New trends in management of Scaphoid fractures

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بسم الله الرحمن الرحيم

(قالوا سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم)

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Abbreviations

1. A O: Arbeitsgemeinschaft Osteosynthese.
2. BMPs: Bone morphogenetic proteins.
3. C T: computed tomography.
4. DISI: dorsal intercalated scapholunate instability.
5. FCR: flexor carpi radialis.
6. FDMA: first dorsal metacarpal artery.
7. Fig.: figure.
8. HBS: headless bone screw.
9. ICSRA: Intercompartmental supraretinacular arterial bone graft.
10. I V: intra-venous.
11. K-wire: Kirschner wire.
12. lb: pound.
13. LT: lunotriquetral.
14. MRI: magnetic resonance imaging.
15. Ops: osteogenic proteins.
16. P A: postero-anterior.
17. R, RMC, and UMC portals: radial, radial mid carpal, and ulnar mid carpal (for wrist arthroscope).
18. SL: scapholunate.
19. SNAC: scaphoid nonunion advanced collapse.
20. SR-PLLA: self-reinforced poly-L lactic Acid.
21. Tc99m-HDP: 99m Technetium-diphosphonate.
22. U S: ultra-sonography.
23. X-CB: carpal box radiograph.
24. 3-D: three-dimensions.

Introduction

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Aim of the work

Introduction

The scaphoid is a critical bone in the carpus for several reasons. It is the link between the proximal and distal carpal rows and provides important load bearing to the radial side of the joint[1].

Fractures of the scaphoid bone are the most common carpal fractures, they account for 60% to 70% of all diagnosed carpal injuries. Scaphoid fractures are most common in males 15 to 30 years of age and are rare in young children and the elderly because of the relative weakness of the distal radius compared with the scaphoid in these age groups[2].

Hyperextension at the wrist is the causal mechanism in approximately 97% of scaphoid injuries, with approximately 3% caused by forced flexion, of all the wrist injuries encountered in the Emergency Department, fracture of the scaphoid is one of the most commonly missed. Accurate early diagnosis of scaphoid fracture is critical as the morbidity associated with a missed or delayed diagnosis is significant, and can result in long-term pain, loss of mobility, and decreased function[3].

Even with appropriate films, fractures of the scaphoid can be subtle and difficult to visualize. Conservative estimates that 10% to 20% of these fractures will not be visible on any view in the acute setting. Various radiologic modalities can be used to diagnose a scaphoid fracture. These diagnostic methods include plain

radiography, carpal box radiography, magnetic resonance imaging (MRI), bone scintigraphy, colour flow Doppler ultrasonography & computed tomography[4].

Early MRI after negative plain radiographs of suspected scaphoid fractures changed management strategies 90 percent of the time, also High-spatial-resolution ultrasonography has been shown to be reliable and accurate in identifying occult scaphoid fractures[5].

Nondisplaced fractures of the scaphoid have been shown to have a high rate of union when treated conservatively with cast immobilization for eight to twelve weeks. The long-term morbidity of this treatment is low, and it has been the traditional standard of care. On the other hand, as the population has grown more active and as the amount of time that it takes to return to work, sports, or duty has become increasingly important, the indications for fixation of acute nondisplaced or minimally displaced scaphoid fractures has become a topic of some interest and debate[6].

Aim of the work

The aim of this study is to spot light the new trends in early diagnosis & treatment of scaphoid fractures.

Anatomy of Scaphoid & Biomechanics of the wrist joint

Anatomy of Scaphoid

A) Features of the Scaphoid

The scaphoid is an irregularly shaped bone, more resembling a deformed peanut than the boat for which it is named (scaphon in Greek means boat). Alexander Moro[7], from Edinburgh, was the first to introduce the term of scaphodium in 1726. It rests in a plain at 45 degrees to the longitudinal axis of the wrist. Articular cartilage covers 80% of the surface. The proximal pole constrained to the lunate by an interosseous membrane. The distal pole has a V-shaped scaphotrapezial ligament, scaphocapitate ligament and dorsal capsule. It rests on and is attached along the ulnar aspect of the waist to the radioscaphocapitate ligament. The only other capsular influence is where the radiocarpal ligaments is inserted obliquely on a roughened ridge and brings the main blood supply that enters the scaphoid[7].

The scaphoid has four articular facets covering approximately 80% of its entire surface: (fig. 1)

1. **Lateral proximal surface: convex, articulating with the scaphoid fossa of the distal radius.**
2. **Medial facet: semilunar in shape articulating with the lateral aspect of lunate.**
3. **Distal medial facet: concave, oval facet, and facing the lateral aspect of the head of the capitate.**
4. **Distal articular surface: convex and sometimes divided by a sagittal smooth ridge into two sectors, medial and lateral, for the trapezoid and trapezium respectively.**

On the palmer aspect of the bone, between the proximal and the distal articular surfaces, there is a rounded prominence, called the scaphoid tubercle, that provides attachment for strong ligaments

(radioscaphocapitate and scaphotrapezialtrapezoid), while acting as a pivoting for the tendon of flexor carpi radialis. This nonarticular surface extend laterally, all around the bone, forming the so-called scaphoid ridge or waist, through which about 80% of the vascular elements enter the bone.

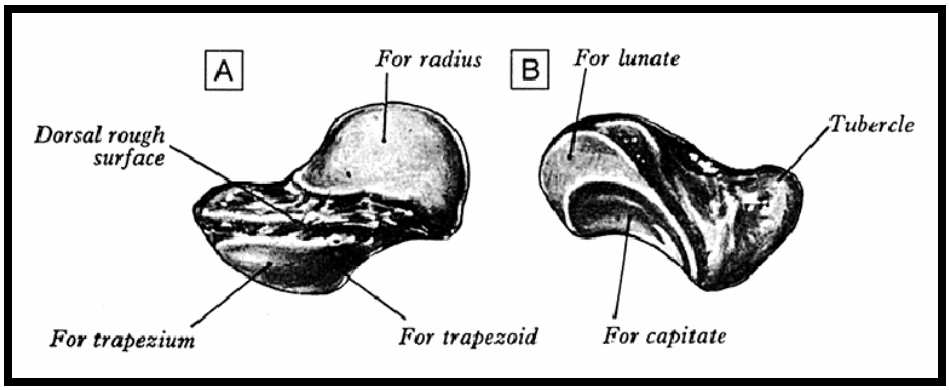

Fig. 1: The left scaphoid: A, dorsal, B, palmer aspect[8].

The dorsal surface, under the extensor tendons, is also rough, although narrower and shorter than the opposite palmer surface. The proximal margin of the medial (lunate) articular surface contains a rough-ended edge-site of attachment for the scapholunate interosseous membrane. With the wrist is in neutral position, the long axis of scaphoid is obliquely oriented in both the sagittal and the coronal planes. The long axis of scaphoid is directed distal, lateral, and slightly palmer. The average three-dimensional angle produced by the long axis of scaphoid and that of the capitate was about 73 degree. This obliquity may explain inherent instability of the bone during axial load when isolated from the adjacent bony structures[9].

B) Scaphoid vascular supply

Useful information has resulted from microvascular studies of the extraosseous and intraosseous blood supply of the wrist using barium sulfate suspension injection, Ward's blue latex, and