

Nonoperative Management: Who, When, and What?

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Disorders of the rotator cuff are among the most common shoulder pathologies encountered by orthopedic surgeons. Although both acute and chronic tears of the rotator cuff are recognized and traditionally classified based on tear size, the increasing appreciation of asymptomatic tears in population studies challenges our current treatment algorithms. Conventionally, nonoperative treatment has been reserved for patients who do not have significant pain, including those with massive tears. Recent studies demonstrating successful treatment of various cuff tear morphologies using nonoperative modalities have increased interest in conservative management. Presently, nonoperative options include exercise/physical therapy, corticosteroid injections, oral anti-inflammatory medications, and autologous biological administration. However, it is unclear at this time which patient populations benefit most among the nonoperative treatment options, as the literature to date represents heterogeneous cohorts of tear types, symptom duration, as well as varied treatment modalities. Any further comparison between operative and nonoperative outcomes necessitates prospective studies with rigorous inclusion/exclusion criteria and standardized interventions.

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Although the incidence of shoulder pain in the United States is reported as 14.7 per 1000 patients per year, the overall prevalence during a lifetime reaches nearly 70%.^{1,2} Furthermore, disorders of the rotator cuff in particular are among the most common shoulder pathologies, with the incidence of symptomatic as well as asymptomatic tears increasing with age.^{3,4} Despite the ubiquity of rotator cuff pathology in clinical practice, the etiology remains largely unknown.⁵ Although both intrinsic and extrinsic mechanisms have been proposed, it is likely that rotator cuff disease is a multifactorial process. Moreover, it is unclear on a clinical as well as molecular level whether these mechanisms are primary or secondary in the pathogenesis of the disease.⁶ The fact that there are so many asymptomatic patients' further obscures our understanding of the pathophysiology.

Traditionally, rotator cuff tears have been classified based on size (ie, partial vs full-thickness tears). This distinction is largely because of the relationship between cuff tear size and reported success of surgical intervention.⁷ Notwithstanding, it appears that the presence of pain is of more relevance in

clinical management, and conventionally, nonoperative treatment has been reserved for patients who do not have significant pain, including those with massive tears.⁷

However, no correlation between tears and symptoms has been shown in population studies. Therefore, although it is not difficult to diagnose a rotator cuff tear based on magnetic resonance imaging (MRI) findings, to ascertain whether this finding is causative of the patient's pain and/or functional ability is not so clear. There is considerable interest in the field as to why some full-thickness rotator cuff tears are painful and disabling, whereas others are not. For example, it has been observed that small partial tears may disable some patients, yet other patients remain asymptomatic and functional with massive rotator cuff tears.⁸ Certainly, this clinical challenge remains pivotal in our development of successful treatment, operative and nonoperative alike.

Thus, it is not surprising that the challenges of diagnosis have implications for treatment. Outcomes after surgical intervention are well documented in the literature, yet there is a paucity of rigorous studies concerning nonoperative management. Nonoperative investigations are often retrospective and usually complicated by their comparison with heterogeneous populations of surgical patients and varying indications.

The interest in nonsurgical management of full-thickness rotator cuff tears is increasing. This may be accounted for by

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a variety of reasons; however it is evident that the growing trend toward nonoperative treatment reflects better outcomes and an improved appreciation of the complexity of rotator cuff healing after surgery and the challenges of postoperative care if healing is impaired.⁹

Kijima et al¹⁰ recently published one of the few studies that prospectively enrolled patients with rotator cuff tears to undergo conservative treatment without selection bias. One of the strengths of this study lies in the inclusion of all patients with diagnosed rotator cuff tear for nonoperative treatment, regardless of tear size or patient age. Nonetheless, 2.8% of all patients ultimately underwent surgery, as their pain did not improve with traditional conservative intervention by 6 months. Although 103 patients were diagnosed with rotator cuff tear at the initiation of the study, at time of follow-up, 11 patients had died and 10 patients had severe dementia limiting follow-up evaluation, which resulted in analysis of 43 patients >13 years. The results of the study were thus limited to follow-up of younger healthier patients. Furthermore, the investigation did not distinguish among traditional characteristics, such as acuity of symptoms, physical examination of strength, size of tear, degree of fatty infiltration, and age/activity of the patient. At time of follow-up, 90% of patients had no or little pain and 70% reported no disturbance in activities of daily living. Of note, the authors determined that the younger patients (mean age 54 years) tended to have significant pain and disability at 10 years after diagnosis than older patients (mean age 64 years). Although limited by the heterogeneity of subjects enrolled and lack of baseline information regarding cuff pathology and physical examination findings, the prevalence of patients without significant pain and capable of completing activities of daily living at 13 years without surgical intervention is encouraging.

In an exhaustive review of 86 articles pertaining to surgical indications and outcomes for rotator cuff pathology, Marx et al¹¹ confirmed a significant heterogeneity among articles from high-quality journals. Most notably, 44% of the studies did not report duration of symptoms preoperatively, and a majority of studies did not report limitations of activities of daily living nor duration of nonoperative treatment before surgery. As these factors are clearly integral to the surgical decision-making process and subsequent outcomes, any comparison with nonoperative management casts doubt because the existing reports provide arguably unacceptable evidence. It has been documented that patients with full-thickness tears can be successfully treated both operatively and nonoperatively, thus any further comparison between operative and nonoperative outcomes demands rigorous inclusion/exclusion criteria as well as standardized pre- and postoperative regimens. Validation of both treatment options is imperative in the clinical decision-making process.

Typically, given MRI and physical examination findings consistent with a diagnosis of rotator cuff tear, surgical intervention for rotator cuff tears has been relegated to those patients with refractory pain for >6 months, acute full-thickness tears in young active patients, and concurrent shoulder instability. However, to date, there is no clear agreement regarding the indications for rotator cuff surgery. Needless to

say, this debate has implications for the nonsurgical treatment of rotator cuff tears as well. Although there are many reports in the literature of successful outcomes after rotator cuff repair, the inclusion criteria, indications, and postoperative rehabilitation protocols and outcome measurements are so varied that there is remarkably no consensus.¹²

Nonoperative Management Options

Nonoperative management options typically have been reserved for the elderly or for partial tears. The modalities used include exercise, electrotherapy, acupuncture, manual therapy, injection therapy, and bracing/taping. More recently, clinical outcome studies suggest that the level of degeneration within repaired tendons is the most important factor influencing tendon-to-bone healing,⁵ and may account for the poor response to surgical intervention in the elderly patients or chronic rotator cuff tear populations.

Exercise/Physical Therapy

The approach most commonly offered to all patients with rotator cuff pathology is exercise. Although systemic reviews of the literature have been published,¹³⁻¹⁵ currently, there is no consensus as to the optimal exercise regimen. This, in part, it reflects the heterogeneity of the methods in the literature as well as distinctions in patient selection. For example, "standard" exercise regimens for rotator cuff disease may imply various degrees of stretching/strengthening maneuvers, range of motion exercises, and other modalities. Moreover, the quality of the literature dealing with exercise treatment is often retrospective studies of patients that participated in an exercise regimen, rather than several prospective studies with clear inclusion criteria. Our fundamental lack of understanding of the pathophysiology of rotator cuff tears, pain, and healing further obscures the question as to why exercise regimens should have a beneficial impact in this disease. There has been little discussion of the possibilities, but exercise may modulate pain responses, provide placebo effect, and may train other muscles to coordinate movement and restore functional ability. For example, weakness of scapular stabilizers as well as rotator cuff musculature has been proposed as an etiology of glenohumeral dysfunction and arthropathy, and its early rehabilitation has been advocated to prevent progressive disease.^{15,16}

It has also been postulated that symptoms occur with rotator cuff pathology when glenohumeral and scapulothoracic motion is abnormal, or the muscle forces across these joints is imbalanced.^{17,18} Yamaguchi et al¹⁹ has published several related studies, one in particular that suggested abnormal glenohumeral motion is associated with symptomatic tears.

Although there is no standard of care for exercise therapy at this time, typically rotator cuff injuries are managed in a 3-phase approach.²⁰ The first phase focuses on range of motion and pain control, the second on strengthening scapular stabilizing muscles as well as deltoid strengthening, and the

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