

CONTEMPORARY AND PROSPECTIVE DEVELOPMENTS IN THE MANAGEMENT OF SHOULDER TENDINOPATHIES

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Abstract

Shoulder tendinopathies constitute a significant issue. Contemporary interventions encompass exercise, physical therapy, corticosteroid injections, and surgical procedures. Nonetheless, the clinical outcomes from randomized controlled trials assessing the efficacy of these therapies are predominantly unremarkable. In light of the evident stagnation in enhancing therapeutic outcomes for patients, it is prudent to explore alternative options. Research has established a correlation between lifestyle-related modifiable risk factors, such as smoking, obesity, and physical inactivity, and the emergence and maintenance of shoulder tendinopathies. Additional research is necessary to see if addressing these characteristics leads to improved clinical outcomes for patients. Teachable moments and shared decision-making are notions that could facilitate doctors in integrating the evaluation and management of various lifestyle issues. Considering that these lifestyle factors also elevate the chance of other prevalent morbidities, such as cardiovascular disease, an evolution of normal clinical care in this manner could signify a significant advancement.

Keywords: tendinopathy, shoulder, rotator cuff, exercise, rehabilitation, corticosteroid, surgery, risk factors, lifestyle, review.

Introduction

Each year, 1% of persons over 45 years old experience a new episode of shoulder pain. Shoulder tendinopathies constitute 70% of cases, resulting in significant pain and negatively impacting quality of life [1]. Fifty percent of patients report persistent symptoms two years post-onset, indicating that, for numerous individuals, this clinical manifestation is resistant to existing therapies and the passage of time [2]. Over the past 30 years, shoulder tendinopathies have undergone a cyclical evolution, transitioning from the designation of supraspinatus tendinitis in the 1990s, which suggested an inflammatory origin, to supraspinatus tendinosis in the 2000s, indicating soft tissue degeneration, and subsequently to the broader term tendinopathy, which denotes an unspecified etiology, followed by a resurgence of the inflammatory pathoetiological model. The diverse non-specific pain condition designations, such as subacromial pain syndrome, highlight the stagnation in comprehension due to the evolving nomenclature. The nomenclature narrative indicates that the pathoetiology of shoulder tendinopathies is still inadequately comprehended [4]. In this environment of ambiguous and variable labeling and pathoetiology, numerous treatments have been suggested and evaluated, encompassing diverse drugs, injections, exercise, physical therapies, and surgical interventions [5]. This array of medications, which may operate through various pathways, has predominantly yielded inconspicuous clinical effects for patients [6–9]. It is likely not surprising that we are witnessing these mediocre clinical outcomes

given the ambiguous pathoaetiology and mechanisms of action associated with most treatments, especially the most commonly prescribed intervention, exercise [4, 10]. Considering this, given the plethora of existing studies on shoulder and rotator cuff tendinopathies, in what manner could an additional review prove beneficial? Despite this cyclical journey and significant uncertainty, it is evident that the realm of tendinopathy, including physicians and academics, has predominantly concentrated on shoulder tendinopathy as a distinct clinical diagnosis. The subsequent therapies, especially injections, exercise, and surgery, concentrate on particular tissues. In light of our remarkable stagnation in enhancing clinical outcomes for patients, we must now consider other mechanisms of onset, symptom duration, and treatment modalities. Therefore, the objective of this review is dual. Initially, we present a literature analysis to contextualize the suboptimal clinical outcomes of existing treatments for patients, which we must acknowledge as a catalyst for advancing our perspectives. Secondly, we offer a suggestion to expand viewpoints by examining the significance of lifestyle and potentially changeable risk variables as critical considerations in the assessment, diagnosis, care, and future research concerning individuals with shoulder tendinopathy. Additionally, we will present the notions of teachable moments and collaborative decision-making to assist physicians in this endeavor.

Effectiveness of current treatments

Defining the clinical presentation

To ensure clear communication in this review, the term "shoulder tendinopathies" refers to individuals who commonly report discomfort in the anterior and/or lateral deltoid area. Individuals with shoulder tendinopathies may exhibit a predominantly preserved range of motion in the shoulder but will indicate that their discomfort is elicited more by aggressive and/or resistant motions, such as shoulder flexion or abduction, rather than by passive movement. Elevating the shoulder or reclining on the affected side typically exacerbates the known shoulder pain. Imaging is unnecessary to validate this clinical diagnosis. Some may opt to incorporate additional clinical assessments into their evaluation, such as Speed's test and Hawkins–Kennedy impingement tests, and may employ diagnostic terminology including bicipital tendinitis, subacromial impingement syndrome, rotator cuff tendinopathy, and subacromial pain syndrome, among others. For the purposes of this review, we consider further tests superfluous and propose that the diverse terminology does not enhance comprehension or communication; therefore, these will be categorized under the term shoulder tendinopathies. Treatment guidelines for shoulder tendinopathies [10], founded on limited evidence and clinical opinion, traditionally advocated for physiotherapy and/or corticosteroid (CS) injection as the primary treatment, which will be the focus of this review. Effectiveness of physical exercise and therapeutic interventions The GRASP randomized controlled experiment [6] assessed these treatment guidelines by recruiting 708 persons from the UK NHS with rotator cuff problems and conducting a comparison. (i) One session of optimal physiotherapy [in-person (60 min); shoulder assessment, informational booklet, and exercise regimen] without a corticosteroid injection; (ii) one session of optimal physiotherapy with a corticosteroid injection; (iii) up to six sessions of progressive exercise facilitated by a physiotherapist without a corticosteroid injection; and (iv) up to six sessions of progressive exercise facilitated by a physiotherapist with a corticosteroid injection. All groups of participants demonstrated improvement over time; however, six visits with a physiotherapist did not yield greater benefits than a single session, and corticosteroid injection offered no advantages over a 12-month period. Nonetheless, we must recognize that, without a no-treatment control group, the observed gains over time may be attributed to natural history and other generic effects rather than

to any specific effects of the treatment [11]. A Cochrane systematic review reinforces this hypothesis by evaluating the efficacy of manual treatment paired with exercise compared to placebo, no intervention, or alternative control interventions for individuals with rotator cuff problems or tendinopathies of the shoulder [12]. Only one randomized controlled experiment ($n = 120$) comparing manual therapy paired with exercise to a placebo (inactive ultrasound therapy) was identified and included in the systematic review [8]. No clinically significant variations in shoulder discomfort and impairment were observed during the last follow-up at 6 months [8, 12]. The absence of comparative treatment effectiveness noted in the GRASP trial and Cochrane systematic review is seen in other prevalent musculoskeletal disorders, reinforcing the need to consider factors beyond specific tissues or tendons. Miller et al. [13] conducted a comprehensive analysis of the efficacy of exercise-based interventions compared to true control (no treatment or wait-and-see) or standard care (general practitioner care excluding physical therapy) for individuals with chronic musculoskeletal pain problems. Their systematic evaluation determined that exercise-based interventions were more successful than genuine control or standard care; nevertheless, the therapeutic significance of this disparity remains ambiguous. The evidence quality was deemed exceedingly low, there was a danger of publication bias, and cost-effectiveness studies were lacking. There is a notable lack of high-quality, sufficiently powered randomized controlled studies with mid- to long-term follow-up.

Effectiveness of CS injections

CS injections may be administered independently or in conjunction with exercise or other physical therapy, as previously outlined. Mohamadi et al. [9] conducted a systematic review and meta-analysis encompassing data from 726 patients diagnosed with rotator cuff tendinopathy. Their findings indicate that corticosteroid injections provide temporary pain alleviation in a limited subset of patients, although do not beneficially alter the progression of shoulder tendinopathies. Mohamadi et al. [9] assert that, due to their restricted clinical efficacy and the possibility of hastening tendon deterioration, corticosteroid injections possess limited attractiveness. The restricted efficacy of corticosteroid injections for shoulder tendinopathies has been ascribed to inadequate administration methods. The majority of injections are administered utilizing surface markers for needle placement, commonly referred to as blind injections, in contrast to the gold standard of image-guided injections [14]. Roddy et al. [14], in their factorial randomized controlled study comparing physiotherapist-led exercise with an exercise booklet, and ultrasound-guided subacromial corticosteroid injection with unguided injection, concluded that ultrasound guidance offers no incremental advantage over unguided corticosteroid injection. The findings from this trial somewhat contested the idea of enhanced results from image-guided CS injections and corroborated the conclusions of Mohamadi et al. [9]. Roddy et al. [14] indicated that physiotherapist-led exercise yielded better clinical outcomes compared to an exercise booklet; however, this was observed at just one time point (6 months) and held no clinical relevance. This is a significant factor due to the time and expenses involved in educating physiotherapists and patients attending appointments.

Effectiveness of surgery

Generally, if pain and impairment related to shoulder tendinopathies persist unacceptably after exercise, corticosteroid injections, and other physical therapy, surgical intervention may be contemplated [7, 10]. Beard et al. [7] conducted a randomized controlled experiment ($n = 313$) comparing arthroscopic subacromial decompression, investigational arthroscopy alone without

bone or soft tissue excision, and a control group receiving no therapy. Their findings indicated that arthroscopic subacromial decompression and experimental arthroscopy yielded superior clinical results for patients relative to no therapy; nevertheless, this difference lacked clinical significance. The absence of clinical significance, considering the additional time, expense, and burden associated with surgery, constitutes a significant conclusion. Furthermore, arthroscopic subacromial decompression provided no additional advantage compared to investigational arthroscopy alone, prompting Beard et al. [7] to deduce that the disparity between the surgical groups and no treatment could be ascribed to placebo effects, and any alterations in pain and/or function over time might be due to natural progression. The comparative effects of existing treatments, such as exercise, physical therapies, corticosteroid injections, and surgery, are mostly insignificant, showing no consistent variation in clinical results among active treatments. Moreover, when evaluated against placebo or natural history, a comparable scenario arises, characterized by an absence of clinically significant results, even with the most intrusive and costly procedures. Tendinopathies of the shoulder impose a considerable burden on affected individuals, healthcare systems, and society at large. This research evidence should prompt a reevaluation of shoulder tendinopathies. Current evidence indicates that this clinical condition is predominantly resistant to existing therapeutic modalities, including exercise, physical treatments, injections, and surgical interventions. It is evident that alterations in clinical status for individuals with shoulder tendinopathies may be ascribed to the placebo effect and/or the passage of time rather than to specific therapy effects.

Modifiable risk factors and the relevance of lifestyle in shoulder tendinopathies

A risk factor is an element that elevates the likelihood of developing a condition, such as shoulder tendinopathy. Risk factors may be categorized as changeable or non-modifiable, and understanding these factors might inform treatment recommendations. Nonmodifiable risk variables such as advancing age, gender, and, to some degree, occupational practices—specifically, repetitive tasks performed above shoulder height—have been documented; nevertheless, this information may be deemed of low relevance if the factors cannot be altered or addressed through treatment [15]. While most modern treatments concentrate on localized concerns, such as tissues and tendons, an emerging corpus of research underscores the significance of lifestyle variables in relation to the incidence and duration of shoulder tendinopathies. Bishop et al. [16], in their comprehensive analysis, analyzed 13 studies encompassing 16,172 individuals and found a favorable correlation between smoking and shoulder pain, disability, and the occurrence of rotator cuff tears. Rechardt et al. [17] substantiated these findings in a population-based cross-sectional study involving 6,237 participants. It was revealed that smoking, waist circumference, and waist-to-hip ratio were associated with a heightened prevalence of shoulder pain in both genders. Viikari-Juntura et al. [18], in their systematic review, sought to evaluate the correlation between atherosclerosis risk factors and shoulder pain/disorders. Consistent with the findings of Rechardt et al. [17], a correlation was identified between diabetes and shoulder issues, alongside some relationships with weight-related factors, as well as a potential preventative impact of physical exercise. Viikari-Juntura et al. [18] proposed a metabolic pathophysiological process associated with shoulder problems, potentially connected to systemic inflammation as a fundamental cause. Wendleboe et al. [19] conducted a case-control study with 311 participants, revealing a correlation between obesity and shoulder repair surgery in both genders, ultimately concluding that elevated BMI is a risk factor for shoulder tendinopathies. Applegate et al. [20] conducted a cross-sectional study involving 1226 people to assess potential connections between

cardiovascular disease risk variables and rotator cuff tendinopathy. It was discovered that specific risk factors, such as hypertension, were linked to rotator cuff tendinopathy. Combined cardiovascular risk factors, such as cholesterol levels, hypertension, and diabetes, shown a significant connection with rotator cuff tendinopathy. These findings corroborate the previously referenced study and prompted Applegate et al. to deduce that their results indicate a possibly alterable illness mechanism. Notwithstanding this developing data, it is evident that evaluating and subsequently addressing pertinent lifestyle factors in conjunction with musculoskeletal pain problems, such as shoulder tendinopathies, is an anomaly for numerous practitioners. Within the framework of uncertainty and time constraints, the notions of teachable moments and shared decision-making for people and populations may prove beneficial and are therefore presented and examined in the subsequent section.

Teachable moments and shared decision-making

If lifestyle factors can influence the onset of shoulder tendinopathies, then advocating for pertinent lifestyle modifications may be beneficial for secondary prevention at the individual level. Integrating pertinent behavior modification messaging into standard clinical consultations may serve as a strategy for preventing and controlling shoulder tendinopathies without escalating existing care expenses. The phrase teachable moments refers to health behavior change messaging that utilizes pertinent aspects of a patient's situation to formulate compelling recommendations. A patient's present health issue, for which they are pursuing therapy, may be associated with an adverse health behavior, such as smoking or lack of physical activity, and can be utilized to encourage a modification of this behavior. Cohen et al. [21] delineate three essential communicative attributes of a teachable moment: (i) discourse that connects a patient's present health issue to the relevant health risk factor or detrimental behavior; (ii) discourse aimed at inspiring the patient to alter the detrimental behavior; and (iii) a patient response that signifies involvement and a dedication to modifying the detrimental behavior. Teachable moments arise from the interaction between patients and doctors and aim to contextualize behavior-change discussions in ways that are significant to patients. Implementing this strategy for individuals exhibiting shoulder discomfort may provide an alternative to existing treatments and facilitate a more comprehensive therapy of shoulder tendinopathies. Tendinopathies of the shoulder are predominantly resistant to treatment; yet, interventions like exercise, physical therapies, corticosteroid injections, and surgery are frequently used, often without sufficient clarification regarding their efficacy. It is, therefore, a fundamental duty of the treating doctor to assist patients in comprehending this uncertainty and choosing the most suitable treatment option for them. Shared decision-making in healthcare is a collaborative process between the patient and practitioner that enables patients to make informed decisions regarding their treatment. A comprehensive shared decision-making process integrates the clinician's expertise regarding available treatment options (including evidence of effectiveness, risks, and benefits) with the patient's preferences, personal circumstances, values, and beliefs. Optimal practice in shared decision-making entails conveying any existing uncertainties regarding the efficacy of available treatments and, crucially, elucidating the consequences of leaving the illness untreated [23, 24]. Consequently, conversations regarding the restricted efficacy of standard therapies for shoulder tendinopathies and the possible advantages of lifestyle modifications would conform to best practices in this context. To contextualize teaching moments and shared decision-making in the management of shoulder tendinopathies, the doctor might consider incorporating the following questions and talks into consultations. When a patient exhibits shoulder pain, the doctor might

inquire, 'Are you aware that your shoulder pain may be associated with smoking, obesity, or physical inactivity [if applicable]?' Are you willing to engage in more discussion on this matter? Could we establish a goal to, for instance, enhance your levels of physical activity? This instructional opportunity might be integrated into a collaborative decision-making process in which clinicians might initiate with, 'There are various therapy options available to you, including exercise, steroid injections, lifestyle modifications, or monitoring the progression of your shoulder pain over time.' The available research indicates that there is no definitive optimal treatment; therefore, it is essential to discuss the advantages, disadvantages, and expenses associated with each option, including the factor of time, to facilitate your informed decision-making at this juncture. We acknowledge that emphasizing existing clinical ambiguity and the absence of therapeutic superiority over time may be seen negatively by patients and/or professional colleagues. Through our patient consultations, we frequently observe that patients seek comprehensive and candid information regarding the advantages and disadvantages of the therapy options accessible to them.

Research and future avenues for development

Viewing shoulder tendinopathies and other prevalent musculoskeletal disorders and chronic conditions as distinct clinical entities corresponds with contemporary specialization and medical compartmentalization, appealing due to its perceived simplicity amid the time constraints and pressures of modern clinical practice; however, this perspective may ultimately disadvantage our patients. In this therapeutic domain, as in others, significant knowledge gaps persist, and we operate under substantial uncertainty, which is frequently underappreciated. Critical domains for future progress encompass establishing a comprehensive understanding of any clinically significant advantages of existing treatments beyond the influences of natural history or temporal progression. Alongside this knowledge, acquired through rigorous research, it is essential to comprehend the most effective methods for incorporating the assessment and management of modifiable risk factors, especially lifestyle-related factors that significantly contribute to the onset and persistence of shoulder tendinopathies, into clinical practice. Incorporating the principles of teachable moments and authentic shared decision-making between patients and physicians seems to be a viable approach to accomplish this. Consequently, future research could effectively compare existing treatments, such as exercise, with strategies that detect and mitigate pertinent lifestyle factors, including overweight/obesity, smoking, and physical inactivity, in relation to current treatments alone and/or natural history.

Conclusion

Tendinopathies of the shoulder persist as a significant issue, and for numerous individuals, the ailment is resistant to existing treatments or the passage of time. The comparative efficacy of existing treatments, such as exercise, physical therapies, corticosteroid injections, and surgery, which mostly concentrate on the isolated care of tendon diseases, is unremarkable. There is increasing evidence that emphasizes significant modifiable risk variables, especially those associated with lifestyle, that require additional examination. This research serves as a catalyst to reevaluate existing paradigms and contemplate the influence of lifestyle factors on the assessment and care of individuals with shoulder tendinopathies, given the minimal advancement in enhancing clinical outcomes for patients. Given the significant clinical and scientific ambiguity, physicians can utilize teachable moments and collaborative decision-making to effectively address this complex issue with their patients. Modifiable risk factors for shoulder tendinopathies, such as

smoking, obesity, physical inactivity, and hypertension, which overlap with other conditions like diabetes, cardiovascular disease, and cancer, indicate potential significant connections between major disease categories that may not be sufficiently acknowledged.

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