



THE SHOULDER CLINIC  
OF IDAHO P.L.L.C.

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### **Tears of the Rotator Cuff Tendon** **Joseph R. Lynch, M.D.**

Disorders of the rotator cuff represent the most common cause of shoulder pain in the injured worker. As such, an understanding of the etiology of rotator cuff disease, its natural history, and appropriate treatment is essential for successful diagnosis and management.

Rotator cuff tears present in three broad categories: Acute tears, chronic tears, and acute-on-chronic tears. Acute tears of the rotator cuff typically occur in the younger population and manifest as a result of direct or, more commonly, indirect trauma of a significant magnitude, such as a fall from height, bicycle accident, or motorcycle accident. This diagnosis will manifest with an acute onset of pain referable to the shoulder and will commonly present with the inability to raise the arm. It would be uncommon for an acute tear to present in a delayed fashion – even with significant distracting injuries – as these patients, and treating physicians, will typically notice a distinct change in the comfort and function of the involved shoulder. In the younger patient, this diagnosis may result in a fracture of the greater tuberosity rather than an avulsion of the tendon from bone. Successful management for the acute rotator cuff tear hinges critically upon early recognition and early direct surgical repair. If suspicion of this injury is present, imaging should be obtained early to make a timely diagnosis to facilitate proper expedient care. Delayed treatment can result in poorer outcomes, and/or an inability to achieve a successful repair. If a fracture is associated with an acute tear, this must be fixed, which typically requires secure fixation of both the tendon and bone to achieve a stable overall construct.

Chronic tears are the most common manifestation of rotator cuff disease seen in both the working and non-working population. Chronic tears are thought to occur by attritional rupture. Theories exist as to why chronic tears occur and why they occur naturally with age. The most well-known theory is that popularized by Dr. Charles Neer in his 1972 article, *Anterior Acromioplasty for the Chronic Impingement Syndrome in the Shoulder* (JBJS 1972;54-A:41-50). This article discusses the theory that chronic rotator cuff disease is a spectrum of disease which occurs as a result of physical abrasion from the undersurface of a rough acromion – the prototypical “bone spur” commonly cited by patients. Though well-known, this theory does not adequately explain why the articular-side of the tendon tears more frequently than the bursal side - the side opposed to the alleged roughened undersurface of the acromion and acromioclavicular joint.

The articular surface of the rotator cuff is relatively hypovascular, as the arterioles are larger and more prevalent on the bursal-side of the tendon. Age-related degenerative changes, such as decreased cellularity and fascicular thinning lead to weakening of the rotator cuff. The relative lack of vascularity on the articular side of the tendon, coupled with the age-related degenerative changes, predispose the articular side to failure. Partial failure of the articular side of the rotator cuff may then progress to involve the full thickness of the tendon and may involve multiple tendons of the rotator cuff as one ages.

The presentation of a chronic tear is quite distinct from that of an acute or acute-on-chronic tear. Most patients with chronic tears experience a gradual onset of symptoms. Progression is typically slow, allowing patients with moderate symptoms and massive tears to maintain satisfactory shoulder function. Age is the most common factor known to be associated with chronic cuff failure. Other factors associated with degenerative cuff failure include obesity, nicotine, and corticosteroids – the latter two affect collagen composition, strength, and the native tendon's ability to heal.

Neer's work strongly supports the age-related degenerative process commonly seen with chronic rotator cuff disease. His experience with over 450 patients with impingement syndrome (*Impingement Lesions*. CORR1983;173:70-77) documents the following observations: Forty percent of patients with rotator cuff defects never performed strenuous physical work, rotator cuff defects were frequently bilateral, rotator cuff defects never developed in many heavy laborers, and 50% of patients with rotator cuff defects had no recollection of shoulder trauma. In addition, further data from the same author noted that 70% of rotator cuff defects were found in sedentary individuals doing light work and 28% in the non-dominant arm.

In that chronic rotator cuff disease is characterized by slow progression and relatively maintained shoulder function, this condition lends itself to alternative forms of conservative treatment such as physical therapy, medications, injections, activity modification, and observation. Surgery may not be required.

Lastly, is the acute-on-chronic tear. As the name implies, this diagnosis has attributes of both an acute as well as a chronic tear. Typically, these patients present with an acute alteration in shoulder comfort and function – much like the presentation of an acute tear, but often as the result of a much more subtle mechanism of injury. A ground level fall, reaching for an object, applying a force overhead or away from the body, may be examples of such a mechanism that on face value seem trivial, but can have a significant impact on shoulder comfort and function. The manifestation of a rotator cuff tear as a result of a seemingly simple mechanism can be difficult to understand and accept. However, when taken in context of what we know to be the natural history of cuff disease – that of age-related degeneration - it may be less surprising, particularly in those individuals with a long standing history of shoulder pain who may have other attributes associated with weakened tendons such as age, nicotine use, history of multiple injections and obesity.

As acute-on-chronic tears represent acute injuries, treatment may rely heavily on timely diagnosis. Surgical treatment of such injuries can be difficult as the presentation may be associated with a distinct change in shoulder comfort and function, but successful

treatment is challenged by the need to address failure of an already diseased, weakened, and aging tendon. As such, expectations for healing and function may be quite different than in the young patient with an acute tear. Often times, patients and surgeons must address (or accept) factors such as significant retraction, poor tissue quality, atrophy and irreversible fatty infiltration of the tendon – all which may affect outcome.

Though common, not all cuff disease is alike. Understanding the natural history, presentation, and management options for the variety of cuff lesions is beneficial when attempting to optimize patient care.

**About the Author:** Joseph Lynch, M.D., is certified by the American Board of Orthopaedic Surgery (ABOS), possesses a Certificate of Added Qualification in Sports Medicine from the ABOS, and maintains a full-time surgical practice. Dr. Lynch is a graduate of Harvard University, finished first in his medical school class at Oregon Health Sciences University, and completed a shoulder & elbow fellowship at the University of Washington. He has published numerous peer-review articles and has spoken nationally on a variety of topics concerning orthopaedic surgery.

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