Management of Partial-Thickness Rotator Cuff Tears

An Essay
For Partial Fulfillment of Master Degree
In Orthopedic Surgery

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List of Abbreviations

NO.	Symbol	Meaning
1	RC	Rotator Cuff
2	SS	Supraspinatus
3	IS	Infraspinatus
4	TM	Teres Minor
5	SSC	Subscapularis
6	GH	Glenohumeral
7	GT	Greater Tuberosity
8	LT	Lesser Tuberosity
9	SA	Subacromial
10	CA	Coraco-acromial
11	U/S	Ultrasonography
12	MRI	Magnetic Resonance Imaging
13	PTRCT	Partial-thickness Rotator Cuff Tear
14	PT	Physiotherapy
15	PRP	Platelet-rich Plasma
16	FAST	Focused Aspiration of Soft Tissue
17	AC	Acromioclavicular
18	ECM	Extracellular matrix
19	MMP	Metalloproteinase

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Abstract

RTRCTs are now thought to be more common than what previously thought. It is a cause of chronic pain and considerable disability in affected subjects and are often diagnosed with difficulty even after the advents of radiological investigations and arthroscopy[(1)].

It has been reported that 4% of people over 40 and 50% over 60 years old have PTRCTs with or without shoulder pain[(2)].

The RC muscles comprise the SS, IS, TM, and SSC. They act as shoulder steerers and also act as dynamic stabilizers to the shoulder joint [(3)].

PTRCTs are considered a step in a sequence of changes affecting the muscles starting with inflammation and end in the form of tears that are massive and retracted .the causative factors can be classified to extrinsic and intrinsic causes. Intrinsic causes can be synonymized into the word "degeneration". As series of vascular and metabolic changes result in degenerative tearing of the RC.

Extrinsic factors are represented mainly by subacromial impingement; with its resultant inflammation and degeneration lead to tearing in addition to other factors like GH instability, single traumatic event (e.g.: dislocation), internal impingement, and micro-trauma[(4)]. Vascular insufficiency of the SS tendon and secondary microcirculatory disturbances have been theorized as a cause to RC tears [(5)].

Classic symptoms include shoulder pain, shoulder stiffness, or dysfunction on the affected side. Patients commonly report a painful arc of motion, resting pain, and nocturnal pain.

Signs and symptoms include SS weakness, weakness in external rotation and signs of SA impingement [(2)].

Keywords: Partial-Thickness and Rotator Cuff Tears.

INTRODUCTION

RTRCTs are now thought to be more common than what previously thought. It is a cause of chronic pain and considerable disability in affected subjects and are often diagnosed with difficulty even after the advents of radiological investigations and arthroscopy[1].

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like GH instability, single traumatic event (e.g.: dislocation), internal impingement, and micro-trauma[4]. Vascular insufficiency of the SS tendon and secondary microcirculatory disturbances have been theorized as a cause to RC tears [5].

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Signs and symptoms include SS weakness, weakness in external rotation and signs of SA impingement [2].

As with all cases of trauma, a comprehensive physical examination is critical for diagnosis. Specific attention must be given to RC power testing, stability, joint laxity, and scapular mobility with shoulder motion.

Assessment of each muscle unit of the RC should be carried out using the contralateral arm as a comparison; impingement signs (i.e. Neer and Hawkins tests) should always be performed. During examination, it is imperative to determine whether any positive test truly recreates the patient's presenting pain or symptoms by asking the patient that pain is similar to the one which he is complaining from. Range of motion of the shoulder should also be keenly evaluated [6].

U/S is a valid cost-effective tool in screening for RC pathology with high levels of diagnostic accuracy in detecting PTRCTs and can be applied in the outpatient setting [7]. MRI or more accurately, MR arthrography using intra-articular diluted gadolinium, is considered to be the most accurate imaging modality for the evaluation of RC tears, with high diagnostic accuracy for the detection of PTRCTs (80% sensitivity, 97% specificity) [8]. Recent studies showed that additional imaging in abduction and external rotation (ABER) position of the shoulder improves diagnosis of articular-sided PTRCTs[8]. Conservative treatment must be considered in patients with RC tendonitis, PTRCTs (except some larger bursal-sided tears), and potentially small full-thickness tears. In cases of PTRCTs, there is limited risk for the development of irreversible, chronic changes, such as fatty infiltration, or GH arthritis with this treatment regimen. Although healing has not been shown to occur with PTRCTs without repair, significant improvements in function have been shown with non-operative treatment [9]. The last two decades have seen dramatic advancements in RC surgical repair technique and instrumentation. Despite innovations, there isn't a consensus on the ideal RC repair construct. Surgeons

continue to use mini-open, open and arthroscopic approaches with single- and double-row techniques for suture configurations [10].

In addition to decreasing pain and inflammation, the rehabilitation process must aim to regain mobility, muscular power, and stamina, as well as proprioception, dynamic stability, and neuromuscular control rehabilitation must progress in a physician-guided protocol containing acute, intermediate, advanced strengthening, and return to activity level[11].

ANATOMY & BIOMECHANICS

The GH joint shows a perfect compromise between mobility and stability [12]. Its extraordinary range and motion and stability provide extreme important benefits to the work of not only the GH joint, but to the whole upper limb as a whole by keeping it at the anatomic relative position in relation with the trunk and aids in positioning and stabilizing of the hand . Absent shoulder motion is partially compensated by the cervical spine, scapulo-thoracic articulation, elbow, wrist, and finger joint mechanisms [13].

Muscles of the shoulder joint can be divided into two groups:

- **EXTRINSIC MUSCLES**

Rhomboid Major

Rhomboid Minor

Levator scapulae

Trapezius

Serratus Anterior

● **INTRINSIC MUSCLES (Scapulo-humeral muscles)**

The RC muscles

Deltoid

Pectoralis Major

Teres Major

LatissimusDorsi

Biceps Brachii[3].

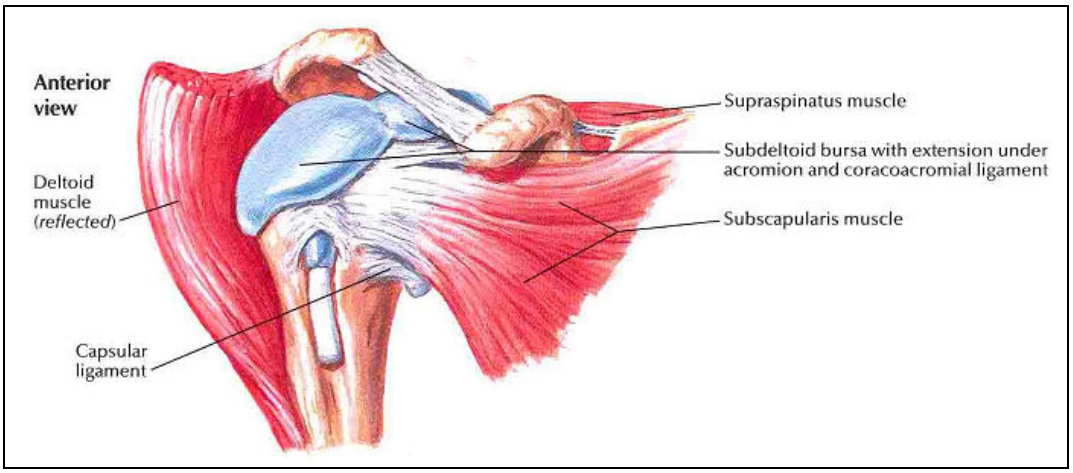

FIG. 1: Anatomy of the shoulder [7].

The Rotator Cuff (RC)

The RC is the musculo-tendinous complex formed from the attachments to the capsule with the supraspinatus (SS) muscle superiorly, the Subscapularis (SSc) muscle anteriorly, and the Teres Minor (TM) and Infraspinatus (IS) muscles posteriorly [14]. All their tendons fuse

intricately with the fibrous capsule, providing an active support for the joint and can be considered as true dynamic ligaments [13]. The RC, act as dynamic stabilizers to the shoulder in addition to providing and maintaining a great range of movement[13].

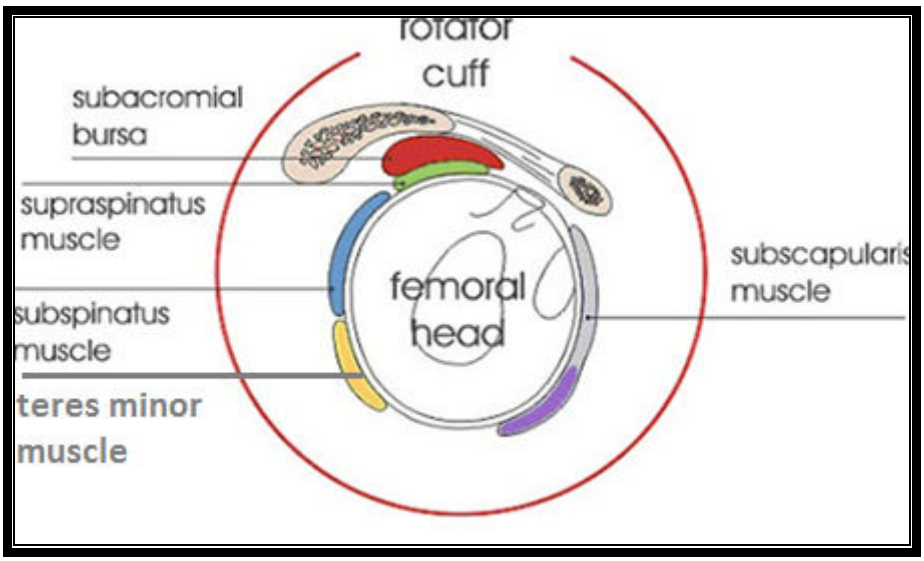

FIG.2: The RC muscles Insertions about the GH joint **[15].**

The RC muscles of the shoulder present a characteristic anatomical feature. Their tendons fuse to a 'muscle-tend on cap', also called the RC. The RC covers the shoulder joint on the dorsal, cranial, and ventral side and inserts at the three facets of the GT of the humerus as well as at the LT [14].