Table 1. Relative Signal Intensity of Adult Normal Tissues

Tissue	T1	N(H)	T2	T2*
Cortical bone	low	low	low	low
Ligament/tendon	low	low	low	low
Nerve	low	low	low	low
Fibrocartilage	low	low	low	low
Annulus fibrosus	low	low	low	low
Nucleus pulposus	intermediate	intermediate	high	high
CSF/vessel*	low	low	high	high
Muscle	intermediate	intermediate	low	low
Articular cartilage	intermediate	intermediate	low	high
Fat	high	high	intermediate	low
Bone marrow	high	high	intermediate	low

*Generally speaking, the faster the flow velocity (measured in cm/s, not in ml/sec) and the more perpendicular to the plane of section, the darker the signal will be.

pertrophy of the AC joints.[3] Adequate surgical decompression of the subacromial space is one of the treatments for outlet impingement.

In Bigliani's study in 140 cadavers,[4] 70% of rotator cuff tears were associated with type III (hooked) acromions, 24% with type II (curved), and 3% with type I (flat) acromions. Aoki et al.[5] found that an anterior acromial slope of less than 32^0 was associated with an 80% prevalence of shoulder impingement.

In Epstein's MR study,[6] type III acromions tended to be more prevalent in patients with impingement syndrome (30%) and rotator cuff tears compared with the control group (62% vs. 13%).

The author reviewed 102 consecutive patients who underwent MR imaging of the shoulder and subsequently had arthroscopy (unpubl. data). Preliminary results revealed that rotator cuff disease has strong age dependence. Subacromial osteophytes may be a risk factor for rotator cuff tears in older patients. Although MR imaging may offer accurate assessment of "anatomical risk" factors for supraspinatus outlet narrowing, a complete subacromial decompression of these "risk" factors still does not cure outlet impingement. The author concludes that impingement syndrome is not an imaging diagnosis.[7,8] Clinical diagnosis plays a major role in shoulder impingement that can be highly related to the aging process.

Notwithstanding the causal factors, the hallmark of rotator cuff tear on MR is progressively increased signal intensity within the supraspinatus tendon on proton-density and T2W images (Fig. 1). Secondary signs such as subacromial/subdeltoid effusions are sensitive but not specific in the diagnosis of complete tearing. Overall, the diagnostic sensitivity and specificity for rotator cuff tears are 90% to 100% and 80% to 95%, respectively.[9] Arthrography is commonly accepted as the diagnostic gold standard in rotator cuff tears, especially in patients with frozen shoulder that coexists with occult rotator cuff tears.[10]

Glenohumeral Instability

Shoulder stability is maintained by 3 anatomic structures: the glenoid labrum, the fibrous capsule, and rotator cuff muscles. Anterior instability accounts for 95% of glenohumeral instability. Common surgical findings include separation of the anterior capsule from the glenoid rim, absent or complete tears of the glenoid labrum, and Hill-Sacks lesions.

Direct signs of labral tears on MR images consist of a hyperintense signal within the fibrous cartilage continuing to its surface, a detached or displaced labrum, an absent labrum, or a blunted labral edge. Although double-contrast CT-arthrography remains the gold standard for labral tears, overall diagnostic sensitivity (88%) and specificity (93%) by MR are high.[11] MR-arthrography has been assessed in clinical trials to