

The Chevron Capitate-Trapezoid Joint: A Case Report

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ABSTRACT

Anatomical variations to the human skeletal system are common and frequently reported in the literature. The structures around the hand and wrist are no exception, and these variations can affect ligaments, tendons, muscles, nerves, arteries, joints, and bone morphology. Musculoskeletal health care providers must be familiar with normal, individual variations when encountered during patient care and diagnostic imaging. In some instances, morphological variations have resulted in differences in kinematics, while others have been found in association with certain medical conditions. We discuss an unusual variation of the capitate-trapezoid joint. To the best of our knowledge, no prior studies have previously reported on this topic.

Keywords: Anatomy, Wrist Joint, Carpal Bones

INTRODUCTION

Knowledge of radiographic and topographical anatomy of the hand and wrist is essential to upper-extremity specialists. Nakamura et al¹ and Patterson et al² described hundreds of normal anatomical variants in the human carpus regarding bone morphology, ligaments, and joint relationships. The capitate is the largest and most centrally located carpal bone. Studies have reported anatomical variations of the long finger metacarpal, hamate, trapezoid, and lunate relationships.^{1,3-7}

We describe a patient with a chevron-shaped, capitate-trapezoid joint and an enlarged capitate body identified on plain radiographs and magnetic resonance imaging (MRI). Two distinct joints are noted in association with the capitate along the proximal and ulnar surfaces of the trapezoid. The significance of this study is not yet known, but it may add a normal variation of this joint to the literature or be a residual presentation of a rare os centrale carpi coalition with the capitate.

CASE REPORT

A 32-year-old man with no history of wrist trauma or wrist problems presented for evaluation of a non-tender progressive mass on the dorsal aspect of his dominant right wrist. Range of motion of the right wrist was within normal limits and equal to the left wrist. The dorsal wrist mass was mobile, compressible, and had clinical and MRI findings consistent with a dorsal wrist ganglion.

Posteroanterior radiographs (Figures 1A and 1B) and a T2 coronal MRI (Figure 2) showed a chevron-shaped, capitate-trapezoid joint and capitate diameter of 22 mm and 20 mm, respectively. Widening at the scapholunate interval and a dorsal ganglion was noted on the MRI, along with intact intercarpal ligaments.

DISCUSSION

Understanding wrist anatomy and its associated carpal attachments and carpal joints, as well as any potential normal variations are important when assessing traumatic, degenerative, and other pathological conditions in the wrist. Previous anatomical studies of the wrist and capitate have defined various normal osseous and articular features with the capitate and trapezoid.^{1,3,7}

We searched the literature on human capitate morphology and did not find additional radiographic descriptions of chevron-shaped, capitate-trapezoid joints. We did find unpublished communications identifying a teenage patient with a widened scapholunate interval and a congenital chevron-shaped, capitate-trapezoid joint on both wrists.⁸

Possible explanations, in this case of the capitate-trapezoid findings, include previously undescribed variant of a normal capitate-trapezoid joint or an os centrale carpi (accessory ossicle) coalition to the radial side of the capitate. In a cadaveric anatomical study involving 80 wrists, Nakamura et al¹ reported three types of capitate-trapezoid joints, including volar only single facet, 75.0% of specimens; double dorsal and volar facet, 11.0% of specimens; and a large-single facet, 14.0% of specimens. The facet on the capitate side was concave

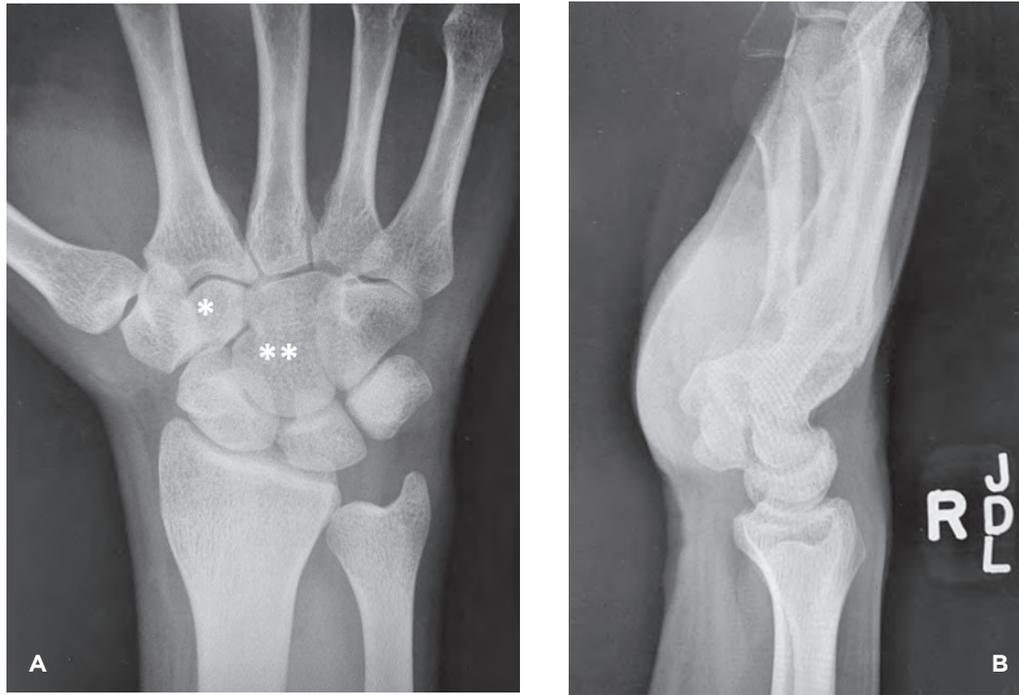


Figure 1. A) Posteroanterior and B) lateral radiographs showing the chevron-shaped joint between the capitate and trapezoid, as well as the enlarged capitate body (*trapezoid and **capitate).



Figure 2. T2 coronal magnetic resonance image showing the chevron joint and enlarged capitate body, with widening at the scapholunate joint (*trapezoid and **capitate).

in 94.0% of the specimens. In an anatomical computed tomography study of live and cadaveric wrists, Patterson et al² found that the volume, maximum length, and surface areas of the capitate were greater in males. However, other differences in capitate-trapezoid joints

between sexes were not reported. In a radiographic study, Hawkins-Rivers et al⁹ reported on capitate and lunate length, diameter, and circularity. They found an average MRI diameter of the capitate in the coronal plane of 12.9 mm (+/-1.89 mm) and an average radiographic capitate diameter in the same plane of 11.9 mm (+/- 1.8 mm).

The capitate-trapezoid joint reported in this case is most similar to the large-single facet described by Nakamura, but it is distinctly different because it involves an angulated joint in the axial and sagittal plane, forming a chevron-shaped joint with the trapezoid. The capitate coronal diameter was 9 mm larger on MRI than the average capitate diameters previously reported.

Over twenty-five accessory ossicles have been described in the human carpus. The os styloideum is the most common carpal accessory ossicle and is considered one of the underlying contributors to the formation of the metacarpal boss.¹⁰ The os centrale carpi is the third most common accessory ossicle in the wrist and has been traced phylogenetically to some members of the primate family and other hominins.¹¹ When present, the os centrale carpi is considered an asymptomatic normal variant in most cases.^{12,13} During the early stages of normal human embryo development, the cartilaginous os centrale carpi appears and eventually fuses with the distal ulnar scaphoid.^{14,15} In some instances after gestation, a residual os centrale carpi forms an accessory ossicle between the scaphoid, trapezoid, and capitate⁷ and has been reported in conjunction with congenital malformation syndromes,

such as Holt-Oram syndrome. However, there is some debate over the cause of carpal accessory ossicles as either the residual expression of phylogenetic evolution or just normal genetic human variation. Although uncommon, os centrale fusion with the capitate or trapezoid has also been described.^{12,16}

In summary, the abnormal capitate-trapezoid joint described in this case was asymptomatic. The radiographic findings in the carpus were incidental and not involved with the dorsal wrist ganglion. Further anatomical study of a larger cohort of wrists would better determine if the chevron-shaped, capitate-trapezoid joint results from an unusual and uncommon os centrale coalition with the capitate or the fourth type of a normal but less common capitate-trapezoid joint.

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