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A Method for Diagnosing Shoulder Musculoskeletal Sonopathology Based on an Analogy

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Keywords
Ultrasonography, Shoulder pain, Musculoskeletal.

Introduction
Ultrasonography (US) is a commonly performed examination for shoulder pain, recommended by experts as the first-choice technique to evaluate various rotator cuff diseases and non-rotator cuff. Rotator cuff disease, shoulder impingement syndrome, and subacromial bursitis are the most common diagnoses reported on shoulder ultrasonography [1]. The most common rotator cuff abnormalities are supraspinatus full-thickness tear, supraspinatus partial thickness tear, and supraspinatus tendinosis [2].

The use of (the US) in modern hospitals is easy to access. Moreover, there is no exposure to ionizing radiation, and it is relatively inexpensive. Trained operators can use it for an initial diagnosis of soft tissue pathologies with great success. Due to its numerous advantages and applications in musculoskeletal (MSK) medicine, ultrasonography (US) is a routine diagnostic tool used by physical and rehabilitation medicine practitioners [3]. In contrast, MSK US remains a complex discipline due to its user dependency, requiring knowledge of (sono) anatomy, training, experience, and interpretation skills. There are several resources (books, courses, etc.) available for covering these needs as well as reducing the learning curve, e.g., artificial intelligence, applications, online courses, or standardized protocols [3,4].

Because of the high incidence of rotator cuff disorders, shoulder ultrasound (US) is one of the most common musculoskeletal US applications **[5].** Several studies have demonstrated that it is highly sensitive and specific for detecting rotator cuff tears, comparable to MRI in diagnosing rotator cuff diseases **[6]**. It is necessary to understand what anatomy can be evaluated, such as the anatomy of the rotator cuff, subacromial bursa, and acromioclavicular joint. Teefy and his colleague found that Ultrasonography was highly accurate for detecting full-thickness rotator cuff tears, characterizing their extent, and visualizing dislocations of the biceps tendon. It was less sensitive for detecting partial-thickness rotator cuff tears and ruptures of the biceps tendon. Another study conducted by Robert and his colleagues claimed that ultrasound had sensitivity and specificity rates of 80% and 100%, respectively (positive and negative predictive rates of 100% and 88%) for rotator cuff tears of full thickness, and sensitivity and specificity rates of 71% and 100%, respectively, for partial-thickness tears (positive and negative predictive values of 100% and 88%).

A number of classical/modern teaching methods [7] have been shown to improve information retention and better understanding through the use of mnemonic aids. The concept of entertainment education, which is defined as the placement of educational messages within entertainment, has become an essential element of modern education. All these techniques have also been incorporated into this comprehensive set of expert- and consensus-based image schematic drawings **[8].** This project was intended primarily/eventually to facilitate MSK US's learning process through shoulder sonography analogies.

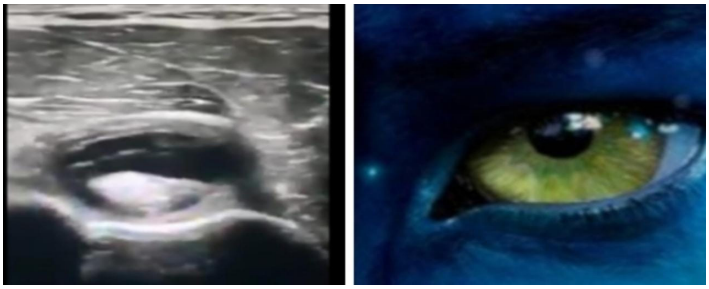

Figure 1: Avatar eye
The picture of the diagnosis is similar to the corresponding Figures.

A lot of Synovial fluid in the bicipital groove has been shown to lead to LHB tenosynovitis; We can see the similarity to the Avatar eye figure. The Details of GHL under LHB and LHB under GHL show similarities to the shape of the Avatar eye.

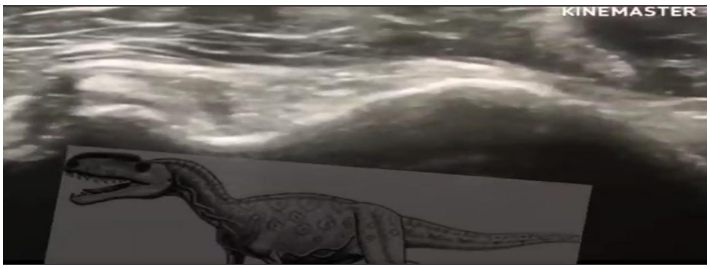

Figure 2: Dinosaur
LHB short axis transverse imaging over the bicipital groove-hyperechoic biceps brachi Longs head tendon within the bicipital groove; Subscapularis tendon is on the medial side.

When LHB shows a subluxation in the medial side towards the Subscapularis on the edge of the bicipital groove, it will be seen as the dinosaur Jaw figure, and the part toward the greater tuberosity of the humerus will be seen as a figure of the Dinosaur with a tail.

Figure 3: Camel shoulder
The subscapularis is examined with the elbow flexed at 90 degrees and the hand externally rotated,

Subscapularis (short axis) shows a slightly heterogeneous appearance due to hypoechoic muscle (partial tendon tear) similar to the figure of the Camel's shoulder.

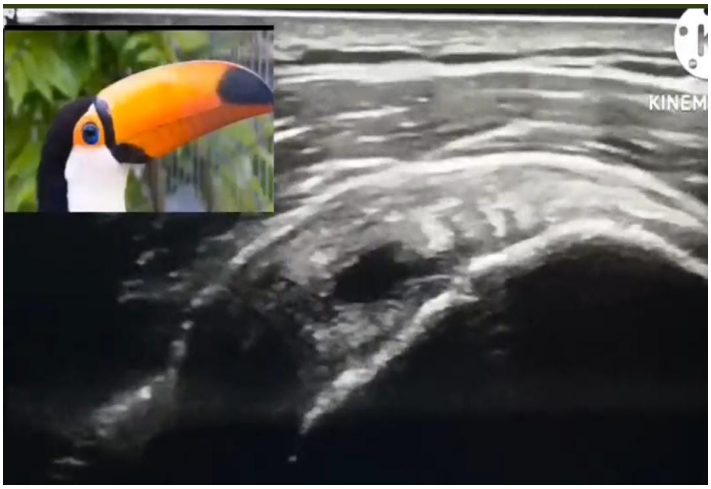

Figure 4: Bird beak
Supraspinatus (long axis); supraspinatus looks like the bird's beak; In addition, there was a partial tear in the fibers, so it formed exactly where the bird's eye was.

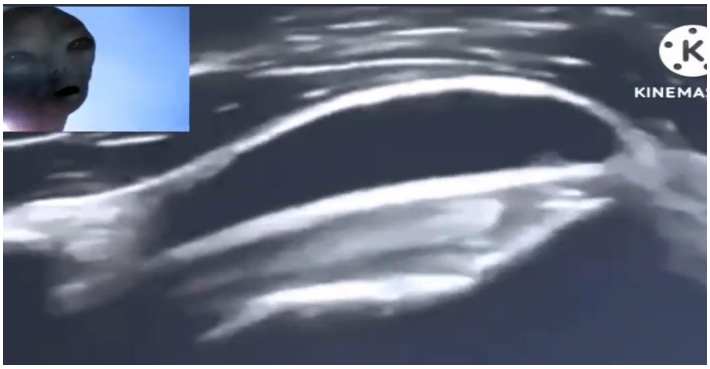

Figure 5: Alien eyes
Using sagittal planes, scanning over the subscapularis show anechoic fluid distension extending above the subscapularis tendon; the amount of fluid above the tendon was like an alien eye.

Figure 6: Tire bulge

The inflammation of the bursa (fluid) that separates the superior surface of the supraspinatus tendon from the overlying coracoacromial ligament acromion and coracoid is similar to bulged tire figure.

Figure 7: Flat tire
Full-thickness tear extends from the bursal side to the articulate side; an anechoic area will be similar to a flat tire.

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