reverse total shoulder arthroplasty (RTSA), initially indicated for cuff tear arthropathy, has progressively expanded its indications, including elderly patients with an intact rotator cuff. Methods: A systematic review of the literature was conducted in the PubMed, Embase, Cochrane Library, and Virtual Health Library databases up to November 2025, with the aim of comparing ATSA and RTSA regarding functional outcomes, complication rates, and the need for reoperation in patients aged 70 years or older with primary shoulder osteoarthritis and an intact rotator cuff. Results: Only one systematic review met the inclusion criteria, encompassing four observational studies, with a total of 2.731 arthroplasties. RTSA showed a lower reoperation rate compared with ATSA. Functional outcomes favored ATSA, although based on limited data. No statistically significant differences were observed between the techniques regarding complication rates. The overall quality of evidence was classified as very low. Conclusions: In patients aged 70 years or older with primary glenohumeral osteoarthritis and an intact rotator cuff, RTSA is associated with a lower revision rate, whereas ATSA demonstrates superior functional outcomes, with similar complication rates between the two techniques. ***Level of evidence II; Systematic review.***

Keywords: Arthroplasty, Replacement, Shoulder; Arthroplasty; Osteoarthritis; Rotator Cuff; Elderly.

RESUMO

Introdução: A artroplastia anatômica total do ombro (AATO) é tradicionalmente indicada para osteoartrite glenoumeral com manguito rotador íntegro. Contudo, a degeneração do manguito relacionada à idade pode comprometer seus resultados. A artroplastia reversa total do ombro (ARTO), inicialmente indicada para artropatia do manguito rotador, teve suas indicações ampliadas, incluindo pacientes idosos com manguito íntegro. Métodos: Realizou-se revisão sistemática da literatura nas bases PubMed, Embase, Cochrane Library e Biblioteca Virtual de Saúde, até novembro de 2025, com o objetivo de comparar a AATO e a ARTO quanto aos desfechos funcionais, às taxas de complicações e à necessidade de reoperação em pacientes com idade igual ou superior a 70 anos, portadores de osteoartrite primária do ombro e manguito rotador íntegro. Resultados: Apenas uma revisão sistemática atendeu aos critérios de inclusão, englobando quatro estudos observacionais, com total de 2,731 artroplastias. A ARTO apresentou menor taxa de reoperação em comparação à AATO. Os desfechos funcionais favoreceram a AATO, embora baseados em dados limitados. Não foram observadas diferenças estatisticamente significativas entre as técnicas quanto à taxa de complicações. A qualidade da evidência foi classificada como muito baixa. Conclusões: Em pacientes com idade igual ou superior a 70 anos, com osteoartrite glenoumeral primária e manguito rotador íntegro, a ARTO associa-se a menor taxa de reoperação, enquanto a AATO apresenta melhores desfechos funcionais, com taxas de complicações semelhantes entre as duas técnicas. ***Nível de evidência II; Revisão sistemática.***

Descritores: *Artroplastia do Ombro; Artroplastia; Osteoartrite; Manguito Rotador; Idosos.*

Citation: Fernandes MR, Zanesco L, Murachovsky J, Mouraria GG, Lara PHS, Belangero PS, Medeiros Filho JF, Malavolta EA. Evidence-based review and recommendations from the Brazilian Society of Shoulder and Elbow Surgery: reverse versus anatomic total arthroplasty for the treatment of primary glenohumeral osteoarthritis with an intact rotator cuff in patients aged 70 years or older. Acta Ortop Bras. [online]. 2026;34(Spe.1): Page 1 of 4. Available from URL: http://www.scielo.br/aob.

All authors declare no potential conflict of interest related to this article.

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Article received on 04/15/2026 approved on 05/06/2026.
Handling Editor: Américo Zoppi Filho

RECOMMENDATION

There is very low-quality evidence that reverse total shoulder arthroplasty (RTSA) is superior to anatomic total shoulder arthroplasty (ATSA) regarding the reoperation rate in the treatment of primary glenohumeral osteoarthritis in patients with an intact rotator cuff aged 70 years or older.

With respect to functional outcomes, there is weak scientific evidence indicating that ATSA is superior to RTSA in this population. There is very low-quality evidence that both modalities present similar results regarding the complication rates in the studied population. Therefore, the Brazilian Society of Shoulder and Elbow Surgery Consensus Project recommends that the choice between RTSA and ATSA be individualized, considering, on a case-by-case basis, patient-related factors, expectations, functional demands, physical examination findings, and imaging results, in order to guide the decision toward the most appropriate procedure.

From a practical standpoint, the findings suggest that RTSA may represent an alternative in patients at greater risk of long-term rotator cuff functional failure, whereas ATSA tends to provide better functional parameters, especially with regard to rotational mobility. Thus, the choice of prosthesis type should consider not only the average reported outcomes but also the individual patient's expectations.

INTRODUCTION

ATSA has a long history in the treatment of degenerative joint diseases in patients with an intact rotator cuff, with several studies reporting satisfactory outcomes.[1,2] However, in the presence of rotator cuff tears or when severe atrophy associated with fatty infiltration is present, clinical outcomes tend to be unfavorable.[3,4]

Rotator cuff tendons undergo progressive degeneration with advancing age, accompanied by secondary muscle belly atrophy, and injuries are present in nearly 50% of the population in the eighth or ninth decades of life.[5-7] Furthermore, even in the absence of tendon rupture, fatty degeneration of the rotator cuff muscles has been associated with worse clinical outcomes, reduced range of motion, and lower satisfaction after ATSA.[4]

On the other hand, RTSA was initially introduced as a treatment for rotator cuff arthropathy. Over the years, its indications have progressively expanded, with an exponential increase in frequency of use. In this context, RTSA has also been indicated for the treatment of shoulder osteoarthritis, even in the presence of an intact rotator cuff, with the theoretical advantage of compensating for potential cuff dysfunction or a possible late rupture following ATSA.

However, due to its particular biomechanics, recovery of range of motion, especially medial and lateral rotations, after RTSA is less predictable when compared with ATSA. In addition, there is a potential increase in the risk of complications, such as infection and nerve injury, as well as a scarcity of long-term survivorship data.[8,9]

Given this scenario, comparative evaluations between ATSA and RTSA regarding the need for reoperation, functional outcomes, and complication rates in patients aged 70 years or older with primary shoulder osteoarthritis and an intact rotator cuff become relevant.

Research Question

In patients aged 70 years or older with primary glenohumeral osteoarthritis and an intact rotator cuff, which surgical modality is more effective, ATSA or RTSA, considering the need for reoperation, functional outcomes, and complication rates?

METHODS

- Databases searched: PubMed, Embase, Cochrane Library, and Virtual Health Library (VHL).
- Descriptors: "Shoulder Joint"[MeSH]; "Arthroplasty, Replacement"[MeSH]; "Arthroplasty, Replacement, Shoulder"[MeSH]; "Treatment Outcome"[MeSH]; "Reverse Shoulder Arthroplasty"; "Systematic Review"[Publication Type]; "Randomized Controlled Trial"[Publication Type] (see Appendix 1).
- Search period: up to November 2025.
- Study selection: updated systematic reviews (SRs) with adequate methodological quality were prioritized. In the absence of SRs, randomized clinical trials (RCTs) were considered, provided that methodological quality had been assessed.

RESULTS

The search identified 426 references (144 in PubMed, 92 in the Cochrane Library, 144 in Embase, and 46 in the Regional Portal of the VHL). Of these, eight were SRs, the study type prioritized in this evaluation, and no RCTs were identified.

After full-text analysis, seven SRs were excluded.[10-16] Two Cochrane reviews addressed arthroplasty in general terms, without direct comparison relevant to the clinical question.[10,11] One was excluded for being a narrative review,[12] and another for addressing cost-effectiveness, an outcome not intended in this analysis.[13] Of the remaining three reviews, one included samples with other indications for arthroplasty, such as fractures and rotator cuff arthropathy,[14] and two included patients younger than 70 years.[15,16]

Thus, only one SR remained eligible,[17] and no RCTs directly addressing the clinical question were identified (Figure 1).

Included Studies

No RCTs on the topic were found. A single systematic review compared ATSA and RTSA in the treatment of primary shoulder osteoarthritis in patients with an intact rotator cuff aged 70 years or older, with a minimum follow-up of two years.[17] The primary outcome

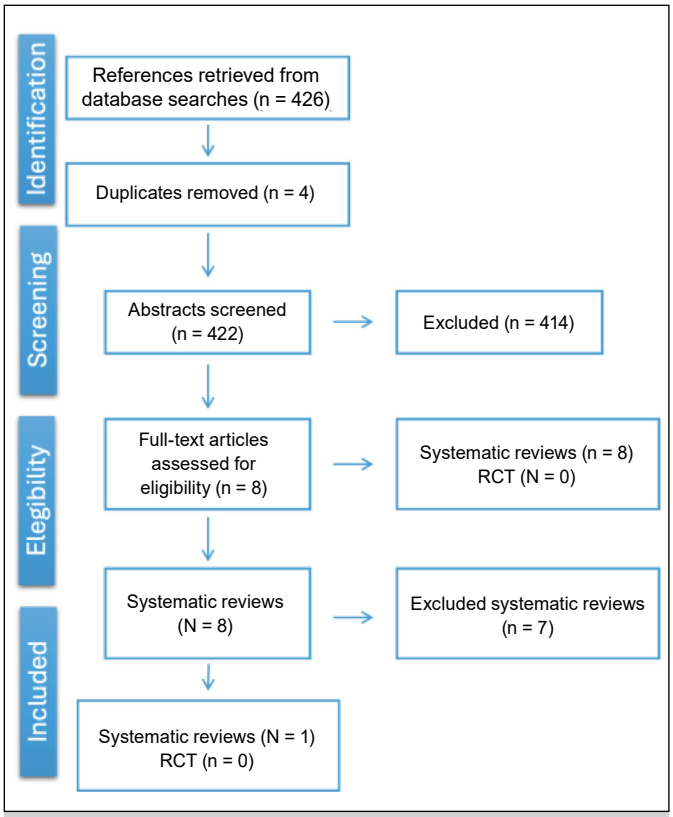

Figure 1. Flowchart of the literature search.

evaluated was the surgical revision rate, while functional scores and complication rates were considered secondary outcomes.
Four studies were included in this SR, totaling 2731 arthroplasties (1472 ATSA and 1259 RTSA).[18-21] Of these, three were retrospective cohort studies and one consisted of a registry analysis. Methodological quality was assessed using the Methodological Index for Non-Randomized Studies (MINORS), with a mean score of 18 points, ranging from 17 to 20, out of a total of 24.
All four studies compared the overall reoperation rate between ATSA and RTSA. The surgical revision rate was 3.05% for ATSA and 1.18% for RTSA (OR 0.50; 95% CI: 0.30–0.84; $p < 0.05$; $I^2 = 0\%$). Direct comparison of functional outcomes was not possible in this SR due to the absence of complete statistical data in the included studies, particularly the lack of standard deviation information, which precluded meta-analysis. The only available parametric analysis referred to the Constant-Murley score, derived from a single study, with results favoring ATSA (80 [75–82]) compared with RTSA (68 [66–76.5]) ($p < 0.0001$).[18]
Two studies provided complete data regarding types of complications and overall complications rates.[18,21] Reported complications included periprosthetic fracture, glenoid component loosening, scapular notching, instability, deep infection, neurological injury, vascular injury, secondary rotator cuff rupture, deep vein thrombosis, and hematoma. The complication rate was 7.9% for ATSA and 8.8% for RTSA, with no statistically significant difference between groups (OR 0.98; 95% CI: 0.34–2.86; $p = 0.97$; $I^2 = 0\%$).
The general characteristics of the eligible study and the assessment of evidence quality according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system[22,23] are presented in Tables 1 and 2, respectively.

Table 1. Characteristics of the included Systematic Review.

	Study design	Included studies	Sample	Prior protocol publication
Dragonas et al. 2023	SR	4 Retrospective studies (18-21)	2.731	Yes (PROSPERO)

SR- systematic review.

Table 2. Assessment of the quality of study evidence according to the GRADE system.

Study	Outcome	Relative Effect (1C95%)	Recommendation grade
Dragonas et al. 2023	Reoperation rate	OR.5 (CI 0.30 - 0.84)	Very low
Dragonas et al. 2023	Functional outcomes	ATSA: 80 (75-82) RTSA: 68 (66- 76.5)	Very low
Dragonas et al. 2023	Complications rates	OR= 0.98 (CI 0.34 - 2.86)	Very low

Note: The GRADE system (Grading of Recommendations Assessment, Development and Evaluation) is a tool used to assess and measure the quality of evidence. It is based on five domains: risk of bias, imprecision, inconsistency, indirectness of outcomes, and publication bias. Based on these criteria, the quality of evidence is classified as very low, low, moderate, or high. OR- Odds Ratio. CI — Confidence Interval.

CONCLUSIONS

In the comparison between ATSA and RTSA in patients aged 70 years or older with primary shoulder osteoarthritis and an intact rotator cuff, there is very low-quality evidence that RTSA is superior to ATSA regarding the reoperation rate.
Regarding functional outcomes, there is very low-quality evidence indicating superiority of ATSA over RTSA. There is also very low-quality evidence that both techniques present similar results regarding complication rates.

Implications for Research

Future research should prioritize the conduct of randomized, multicenter clinical trials with rigorous methodology. Studies with this design are essential to more precisely define long-term clinical and functional outcomes associated with each surgical modality, since no studies with high methodological rigor on this topic were identified.

CONTRIBUTIONS OF THE AUTHORS

All authors contributed significantly to the development of this study. MRF and PSB: Writing – original draft, Writing – review & editing; LZ, JM, GGM, PHSL, JFMF, and EAM: Conceptualization, Writing – review & editing.

DATA AVAILABILITY DECLARATION

The data underlying this study are available within the article.

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Appendix 1. Search Strategies Across Databases.

PUBMED

#1"Shoulder Joint"[Mesh] OR (Joint, Shoulder) OR (Joints, Shoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) OR (Glenohumeral Joints) OR (Joint, Glenohumeral) OR (Joints, Glenohumeral) OR (GlenoidLabrum) OR (Labrum, Glenoid) OR (Glenohumeral Joint) OR (Shoulder Arthritis) OR (Glenohumeral Arthritis) OR (Shoulder Osteoarthritis)
#2 "Arthroplasty, Replacement"[Mesh] OR (Joint Replacement) OR (Joint Replacements) OR (Replacement, Joint) OR (Replacements, Joint) OR (Arthroplasties, Replacement) OR (Replacement Arthroplasties) OR (Replacement Arthroplasty) OR (Joint Prosthesis Implantation) OR (Implantation, Joint Prosthesis) OR (Implantations, Joint Prosthesis) OR (Joint Prosthesis Implantations) OR (Prosthesis Implantation, Joint) OR (Prosthesis Implantations, Joint) OR (Total Joint Replacement) OR (Joint Replacements, Total) OR (Joint Replacement, Total) OR (Replacements, Total Joint) OR (Replacement, Total Joint) OR (Total Joint Replacements) OR (Arthroplasty, Replacement, Reverse Shoulder) OR (Reverse Shoulder Arthroplasty)
#3 "Arthroplasty, Replacement, Shoulder"[Mesh] OR (Shoulder Replacement Arthroplasty) OR (Arthroplasties, Shoulder Replacement) OR (Arthroplasty, Shoulder Replacement) OR (Replacement Arthroplasties, Shoulder) OR (Replacement Arthroplasty, Shoulder) OR (Shoulder Replacement Arthroplasties) OR (Total Shoulder Replacement) OR (Replacements, Total Shoulder) OR (Replacement, Total Shoulder) OR (Shoulder Replacements, Total) OR (Shoulder Replacement, Total) OR (Total Shoulder Replacements) OR (Arthroplasty, Replacement, Shoulder) OR (Anatomic Shoulder Arthroplasty) OR (Total Shoulder Arthroplasty)
#4 ("Treatment Outcome"[MeSH] OR "Postoperative Complications"[MeSH] OR "Reoperation"[MeSH] OR "Functional Outcome")
Filters applied: Clinical Trial, Controlled Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review, Aged: 65+ years, 80 and over: 80+ years.
#5 #1 AND #2 AND #3 AND #4

COCHRANE LIBRARY

#1 (Joint Shoulder) OR (JointsShoulder) OR (Shoulder Joints) OR (Glenohumeral Joint) OR (Glenohumeral Joints) OR (Joint Glenohumeral) OR (Joints, Glenohumeral) OR (GlenoidLabrum) OR (LabrumGlenoid) OR (Glenohumeral Joint) OR (Shoulder Arthritis) OR (Glenohumeral Arthritis) OR (Shoulder Osteoarthritis)
#2 (Arthroplasty Replacement) OR (Joint Replacement) OR (Joint Replacements) OR (Replacement Joint) OR (Replacements Joint) OR (Arthroplasties Replacement) OR (Replacement Arthroplasties) OR (Replacement Arthroplasty) OR (Joint Prosthesis Implantation) OR (Implantation Joint Prosthesis) OR (Implantations Joint Prosthesis) OR (Joint Prosthesis Implantations) OR (Prosthesis Implantation Joint) OR (Prosthesis Implantations Joint) OR (Total Joint Replacement) OR (Joint Replacements Total) OR (Joint Replacement Total) OR (Replacements Total Joint) OR (Replacement Total Joint) OR (Total Joint Replacements) OR (Arthroplasty Replacement Reverse Shoulder) OR (Reverse Shoulder Arthroplasty)
#3 (Arthroplasty Replacement Shoulder) OR (Shoulder Replacement Arthroplasty) OR (Arthroplasties Shoulder Replacement) OR (Arthroplasty Shoulder Replacement) OR (Replacement Arthroplasties Shoulder) OR (Replacement Arthroplasty Shoulder) OR (Shoulder Replacement Arthroplasties) OR (Total Shoulder Replacement) OR (Replacements Total Shoulder) OR (Replacement Total Shoulder) OR (Shoulder Replacements Total) OR (Shoulder Replacement Total) OR (Total Shoulder Replacements) OR (Arthroplasty Replacement Shoulder) OR (Anatomic Shoulder Arthroplasty) OR (Total Shoulder Arthroplasty)
#4 (Treatment Outcome) OR (Postoperative Complications) OR Reoperation OR (Functional Outcome)
#5 (Aged, 80 and over) OR (OlderAdults) OR (Elderly)
#6 #1 AND #2 AND #3 AND #4 AND #5

EMBASE

#1 'shoulder joint'/exp OR 'articulatio glenohumeralis' OR 'articulatio humeri' OR 'gleno-humeral joint' OR 'glenohumeral joint' OR 'humeral joint' OR 'humero-scapular joint' OR 'humeroscapular joint' OR 'joint, glenohumeral' OR 'joint, humeroscapular' OR 'scapulohumeral joint' OR 'scapulohumeral joint' OR 'shoulder (joint)' OR 'shoulder joint'OR (GlenoidLabrum) OR (Labrum, Glenoid) OR (Glenohumeral Joint) OR (Shoulder Arthritis) OR (Glenohumeral Arthritis) OR (Shoulder Osteoarthritis)
#2 'Replacement Arthroplasty'/exp OR 'arthroplasty, replacement' OR 'joint replacement' OR 'joint replacementsurgery' OR 'Replacement Arthroplasty' OR 'replacement, joint' OR (Implantation Joint Prosthesis) OR (Implantations Joint Prosthesis) OR (Joint Prosthesis Implantations) OR (Prosthesis Implantation Joint) OR (Prosthesis Implantations Joint) OR (Total Joint Replacement) OR (Joint Replacements Total) OR (Joint Replacement Total) OR (Replacements Total Joint) OR (Replacement Total Joint) OR (Total Joint Replacements) OR (Arthroplasty Replacement Reverse Shoulder) OR (Reverse Shoulder Arthroplasty)
#3 (Arthroplasty Replacement Shoulder) OR (Shoulder Replacement Arthroplasty) OR (Arthroplasties Shoulder Replacement) OR (Arthroplasty Shoulder Replacement) OR (Replacement Arthroplasties Shoulder) OR (Replacement Arthroplasty Shoulder) OR (Shoulder Replacement Arthroplasties) OR (Total Shoulder Replacement) OR (Replacements Total Shoulder) OR (Replacement Total Shoulder) OR (Shoulder Replacements Total) OR (Shoulder Replacement Total) OR (Total Shoulder Replacements) OR (Arthroplasty Replacement Shoulder) OR (Anatomic Shoulder Arthroplasty) OR (Total Shoulder Arthroplasty)
#4 (Treatment Outcome) OR (Postoperative Complications) OR Reoperation OR (Functional Outcome)
#1 AND #2 AND #3 AND #4 AND #5 AND ([aged]/lim OR [veryelderly]/lim) AND ([cochranereview]/lim OR [systematicreview]/lim OR [meta analysis]/lim OR [controlled clinical trial]/lim OR [Randomized Controlled Trial]/lim)

REGIONAL PORTAL VHL

#1 MH:"Articulação do Ombro" OR (Shoulder Joint) OR (Articulação Glenoumeral) OR (Articulações dos Ombros) OR (Ligamento Glenoide Umeral) OR (Lábio Glenoidal) OR MH:A02.835.583.748$ OR (Articulação do Ombro) OR (Artrite Glenoumeral) OR (Articulação do Ombro) OR (Osteoartrite do Ombro) OR (Artrose Glenoumeral)
#2 MH:"Artroplastia do Ombro" OR (Arthroplasty, Replacement, Shoulder) OR (Substituição Total do Ombro) OR MH:E04.555.110.110.299$ OR MH:E04.617.101.110.299$ OR MH:E04.650.110.299$ OR (Artroplastia Reversa do Ombro) OR (Prótese Reversa do Ombro)
#3 (Artroplastia Anatômica do Ombro) OR (Artroplastia Total do Ombro)
#4 (Idoso) OR (Idoso de 80 anos ou mais)
#5 #1 AND #2 AND #3 AND #4