

Review Article

Conservative versus Surgical Management of Partial Rotator Cuff Tears: Current Evidence, Clinical Outcomes, and Selection Criteria

Carmen Andrea Soto Rojas^{1*}, Diana Patricia Vargas Víquez²,
María José Víquez Angulo³, Otto Andrés Acuña Lopez⁴, Esther
Barrantes González⁵, Juan Manuel Boffill De León⁶

^{1,3}Medical Doctor, Independent Researcher, San José, Costa Rica


²Medical Doctor, Poder Judicial, Heredia, Costa Rica

⁴Medical Doctor, Trauma Hospital (INS), San José, Costa Rica

⁵Medical Doctor, Monseñor Sanabria Hospital, Puntarenas, Costa Rica

⁶Medical Doctor, Caja Costarricense de Seguro Social, San José, Costa Rica

*Corresponding author email: andreasoto1809@gmail.com

	International Archives of Integrated Medicine, Vol. 13, Issue 4, April, 2026. Available online at http://iaimjournal.com/ ISSN: 2394-0026 (P) ISSN: 2394-0034 (O)
	Received on: 24-3-2026 Accepted on: 25-4-2026 Source of support: Nil Conflict of interest: None declared. Article is under Creative Common Attribution 4.0 International DOI: 10.5281/zenodo.19813406
How to cite this article: Carmen Andrea Soto Rojas, Diana Patricia Vargas Víquez, María José Víquez Angulo, Otto Andrés Acuña Lopez, Esther Barrantes González, Juan Manuel Boffill De León. Conservative versus Surgical Management of Partial Rotator Cuff Tears: Current Evidence, Clinical Outcomes, and Selection Criteria. <i>Int. Arch. Integr. Med.</i> , 2026; 13(4): 168-181.	

Abstract

Partial-thickness rotator cuff tears represent a common cause of shoulder pain and functional limitation, particularly in the working population. The rotator cuff, composed of the supraspinatus, infraspinatus, subscapularis, and teres minor, plays a fundamental role in maintaining glenohumeral stability through coordinated muscle action and the concavity-compression mechanism. Disruption of this system leads to altered biomechanics, increased joint loading, and potential progression of tendon damage. These lesions are classified based on depth and location, which directly influence management decisions, with higher-grade tears being more likely to progress and require surgical intervention. The pathophysiology of partial tears is multifactorial, involving degenerative changes, oxidative stress, inflammation, and repetitive microtrauma. Aging-related alterations such as muscle

atrophy and fatty infiltration impair tendon healing capacity, while mechanical overload further contributes to structural deterioration. A significant proportion of partial tears may progress to full-thickness lesions, particularly in the presence of risk factors such as tendon retraction and high physical demand. Clinical evaluation requires integration of patient history, physical examination, and imaging studies. Although ultrasound and magnetic resonance imaging are valuable diagnostic tools, imaging findings do not always correlate with symptom severity, emphasizing the importance of clinical assessment. Conservative management is generally the first-line treatment, demonstrating effectiveness in pain reduction and functional improvement in most patients. Surgical intervention is reserved for high-grade tears, persistent symptoms, or high-demand individuals, offering significant improvements but with higher risks. Overall, individualized, patient-centered decision-making is essential to optimize outcomes and prevent disease progression.

Key words

Biomechanics, tendinopathy, inflammation, rehabilitation, imaging, degeneration.

Introduction

Partial rotator cuff tears are defined as injuries involving damage to the rotator cuff tendons that does not extend through the full thickness of the tendon. These lesions are commonly classified according to their location, whether on the articular or bursal side, as well as by the depth of tendon involvement, which provides clinically relevant information for diagnosis and management [1, 2]. From an epidemiological perspective, partial rotator cuff tears are more prevalent than full-thickness tears, particularly among the working population, where they represent a frequent cause of shoulder pain and contribute significantly to occupational disability. Clinically, these injuries are associated with substantial morbidity, as they can produce persistent pain, joint stiffness, and functional impairment, ultimately affecting daily activities and overall quality of life [3].

In most cases, conservative management is considered the first-line therapeutic approach. This strategy typically includes structured physical therapy programs, targeted exercise regimens, and the use of injectable therapies such as corticosteroids or platelet-rich plasma [1, 3]. Nonoperative treatments have demonstrated effectiveness in reducing pain and improving functional outcomes in a considerable proportion of patients. However, despite these benefits,

conservative management may not halt the structural progression of the tear, which remains a relevant clinical concern [3, 4]. Among adjunctive therapies, platelet-rich plasma injections have shown promising results, particularly in later follow-up stages, where improvements in shoulder function and pain relief have been observed [5].

Surgical management is generally reserved for patients who fail to respond adequately to conservative treatment or who present with significant functional limitations. The decision to proceed with surgery is multifactorial and depends on variables such as tear size, anatomical location, and individual patient characteristics [1, 6]. Several surgical techniques are available, including arthroscopic debridement, transtendinous repair, and tear completion followed by repair. Evidence suggests that both in situ repair and tear completion techniques yield comparable clinical outcomes, supporting the use of either approach depending on the specific clinical scenario [2, 7]. Although surgical intervention has been shown to effectively alleviate pain and improve shoulder function, it remains a more invasive and costly option, with inherent risks such as infection and postoperative complications [2, 3].

Despite the availability of both conservative and surgical strategies, the optimal management of

partial rotator cuff tears continues to be a subject of ongoing debate. Both approaches have demonstrated clinical effectiveness; however, surgical treatment is typically reserved for more advanced cases or for patients in whom conservative measures have failed to provide adequate relief [3, 6]. An additional factor influencing therapeutic decision-making is the recognized risk of disease progression, as tendinopathy may evolve into partial or full-thickness tears over time. This potential for progression underscores the importance of individualized treatment planning and careful clinical monitoring [4].

The objective of this article is to critically analyze the current evidence regarding conservative and surgical management of partial rotator cuff tears, with emphasis on clinical outcomes, effectiveness, and associated risks of each approach.

Methodology

This review was conducted as a structured narrative synthesis designed to provide a comprehensive and clinically relevant overview of conservative versus surgical management in partial rotator cuff tears, with emphasis on treatment outcomes and criteria guiding therapeutic selection. The methodological approach was defined a priori and aligned with the SANRA (Scale for the Assessment of Narrative Review Articles) recommendations to ensure transparency, organization, and scientific rigor. Due to the variability in tear characteristics, patient profiles, and treatment strategies, a qualitative integrative approach was chosen to allow a clinically meaningful interpretation of the available evidence, rather than performing a quantitative meta-analysis. This approach facilitated the incorporation of anatomical, functional, and therapeutic perspectives into a unified framework applicable to clinical decision-making.

The literature search strategy was designed to identify relevant and contemporary evidence on

the management of partial rotator cuff tears. Electronic databases including PubMed, Scopus, and Web of Science were systematically explored for peer-reviewed publications in English and Spanish between January 2020 and December 2026. The search was completed in December 2026. This period was selected to capture recent advances in conservative treatment protocols, biologic therapies, and arthroscopic surgical techniques. When necessary, earlier foundational studies were also considered to support key concepts related to classification systems, pathophysiology, and historical evolution of treatment approaches. The search strategy incorporated a combination of controlled vocabulary and free-text terms related to partial rotator cuff tears, conservative treatment, physical therapy, injectable therapies, arthroscopic repair, and clinical outcomes, applied across titles, abstracts, and indexed terms to optimize sensitivity.

Study selection followed a multistep screening process. After the initial identification of records, duplicates were removed, and the remaining studies underwent title and abstract screening. Articles considered potentially relevant were then assessed through full-text review. The selection process was performed independently by two reviewers, and discrepancies were resolved through discussion to reach consensus. Studies were excluded if they were not peer-reviewed, consisted of isolated case reports, lacked clinical outcome data, focused exclusively on technical aspects without follow-up, or did not directly address management strategies, outcomes, or factors influencing treatment decisions in partial rotator cuff tears.

A broad range of study designs was considered eligible, including randomized controlled trials, observational studies, systematic reviews, meta-analyses, consensus statements, and clinical guidelines from orthopedic and sports medicine societies. Emphasis was placed on studies with clear definitions of tear characteristics and those reporting clinically relevant outcomes such as

pain reduction, functional improvement, range of motion, structural progression, and complication rates. Data extraction focused on study characteristics, patient demographics, tear features, type of intervention, and reported outcomes. The quality and consistency of the evidence were evaluated narratively, considering methodological robustness, sample size, duration of follow-up, and coherence of findings across studies. When discrepancies in the literature were identified, greater weight was given to higher-level evidence and recommendations supported by established guidelines.

The reference lists of selected articles were reviewed manually to identify further relevant studies. As with all narrative reviews, this work is subject to inherent limitations, including the potential for selection bias and the absence of pooled quantitative analysis. Artificial intelligence tools were used solely to support the organization and structuring of the manuscript, while the critical evaluation and interpretation of the evidence were carried out independently by the authors to maintain academic integrity and methodological soundness.

Anatomy and Biomechanics of the Rotator Cuff

The rotator cuff is composed of four key muscles that play a fundamental role in shoulder function and stability. The supraspinatus is essential for initiating shoulder abduction and for maintaining stabilization of the humeral head within the glenoid cavity. Structurally, it consists of a larger anterior bipennate portion with a cord-like tendon and a posterior unipennate portion with a strap-like tendon, each contributing differently to overall shoulder mechanics [8]. The infraspinatus is primarily responsible for external rotation of the shoulder and also contributes to joint stabilization during dynamic movements, particularly those involving overhead activity. In contrast, the subscapularis functions as the principal internal rotator of the shoulder and plays a critical role in providing anterior stability to the glenohumeral joint. The teres minor works

in coordination with the infraspinatus to assist in external rotation and further contributes to the stabilization of the shoulder joint [9].

Together, these muscles act in a coordinated manner to maintain the stability of the glenohumeral joint through a mechanism known as concavity-compression, in which the humeral head is compressed into the glenoid fossa. This mechanism is essential for preserving joint congruity and providing a stable fulcrum for shoulder motion [10]. When the integrity of the rotator cuff is compromised, particularly in the case of supraspinatus tears, there is an increase in glenohumeral joint loading. This alteration in biomechanics can be reversed following rotator cuff repair, which restores native contact mechanics and helps prevent superior migration of the humeral head [11]. In cases where direct repair is not feasible, superior capsular reconstruction has been shown to restore static restraints to superior humeral translation; however, it does not fully reproduce the dynamic stability provided by an intact rotator cuff [12].

The mechanisms underlying rotator cuff injuries can be broadly categorized into degenerative and traumatic causes. Degenerative injuries are typically associated with chronic wear and tear and are more common in older individuals or in those exposed to repetitive overhead activities. These changes can lead to partial-thickness tears, which may progress over time to full-thickness lesions if not appropriately managed [9]. In contrast, traumatic injuries result from acute events such as falls or sudden forceful movements, leading to disruption of the tendon structure. These types of injuries are more frequently observed in younger individuals and athletes [13].

Classification of Partial Tears

Partial rotator cuff tears are commonly classified according to their depth using the Ellman classification system, which stratifies lesions into three grades based on the extent of tendon involvement. Grade I tears involve less than 3

mm of tendon thickness, grade II tears involve between 3 and 6 mm, and grade III tears exceed 6 mm in depth. This classification has direct clinical implications, as higher-grade tears, particularly grade III lesions, are more likely to progress and produce significant symptoms, thereby often prompting consideration of surgical intervention. In contrast, lower-grade tears, such as grade I and II lesions, are typically managed initially with conservative approaches, including structured physical therapy and injectable treatments, given their more favorable response to nonoperative strategies [1, 3].

In addition to depth, partial rotator cuff tears are also classified based on their anatomical location within the tendon. Articular-sided tears occur on the joint side of the tendon and are more frequently observed than bursal-sided tears, which develop on the outer surface adjacent to the subacromial bursa. Intratendinous tears, on the other hand, are located within the substance of the tendon itself. The location of the tear plays a significant role in guiding surgical decision-making, as it may influence the choice of operative technique. For example, bursal-sided tears can be managed using either in situ repair or tear completion followed by repair, with evidence demonstrating comparable outcomes between these approaches [2, 3]. Similarly, articular-sided tears may be treated with transtendinous repair or repair following tear completion, both of which have shown similar clinical effectiveness [15].

The classification of partial rotator cuff tears is therefore essential for assessing disease severity and estimating the likelihood of progression, which are key factors in determining the most appropriate management strategy. Surgical intervention is generally recommended in cases of high-grade tears or when conservative treatment fails to achieve adequate symptom relief [1, 3]. Furthermore, the selection of a specific surgical technique often depends on both the characteristics of the tear, including its depth and location, and the experience of the surgeon

[7, 16]. Although both conservative and surgical approaches have demonstrated effectiveness in improving clinical outcomes, surgical management is associated with higher risks and costs, which must be carefully considered in the context of individualized patient care [3].

Pathophysiology and Disease Progression

Tendon degeneration and microstructural alterations play a central role in the pathophysiology of partial rotator cuff tears. Aging is a key contributing factor, as it is associated with progressive changes in the rotator cuff, including muscle atrophy, fatty infiltration, and modifications in tendon structure and biomechanical properties. These alterations not only exacerbate degenerative processes but also impair the intrinsic healing capacity of the tendon [17]. In addition to age-related changes, chronic rotator cuff tears have been linked to increased oxidative stress, which promotes dysregulated autophagy. This imbalance contributes to further tendon degeneration, disrupts normal repair mechanisms, and facilitates disease progression [18]. Histopathological analyses have demonstrated that degenerative changes are present regardless of the underlying etiology, as no significant differences have been identified between acute trauma-related tears and chronic non-traumatic lesions, suggesting that degeneration is a common and central feature in both scenarios [19].

Inflammatory processes and repetitive microtrauma further contribute to the progression of rotator cuff pathology. Following tendon injury, inflammatory responses can lead to secondary changes such as cartilage damage, muscle fibrosis, and fatty infiltration, all of which negatively impact tendon integrity and function [20]. At the same time, repeated mechanical loading and microtrauma, particularly in individuals exposed to high physical demands or repetitive overhead activities, can accelerate tendon degeneration and

increase the likelihood of tear enlargement over time [21].

Several factors have been identified as predictors of progression from partial to full-thickness tears. Among these, the initial extent of tendon involvement is particularly relevant, as tears affecting more than 47.5% of the rotator cuff footprint have a significantly higher probability of progression. Occupational and activity-related factors also play an important role, with individuals engaged in heavy manual labor demonstrating an increased risk of tear enlargement [21]. Additionally, chronicity of the lesion is a critical determinant, as long-standing tears associated with tendon retraction and muscle atrophy exhibit a reduced capacity for healing, thereby increasing the likelihood of progression to more advanced stages of rotator cuff disease [22].

Clinical Evaluation and Diagnosis

Partial rotator cuff tears represent a common clinical condition with significant implications for patient function and quality of life. These lesions are more prevalent than full-thickness tears and constitute an important cause of shoulder pain, particularly in the working population, where they are frequently associated with occupational disability [3]. From a pathophysiological perspective, partial tears have the potential to progress over time into full-thickness defects. Evidence indicates that approximately 29% of partial tears evolve into full-thickness tears, with factors such as subscapularis involvement and tendon retraction significantly increasing the likelihood of progression [23]. The chronicity and severity of rotator cuff pathology can be further characterized using tools such as the Goutallier grading system and emerging three-dimensional magnetic resonance imaging-based assessments, which provide valuable prognostic information and demonstrate correlation with patient-reported outcomes [24].

The clinical evaluation of partial rotator cuff tears requires a comprehensive assessment that integrates patient history, physical examination, and imaging findings. Several risk factors have been identified that influence both the development and management of these lesions, including age, arm dominance, level of physical activity, and the anatomical location of the tear [1]. A detailed patient history is essential to identify characteristic symptoms such as pain, stiffness, and functional limitation, which are commonly reported in individuals with partial rotator cuff tears [3].

Physical examination remains a key component of the diagnostic process, with specific orthopedic tests used to evaluate shoulder function and detect possible rotator cuff involvement. Among these, the Neer and Hawkins-Kennedy impingement tests, as well as Jobe's test, are frequently employed to assess the integrity of the rotator cuff and identify pain or weakness associated with tendon injury [1].

Imaging modalities play a crucial role in confirming the diagnosis and characterizing the extent of the lesion. Ultrasound has been shown to be a reliable and accurate method for detecting subscapularis tears, particularly partial-thickness lesions, and in some cases demonstrates higher sensitivity than magnetic resonance imaging [5]. Magnetic resonance imaging is widely used for preoperative evaluation, as it provides detailed information regarding tear size, morphology, and the presence of muscle atrophy. However, its reliability may vary depending on the classification system and specific parameters assessed [25]. Magnetic resonance arthrography further enhances the visualization of intra-articular structures and is especially useful in the detection of partial-thickness tears [1].

Despite the utility of imaging techniques, important diagnostic limitations must be considered. A notable challenge is the frequent dissociation between structural findings and clinical symptoms, as imaging abnormalities do

not always correlate with patient-reported outcomes. This underscores the importance of integrating imaging results with clinical evaluation and emphasizes the role of patient education and longitudinal monitoring [26]. Additionally, although magnetic resonance imaging is highly reliable for identifying full-thickness tears, its diagnostic performance for other outcomes is more variable, necessitating cautious interpretation in the context of preoperative planning [27].

Conservative Management

Conservative management is generally indicated as the initial therapeutic approach in patients with low-grade partial rotator cuff tears, particularly in cases where the lesion does not significantly compromise the structural integrity of the tendon. This strategy is also appropriate for individuals with low functional demand, who do not require high levels of shoulder performance for daily activities or occupational tasks. Additionally, patients with medical conditions that increase surgical risk or those who prefer to avoid operative intervention may benefit from a nonoperative approach [3].

The cornerstone of conservative treatment involves a combination of activity modification, pharmacological therapy, and rehabilitation strategies. Reducing or avoiding activities that exacerbate symptoms is essential for controlling pain and preventing further tendon injury [3]. Structured physical therapy programs play a central role in management, focusing on strengthening peri-scapular and rotator cuff musculature while improving shoulder mobility. These interventions have demonstrated effectiveness in improving patient-reported outcomes and maintaining functional capacity over time [27, 28]. Pharmacological management commonly includes the use of nonsteroidal anti-inflammatory drugs, which help reduce inflammation and alleviate pain associated with partial rotator cuff tears. In addition, injectable therapies may be utilized as adjunctive treatments. Corticosteroid injections can provide

short-term pain relief, whereas platelet-rich plasma injections have shown potential benefits in improving pain and function, although their long-term efficacy remains uncertain [3, 29].

Clinical outcomes associated with conservative management are generally favorable in selected patients. Physical therapy has been reported to be effective in more than 70% of cases, with sustained improvements in both pain and functional status over extended follow-up periods [27]. Pain reduction is a consistent finding across conservative strategies, including the use of nonsteroidal anti-inflammatory drugs and injectable therapies, contributing to improved quality of life [3, 29]. However, despite these benefits, conservative treatment is not without limitations. One of the main concerns is the potential for structural progression of the lesion, particularly in patients with underlying symptomatic tendinopathy [4].

From a clinical perspective, conservative management offers several advantages, including its non-invasive nature and the avoidance of risks associated with surgical intervention, such as infection and anesthesia-related complications [3]. Furthermore, it is associated with a lower incidence of adverse effects when compared to operative treatment. Nevertheless, an important limitation is the possibility of disease progression over time. Evidence suggests that up to 39% of patients with tendinopathy may progress to a rotator cuff tear, highlighting the need for careful patient selection and ongoing clinical monitoring [4].

Surgical Management

Surgical management of partial rotator cuff tears is generally indicated in patients who fail to achieve adequate symptom relief or functional improvement following conservative treatment. When nonoperative strategies such as physical therapy and injectable therapies do not provide satisfactory outcomes, surgical intervention becomes a reasonable consideration. In addition, high-grade tears, particularly those involving

more than 50% of tendon thickness, are commonly managed surgically due to their increased risk of progression and their greater impact on shoulder function. Patient-related factors also play a significant role in decision-making, as younger individuals and those with high functional or athletic demands may benefit from early surgical repair to maintain activity levels and reduce the likelihood of further degeneration [3].

Several surgical techniques are available, each tailored to the characteristics of the tear and the goals of treatment. Arthroscopic debridement is a minimally invasive approach that involves the removal of damaged or degenerative tissue, and it is typically reserved for less severe lesions where symptom relief is the primary objective [30]. In contrast, transtendinous repair aims to preserve the intact tendon fibers while repairing the partial tear, thereby maintaining native tendon structure and function. Another commonly utilized approach is tear completion followed by repair, in which the partial tear is converted into a full-thickness defect to facilitate a more standardized repair technique. Evidence indicates that this method yields outcomes comparable to in situ repair strategies [2, 15].

Clinical outcomes following surgical management are generally favorable, with significant improvements reported in both function and pain. Functional recovery is commonly assessed using validated scoring systems such as the American Shoulder and Elbow Surgeons score and the Constant-Murley score, both of which have demonstrated substantial postoperative improvement following techniques such as transtendinous repair and tear completion with repair. Pain reduction is also a consistent finding, as reflected by decreases in visual analog scale scores after surgery [2, 15]. While short-term outcomes are often highly positive, some decline in functional scores may be observed over time, particularly with certain techniques such as the use of subacromial balloon spacers [30].

Despite these benefits, surgical intervention is associated with potential complications that must be considered. Postoperative stiffness is one of the most common complications and can negatively impact recovery and functional outcomes. There is also a risk of re-tear, with reported rates ranging between 6.8% and 9.5% depending on the surgical technique employed. Although relatively uncommon, infection remains an inherent risk of surgical procedures and should be considered when evaluating treatment options [2, 3, 15].

Emerging Trends and Future Directions

Among patient-related factors, age has traditionally been considered an important determinant; however, current evidence indicates that older patients, including those over 75 years of age, can achieve significant improvements in both clinical and functional outcomes following rotator cuff repair, despite an increased risk of re-tear. This finding suggests that chronological age alone should not be used as a contraindication to surgical intervention when other factors are favorable [31, 32]. In addition to age, activity level plays a critical role in treatment selection. Patients with high functional demands, even within older populations, may require surgical management in order to restore shoulder function and maintain their desired level of activity [33]. The presence of comorbidities must also be considered, as conditions such as mild glenohumeral arthritis can negatively influence postoperative outcomes and should be incorporated into the overall decision-making process [32].

Lesion-related characteristics further contribute to determining the optimal therapeutic approach. Tear size and depth are particularly important, as smaller tears, typically defined as those measuring less than 3 cm, have demonstrated superior long-term outcomes following surgical repair compared to physiotherapy, highlighting the relevance of tear dimensions in clinical decision-making [34]. The anatomical location of the tear also plays a significant role, as

involvement of specific tendons, such as the subscapularis, has been associated with an increased risk of re-tear and may impact overall functional outcomes, thereby requiring careful evaluation [32]. Additionally, the temporal characteristics of the lesion must be considered, as acute and chronic tears differ in tissue quality and healing potential. Chronic tears are often associated with tendon degeneration and may necessitate different management strategies compared to acute injuries [35].

Clinical factors are equally important in guiding treatment decisions. Pain severity is a key consideration, as surgical repair has been consistently associated with significant pain reduction, making it a relevant option for patients with severe or persistent symptoms [31, 33]. Functional limitation is another critical determinant, as substantial impairment in range of motion or daily activities often favors surgical intervention due to its potential to restore function [31, 35]. Furthermore, the patient's response to conservative treatment remains a central element in the decision-making process, as failure of nonoperative strategies frequently leads to consideration of surgical options, particularly in individuals with ongoing symptoms [33].

An evidence-based approach to treatment selection is essential to optimize outcomes. Long-term studies have demonstrated that surgical repair may provide superior results compared to physiotherapy in patients with small-to-medium tears, supporting its role as a primary treatment option in appropriately selected cases [34]. In this context, patient stratification based on factors such as age, activity level, and specific tear characteristics allows for a more individualized and clinically effective approach to management, ensuring that therapeutic decisions are both personalized and supported by current evidence [36, 37].

Discussion

The management of partial-thickness rotator cuff tears includes both conservative and surgical approaches, each demonstrating effectiveness depending on the clinical context and patient characteristics. Conservative management, which encompasses nonoperative strategies such as physical therapy, injectable therapies including platelet-rich plasma and corticosteroids, as well as other physical agents, has shown favorable results in controlling pain and improving functional outcomes. Due to its non-invasive nature and lower risk profile, this approach is generally recommended as the first-line treatment, particularly in patients with low-grade tears [3, 27].

In contrast, surgical management is typically reserved for more advanced clinical scenarios. Interventions such as débridement, tendon repair, and suture anchor techniques are commonly indicated in high-grade tears, in patients who do not respond adequately to conservative treatment, or in those with high functional demands. Although surgical treatment can lead to significant improvements in both pain and function, it is inherently more invasive and is associated with higher risks, including infection and the possibility of re-tear [1, 3, 38].

The interpretation of current evidence is limited by several methodological constraints. A large proportion of available studies are retrospective and nonrandomized, which introduces selection bias and restricts the generalizability of findings. Furthermore, the absence of standardized classification systems and diagnostic criteria contributes to variability in outcome reporting and differences in follow-up duration across studies. This heterogeneity is further compounded by differences in both conservative and surgical treatment protocols, making direct comparisons of efficacy challenging. In addition, there is a relative lack of data on long-term outcomes and cost-effectiveness, both of which are essential for comprehensive clinical decision-making [1, 3, 38].

From a clinical perspective, these findings underscore the importance of an individualized, patient-centered approach to management. Treatment selection should take into account factors such as tear depth, anatomical location, and the patient's level of activity. Conservative management remains the preferred initial strategy for low-grade tears, whereas surgical intervention is generally indicated in more severe cases or when nonoperative measures fail to provide adequate relief [27]. Additionally, imaging findings should be interpreted as supportive tools rather than definitive determinants of treatment, given the frequent discrepancy between structural abnormalities and clinical symptoms. Ongoing clinical follow-up and shared decision-making between the clinician and the patient are essential components of care, allowing for timely adjustments in management based on symptom progression, functional status, and patient expectations [3, 27, 39].

Conclusions

The rotator cuff plays a critical role in maintaining glenohumeral stability through coordinated muscular function and concavity-compression, and disruption of this system, particularly in partial tears, leads to altered biomechanics, increased joint loading, and potential progression to more severe pathology if not appropriately managed.

The management of partial rotator cuff tears should be guided by a combination of tear characteristics, patient factors, and clinical presentation, as both conservative and surgical approaches are effective; however, conservative treatment is generally preferred for low-grade lesions, while surgical intervention is indicated in high-grade tears, failed nonoperative management, or high-demand patients.

Disease progression is influenced by degenerative changes, inflammatory processes, and mechanical factors, with a significant proportion of partial tears progressing to full-

thickness lesions, highlighting the importance of early diagnosis, individualized treatment strategies, and continuous clinical follow-up to optimize outcomes and prevent functional deterioration.

References

1. Plancher KD, Shanmugam J, Briggs K, Petterson SC. Diagnosis and Management of Partial Thickness Rotator cuff Tears: A Comprehensive review. *Journal of the American Academy of Orthopaedic Surgeons* [Internet]. 2021 Sep 13;29(24):1031–43. Available from: <https://doi.org/10.5435/jaaos-d-20-01092>
2. Dalmas Y, Hao KA, Barret H, Mansat P, Bonneville N. Arthroscopic Repair of Bursal-Sided Partial-Thickness Rotator cuff tears: Literature Review and Meta-analysis. *The American Journal of Sports Medicine* [Internet]. 2025 Jan 10;53(2):501–7. Available from: <https://doi.org/10.1177/03635465241239883>
3. Eubank B, Sheps D, Dennett L, Connick A, Bouliane M, Panu A, et al. A scoping review and best evidence synthesis for treatment of partial-thickness rotator cuff tears. *Journal of Shoulder and Elbow Surgery* [Internet]. 2023 Dec 14;33(3):e126–52. Available from: <https://doi.org/10.1016/j.jse.2023.10.027>
4. Quinlan NJ, Frandsen JJ, Smith KM, Lu C, Chalmers PN, Tashjian RZ. Conservatively treated symptomatic rotator cuff tendinopathy may progress to a tear. *Arthroscopy Sports Medicine and Rehabilitation* [Internet]. 2022 Jun 15;4(4):e1449–55. Available from: <https://doi.org/10.1016/j.asmr.2022.05.04>
5. Zhu P, Wang Z, Li H, Cai Y. Platelet-Rich Plasma Injection in Non-Operative Treatment of Partial-Thickness Rotator cuff Tears: A Systematic Review and Meta-Analysis. *Journal of Rehabilitation*

- Medicine [Internet]. 2022 Jul 27;54:jrm00312. Available from: <https://doi.org/10.2340/jrm.v54.1434>
6. Eckers F, Loske S, Ek ET, Müller AM. Current understanding and New advances in the surgical Management of reparable rotator cuff tears: A scoping review. *Journal of Clinical Medicine* [Internet]. 2023 Feb 21;12(5):1713. Available from: <https://doi.org/10.3390/jcm12051713>
 7. Rossi LA. Editorial Commentary: Arthroscopic Repair of Partial Thickness Rotator Cuff Tears: What Do We Know So Far and Where Should We Put the Focus of Our Future Research? *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2021 Apr 22;37(5):1455–7. Available from: <https://doi.org/10.1016/j.arthro.2021.01.015>
 8. Schmidt C, Rodriguez-Alejandro OE, Cooke SP, Dworkin JD, Cook AJ, Buce JG, et al. Relative contributions of the supraspinatus cord and strap tendons to shoulder abduction and translation. *Journal of Shoulder and Elbow Surgery* [Internet]. 2023 Aug 3;33(1):172–80. Available from: <https://doi.org/10.1016/j.jse.2023.07.003>
 9. Cavanaugh E, Santillan AA, Hoshikawa K, Giambini H. Subregions of the rotator cuff muscles present distinct anatomy, biomechanics, and function. *Sports* [Internet]. 2024 Dec 18;12(12):349. Available from: <https://doi.org/10.3390/sports12120349>
 10. Cohn MR, Vadhera AS, Garrigues GE, Verma NN. Superior capsular reconstruction: Proposed biomechanical advantages. *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2021 Dec 28;38(1):20–1. Available from: <https://doi.org/10.1016/j.arthro.2021.11.011>
 11. Muench LN, Berthold DP, Otto A, Dyrna F, Bell R, Obopilwe E, et al. Increased glenohumeral joint loads due to a supraspinatus tear can be reversed with rotator cuff repair: a biomechanical investigation. *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2021 Nov 18;38(5):1422–32. Available from: <https://doi.org/10.1016/j.arthro.2021.10.036>
 12. Smith TJ, Gowd AK, Kunkel J, Kaplin L, Waterman BR. Superior capsular reconstruction provides sufficient biomechanical outcomes for massive, irreparable rotator cuff tears: A Systematic review. *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2020 Sep 17;37(1):402–10. Available from: <https://doi.org/10.1016/j.arthro.2020.09.007>
 13. Xiao A, McGinley B, Ahmed A, Gottschalk M, Wagner E. Poster 153: Dynamic Radiographic Evaluation of Scapulohumeral Rhythm in Patients with Massive vs Small Rotator Cuff Tears. *Orthopaedic Journal of Sports Medicine* [Internet]. 2022 Jul 1;10(7_suppl5). Available from: <https://doi.org/10.1177/2325967121s00714>
 14. Cheow X, Yew A, Ang BFH, Lie DTT. No difference in outcome between Articular-Sided and Bursal-Sided Tears: Comparative study with minimum 2-Year Follow-Up of arthroscopic repairs in 104 patients in a Single-Surgeon series. *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2021 Jan 8;37(5):1449–54. Available from: <https://doi.org/10.1016/j.arthro.2020.12.226>
 15. Yang Y, Hu D, Chen S, Guan S, Shang X. Transtendon technique versus repair after completion of the tear for articular-

- sided partial rotator cuff tear: a meta-analysis of comparative studies. *Journal of Orthopaedic Surgery and Research* [Internet]. 2023 May 22;18(1):378. Available from: <https://doi.org/10.1186/s13018-023-03831-4>
16. Hughes JD, Gibbs CM, Reddy RP, Whicker E, Vaswani R, Eibel A, et al. Repair of high-grade partial thickness supraspinatus tears after surgical completion of the tear have a lower retear rate when compared to full-thickness tear repair. *Knee Surgery Sports Traumatology Arthroscopy* [Internet]. 2021 Mar 8;29(7):2370–5. Available from: <https://doi.org/10.1007/s00167-021-06524-9>
 17. Wang N, Wang H, Shen L, Liu X, Ma Y, Wang C. Aging-Related Rotator Cuff Tears: Molecular mechanisms and implications for clinical management. *Advanced Biology* [Internet]. 2024 Jan 31;8(4):e2300331. Available from: <https://doi.org/10.1002/adbi.202300331>
 18. Prasetia R, Purwana SZB, Lesmana R, Herman H, Chernchujit B, Rasyid HN. The pathology of oxidative stress-induced autophagy in a chronic rotator cuff enthesis tear. *Frontiers in Physiology* [Internet]. 2023 Sep 11;14:1222099. Available from: <https://doi.org/10.3389/fphys.2023.1222099>
 19. Aagaard KE, Hallgren HCB, Lunsjö K, Frobell R. No differences in histopathological degenerative changes found in acute, trauma-related rotator cuff tears compared with chronic, nontraumatic tears. *Knee Surgery Sports Traumatology Arthroscopy* [Internet]. 2022 Feb 8;30(7):2521–7. Available from: <https://doi.org/10.1007/s00167-022-06884-w>
 20. Nelson GB, McMellen CJ, Kolaczko JG, Millett PJ, Gillespie RJ, Su CA. Immunologic contributions following rotator cuff injury and development of cuff tear arthropathy. *JBJS Reviews* [Internet]. 2021 Nov 1;9(11). Available from: <https://doi.org/10.2106/jbjs.rvw.21.00126>
 21. Ko SH, Jeon YD, Kim MS. Progression of Symptomatic Partial-Thickness rotator cuff tears: association with initial tear involvement and work level. *Orthopaedic Journal of Sports Medicine* [Internet]. 2022 Jun 1;10(6):23259671221105471. Available from: <https://doi.org/10.1177/23259671221105471>
 22. Paul S, Yadav AK, Goyal T. Comparison of tear characteristics, outcome parameters and healing in traumatic and non-traumatic rotator cuff tear: a prospective cohort study. *MUSCULOSKELETAL SURGERY* [Internet]. 2021 Jun 8;106(4):433–40. Available from: <https://doi.org/10.1007/s12306-021-00719-6>
 23. Frandsen JJ, Quinlan NJ, Smith KM, Lu C, Chalmers PN, Tashjian RZ. Symptomatic rotator cuff tear progression: Conservatively treated Full- and Partial-Thickness tears continue to progress. *Arthroscopy Sports Medicine and Rehabilitation* [Internet]. 2022 Apr 20;4(3):e1091–6. Available from: <https://doi.org/10.1016/j.asmr.2022.03.006>
 24. Riem L, Cousins M, DuCharme O, Feng X, Blemker S, Antosh I, et al. Paper 48: Association of 3D MRI Volumetric Assessment of Rotator Cuff Pathology with Preoperative Patient Reported Outcomes. *Orthopaedic Journal of Sports Medicine* [Internet]. 2023 Jul 1;11(7_suppl3). Available from: <https://doi.org/10.1177/2325967123s00073>

25. Adriani M, Saccomanno MF, Motta M, Galli S, Milano G. Reliability of magnetic resonance Imaging Criteria for the preoperative Assessment of rotator cuff tears: A Systematic review. *The American Journal of Sports Medicine* [Internet]. 2023 May 15;52(3):845–58. Available from: <https://doi.org/10.1177/03635465231166077>
26. Maffulli N, Helander KN, Migliorini F. Tendon appearance at imaging may be altered, but it may not indicate pathology. *Knee Surgery Sports Traumatology Arthroscopy* [Internet]. 2023b Feb 17;31(5):1625–8. Available from: <https://doi.org/10.1007/s00167-023-07339-6>
27. Kuhn JE, Dunn WR, Sanders R, Baumgarten KM, Bishop JY, Brophy RH, et al. 2024 Kappa Delta Ann Doner Vaughan Award: Nonsurgical Treatment of Symptomatic, Atraumatic Full-Thickness Rotator Cuff Tears-A Prospective Multicenter Cohort Study with 10-Year Follow-Up. *Journal of the American Academy of Orthopaedic Surgeons* [Internet]. 2024 Sep 24;32(23):1061–73. Available from: <https://doi.org/10.5435/jaaos-d-24-00841>
28. Riera J, Smythe A, Malliaras P. French physiotherapy management of rotator cuff related shoulder pain: An observational study. *Musculoskeletal Care* [Internet]. 2021 Mar 5;19(4):484–94. Available from: <https://doi.org/10.1002/msc.1545>
29. Xiang X, Deng J, Liu Y, Yu X, Cheng B, He HC. Conservative treatment of partial-thickness rotator cuff tears and tendinopathy with platelet-rich plasma: A systematic review and meta-analysis. *Clinical Rehabilitation* [Internet]. 2021 Apr 26;35(12):1661–73. Available from: <https://doi.org/10.1177/02692155211011944>
30. Davies A, Singh P, Reilly P, Sabharwal S, Malhas A. Superior capsule reconstruction, partial cuff repair, graft interposition, arthroscopic debridement or balloon spacers for large and massive irreparable rotator cuff tears: a systematic review and meta-analysis. *Journal of Orthopaedic Surgery and Research* [Internet]. 2022 Dec 19;17(1):552. Available from: <https://doi.org/10.1186/s13018-022-03411-y>
31. Meng C, Jiang B, Liu M, Kang F, Kong L, Zhang T, et al. Repair of rotator cuff tears in patients aged 75 years and older: Does it make sense? A systematic review. *Frontiers in Public Health* [Internet]. 2023 Jan 17;10:1060700. Available from: <https://doi.org/10.3389/fpubh.2022.1060700>
32. Kim HG, Kim SC, Park JH, Kim JS, Kim DY, Lee SM, et al. Clinical and structural outcomes of arthroscopic rotator cuff repair in patients over 75 years are comparable to those in younger patients: a Propensity Score-Matched Comparative study. *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2023 Nov 10;40(6):1739–50. Available from: <https://doi.org/10.1016/j.arthro.2023.10.046>
33. Fossati C, Stoppani C, Menon A, Pierannunzii L, Compagnoni R, Randelli PS. Arthroscopic rotator cuff repair in patients over 70 years of age: a systematic review. *Journal of Orthopaedics and Traumatology* [Internet]. 2021 Feb 18;22(1):3. Available from: <https://doi.org/10.1186/s10195-021-00565-z>
34. Moosmayer S, Lund G, Seljom US, Haldorsen B, Svege IC, Hennig T, et al. Fifteen-Year Results of a comparative analysis of Tendon Repair versus

- Physiotherapy for Small-to-Medium-Sized Rotator Cuff tears. *Journal of Bone and Joint Surgery* [Internet]. 2024 Aug 23;106(19):1785–96. Available from: <https://doi.org/10.2106/jbjs.24.00065>
35. Gonzalez-Morgado D, Hoffman TR, Ardebol J, Noble MB, Galasso LA, Nugent M, et al. Comparison of clinical outcomes between arthroscopic rotator cuff repair and reverse total shoulder arthroplasty in patients with massive rotator cuff tears and High-Grade fatty atrophy without glenohumeral osteoarthritis. *Orthopaedic Journal of Sports Medicine* [Internet]. 2024 Dec 1;12(12):23259671241298664. Available from: <https://doi.org/10.1177/23259671241298664>
36. Hazra R, Hazra M, Hanson JA, Rutledge JC, Doan KC, Ganokroj P, et al. Minimum 5-Year Clinical Outcomes of Arthroscopically repaired massive rotator cuff tears: Effect of age on clinical outcomes. *The American Journal of Sports Medicine* [Internet]. 2023 Jun 1;51(8):1979–87. Available from: <https://doi.org/10.1177/03635465231174430>
37. Rosenblum J, Madi R, Lee H, Pei Y, Du S, Farooqi AS, et al. Primary arthroscopic repair for massive rotator cuff tears results in good shoulder function, low pain, and satisfactory outcomes at 2-Year minimum Follow-Up. *Arthroscopy the Journal of Arthroscopic and Related Surgery* [Internet]. 2024 Feb 28;40(9):2353–60. Available from: <https://doi.org/10.1016/j.arthro.2024.02.026>
38. Jin H, Deng Z, Sun J, Vithran DTA, Xiao W, Li Y. Surgical management for massive rotator cuff tears: a network meta-analysis of randomized controlled trials. *Burns & Trauma* [Internet]. 2024 Jan 1;12:tkad052. Available from: <https://doi.org/10.1093/burnst/tkad052>
39. Lee J, Griep DW, Burgess CJ, Petrone B, Bitterman AD, Cohn RM. The AAOS 2019 clinical practice guidelines for the management of rotator cuff injuries are unbiased and incorporate a diverse body of literature. *Arthroscopy Sports Medicine and Rehabilitation* [Internet]. 2022 Mar 1;4(2):e559–65. Available from: <https://doi.org/10.1016/j.asmr.2021.11.017>