HOSPITAL PHYSICIAN®

ORTHOPAEDIC SPORTS MEDICINE BOARD REVIEW MANUAL

Rotator Cuff Injury

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Table of Contents

Introduction 2
Anatomy and Biomechanics 2
Evaluation for Rotator Cuff Injury 3
Standard Treatment Approaches 6
Treatment Controversies 9
References 10

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STATEMENT OF EDITORIAL PURPOSE

The *Hospital Physician Orthopaedic Sports Medicine Board Review Manual* is a peer-reviewed study guide for orthopaedic sports medicine fellows and practicing orthopaedic surgeons. Each manual reviews a topic essential to the current practice of orthopaedic sports medicine.

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next page

Rotator Cuff Injury

Matthew A. Ciccotti, Michael C. Ciccotti, and Michael G. Ciccotti, MD

INTRODUCTION

Rotator cuff injury is one of the most common disorders of the shoulder. The spectrum of injury includes tendinosis, partial-thickness tear, and complete tear. Tendinosis may occur secondary to repetitive traction (as seen with overhead work or sports) or compression (as seen with external impingement by acromial spurring). This change in the rotator cuff tendon has been commonly termed *tendonitis* and may coexist with an inflammation of the adjacent bursal tissue (*bursitis*). Partial-thickness or complete tearing of the rotator cuff may result from excessive traction force or compression (as seen with the throwing athlete).

A variety of signs, symptoms, and physical examination maneuvers are helpful in defining the specific form of rotator cuff injury. Imaging studies also are useful in the evaluation. Plain radiography provides indirect evidence of rotator cuff pathology, while ultrasonography and magnetic resonance imaging (MRI) allow documentation of cuff damage as well as degree of injury. Nonoperative treatment benefits most patients with rotator cuff tendonitis or partial-thickness tears. Surgical repair may be recommended for patients with near-complete partial-thickness or complete tears that fail to improve with conservative management. Active patients with near-complete or complete tears often require surgery. The results of surgical treatment for rotator cuff injury have been reliable but are dependent on the degree of pathology. Current topics of debate include optimal surgical technique, management of partial-thickness and massive rotator cuff tears, and treatment of rotator cuff injury in the athlete. This manual reviews the current knowledge on the spectrum of rotator cuff disease and highlights continued areas of controversy.

ANATOMY AND BIOMECHANICS

ANATOMY

Overview of Shoulder Anatomy

Knowledge of the shoulder's complex anatomy is essential for the orthopaedist caring for patients with rotator cuff injury. The bony architecture of the shoulder includes the humerus, scapula, and clavicle. Smooth articulation of the shoulder relies on proper function of the scapulothoracic, sternoclavicular, acromioclavicular (AC), and glenohumeral joints. The stability of the glenohumeral joint is dependent on both static and dynamic restraints. Static restraints include the fibrous glenoid labrum, glenohumeral ligaments, and capsule.[1–6] Dynamic restraints include the scapular muscles and the rotator cuff complex; the rotator cuff provides stability in all but the extremes of motion. The scapular muscles position the glenoid beneath the humeral head, while the rotator cuff muscles precisely position the humerus within the glenoid.[7–10]

Muscles of the Rotator Cuff

The rotator cuff is made up of 4 muscles: the subscapularis, supraspinatus, infraspinatus, and teres minor. In a study of 22 shoulders, Clark et al[11,12] confirmed the interlacing of the rotator cuff tendons as the 4 muscles flare out from their insertions; this interdigitation forms a continuous sheath of tendon superficial to the subjacent glenohumeral joint capsule, which blends with the tendons near their humeral insertions. Much current research has focused on the anatomic nature of the rotator cuff's attachment on the humeral head, or the *footprint*. Dugas et al[13] outlined the importance of the footprint in terms of its dimensions and distance from the articular surface. This study suggested that the footprint insertion of the supraspinatus may range in thickness from 6 to 12 mm, with gradual thinning toward the myotendinous junction. Such knowledge is essential in our attempt to anatomically reconstruct the cuff and thereby restore natural function.

Functionally, the long head of the biceps brachii tendon may also be considered a part of the rotator cuff, as it runs distally from its origin on the supraglenoid tubercle of the scapula between the subscapularis and supraspinatus muscles, which become a part of its sheath.[14] The long head of the biceps acts as a humeral head depressor, and its functional relationship with the rotator cuff is supported by the frequency with which tears of the 2 structures coexist.

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