Dorsal Wrist Carpal Boss Impingement—Dynamic Ultrasound to the Rescue!

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Abstract

The “carpal boss” is a variant present in 19% of the population according to cadaveric studies but becomes symptomatic in only 1% of cases. With the rising popularity of “yoga,” which includes prolonged hyperextension at the wrist joint with weight bearing, an increasing number of individuals with silent carpal boss present with dorsal wrist pain due to impingement over the dorsal soft tissues by this innocuous bony protuberence. This warrants the attention of radiologists and clinicians while dealing with wrist pain. It can be challenging to identify this bossing on routine radiographs, necessitating special views. We describe the use of dynamic ultrasound in diagnosing “symptomatic” carpal boss, the effects of which become more evident on imaging during hyperextension—the triggering movement.

Keywords

► carpal boss  
► dynamic ultrasound  
► impingement

Introduction

The human body is a work of art with anatomical variations unique to each which seldom come to notice. One such variant is a “carpal boss” that is thought to be prevalent in 19% of the population according to cadaveric studies but becomes symptomatic in only 1% of cases.¹ ² Carpal boss is a bony protuberance at the quadrangular joint that is an articulation between the dorsal base of second and third metacarpal and the trapezoid and capitate (► Fig. 1A and B). With the rising popularity of “yoga,” which includes prolonged periods of wrist hyperextension with weight bearing, an increasing number of previously asymptomatic individuals with carpal boss are becoming symptomatic and developing the “carpal boss syndrome.”

Diagnosis

A symptomatic carpal boss often presents with pain on the dorsum of the wrist at the base of the second or third metacarpal with a “hard” swelling that is most apparent on volar flexion of the wrist. There has been a limited mention of the ultrasound findings of a carpal boss in the literature.³ ⁴ We describe and present different patients we encountered in our practice to have a symptomatic carpal boss.

An asymptomatic “incidental” carpal boss is often diagnosed on cross-sectional imaging. Significant findings on computed tomography include arthritic changes or fracture (► Fig. 2A). A single-photon emission computed tomography may have avidity for isotope at the quadrangular joint (► Fig. 2B).⁵ ⁷ Bone marrow edema and soft tissue changes are more striking on magnetic resonance imaging (► Fig. 3A and B).

Dynamic Ultrasound Evaluation—How We Do It

Hyperextension of the wrist is the usual movement that reproduces the symptoms related to a carpal boss. The authors suggest using a “hockey stick” probe (18–21 Hz)
with a small footprint that will fit easily into the crevice for dynamic assessment.

Beginning with imaging at rest, using a linear probe, the wrist and hand are scanned from proximal to distal, looking for an undue bony prominence distal to the distal carpal row in the line of the second or third metacarpal base. Soft tissue changes include synovial thickening, effusion, tenosynovitis of extensor tendon (usually the extensor carpi radialis brevis, ECRB/extensor carpi radialis longus, ECRL or extensor digitorum longus, EDL), and often an associated ganglion cyst. Doppler evaluation demonstrates hyperemia in the soft tissue (Fig. 4A and B).
A generous amount of jelly is used to create a “gel pad” and the patient is asked to perform the wrist movement that reproduces usual symptoms. With the probe at the quadrangular joint, the patient is asked to slowly dorsiflex the wrist. The hypertrophied periarticular soft tissue on the dorsum of the wrist can be seen crumpling into a small space at the maximal limit of dorsiflexion. A small ganglion cyst is often seen in association with a carpal boss (Fig. 4A and B). With hyperextension of the wrist, the ganglion cyst can be seen bulging outward, reflecting increased compartmental pressure. A symptomatic carpal boss may also result in symptomatic snapping of digital extensors around the bony protuberance with extension (Fig. 5A). An accessory digitorum manus brevis muscle belly may be seen getting dynamically impinged by a carpal boss upon dorsiflexion (Fig. 5B). A dorsal wrist ganglion cyst associated with a carpal boss may become large enough to result in splaying of digital extensor tendons around it (Fig. 5C and D).

Real-time evaluation with ultrasound helps to ensure that the patient’s usual symptoms correspond to the identified carpal boss and it is not just an incidental finding.

Fig. 4 (A) Dorsal soft tissue impingement with wrist hyperextension secondary to an underlying carpal boss (yellow), resulting in extrusion of hypertrophied synovium and small effusion (blue). (B) Magnetic resonance imaging sagittal T1 fat-saturated post-contrast image, axial T1, and coronal GRE images: Dorsal soft tissue impingement secondary to an underlying carpal boss (yellow), resulting in post-contrast enhancement of hypertrophied synovium and small effusion (blue). The patient-placed skin markers are along the third ray and correspond to the site of the bony protuberance (green arrows).

Fig. 5 (A) Snapping of third digit extensor tendon (red and blue) over a carpal boss (yellow) with finger extension. Associated small dorsal wrist ganglion. The probe position has been depicted in the inset. (B) Accessory extensor digitorum manus brevis (red) over carpal boss (yellow) resulting in dynamic impingement and dorsal wrist pain. The probe position has been depicted in the inset. (C) Splaying of second- and third-digit extensor tendons (red and green) around a dorsal wrist ganglion (blue) and underlying carpal boss (yellow) with finger extension. The probe position has been depicted in the inset. (D) Splaying of second- and third-digit extensor tendons (red and green) over dorsal wrist ganglion (blue) and underlying carpal boss (yellow) with finger extension.

Fig. 6 Management options for symptomatic carpal boss—ultrasound-guided steroid injection and surgical excision.
Ultrasound-guided steroid injection into the quadrangular space can be offered for pain relief, if conservative therapy fails (► Fig. 6).

Conflict of Interest
None declared.

References
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