Reviewing the epidemiology, diagnosis, and nonsurgical treatments for pisiform ligament complex syndrome and pisotriquetral arthrosis

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Abstract

Ulnar palmar wrist pain originating near the pisiform due to injury to components of the Pisiform Ligament Complex (PLC), leading to Pisotriquetral (PT) joint instability and subsequent arthrosis, is termed Pisiform Ligament Complex (PLC) syndrome. This condition involves degeneration of the articular surfaces of the pisiform and triquetrum, resulting in PT joint osteoarthritis. Primary osteoarthritis of the PT joint is rare, with most cases being post-traumatic and preceded by chronic PT joint instability. Therefore, understanding the mechanism of PT joint osteoarthritis requires considering its interaction with other conditions. Pisotriquetral Arthrosis (PTA) is a broader term encompassing arthritic conditions affecting this joint. Investigating the anatomy, biomechanics of the pisiform and PT joint ligaments, and clinical subtypes of PLC syndrome is crucial for comprehending PTA's structure and manifestations. PLC syndrome spans from instability to Pisotriquetral Arthrosis (PTA). Early identification and management of PLC instability can prevent PTA advancement. The pisiform tracking test is instrumental in diagnosing PLC syndrome. When conservative methods fail to address severe PLC syndrome, pisiformectomy with soft tissue preservation remains the preferred treatment.

Keywords: Pisotriquetral; Pisiform ligament complex; Joint osteoarthritis.

INTRODUCTION

In 1944, Harris noted that, except in humans, the pisiform typically possesses a secondary ossification center and epiphysis akin to the os calcis. In humans, the pisiform is cartilaginous at birth, developing later with one, occasionally two, ossification centers. The auxiliary ossicle, Os pisiforme secundarium, may form if the secondary center is present but does not fuse with the remaining bone. Michelson's 1945 research indicates that the pisiform bone typically ossifies around 8 years and 9 months of age, fully developing by 12 years old. As the smallest carpal bone in the proximal carpal row, the pisiform lies palmar to the plane of the other three carpal bones and displays a distinctive connection to the triquetrum. Embedded within the Flexor Carpi Ulnaris (FCU) tendon, the nearly spherical pisiform acts as a sesamoid bone, uniquely featuring a solitary articular surface and tendinous insertions. Blood supply to the proximal and distal poles of the pisiform is provided by ulnar artery branches. The triquetrum, resembling a pyramid, possesses three articular surfaces, with its palmar surface, articulating with the pisiform, being the smallest and oval-shaped. Located near the ulnar nerve and artery, the pisiform contributes to the medial wall of the Guyon canal.

Kropp's 1945 anatomical study sparked initial interest in the Pisotriquetral (PT) joint, revealing connectivity between the radiocarpal and PT joints in 76% of specimens, contrary to prior descriptions suggesting independent articulations. Subsequent research by Weston confirmed this connection in postmortem arthrography. Viegas and colleagues similarly found joint linkage in 88% of dissected cadavers. Pevny et al. detailed ten soft tissue attachments to the pisiform, including the Flexor Carpi Ulnaris (FCU) tendon and ligaments like the Pisohamate (PH) and Pisometacarpal (PM) ligaments. Yamaguchi et al. categorized three types of PH and PM ligaments based on pisiform attachment. Rayan et al. termed this collection of ligaments the Pisiform Ligament Complex (PLC) to denote its role in supporting pisiform stability.

The primary ligaments attaching to the pisiform include the PM, PH, radial PT, ulnar PT, and Transverse Carpal Ligament (TCL), connecting it to the triquetrum, hamate, and fifth metacarpal base. The pisiform, akin to the patella, serves as a lever for the FCU muscle rather than merely as a point of soft tissue attachment. Its movements are influenced by radial/ulnar deviation and wrist extensors.

Research on pisiform kinematics by Moojen et al. revealed its movement patterns during wrist extension and flexion, while Jameson et al. identified four planes of motion between the pisiform and triquetrum. Radiographic evaluation methods include semi-lateral views and wrist motion views, aiding in diagnosing PT joint instability and pisiform pathology. Real-time fluoroscopy during wrist flexion and extension can further assess instability. Congenital malformations, ganglions, osteoid osteomas, and rare tumors are among the identified pathologies associated with the pisiform and PT joint.

FCU tendinopathy, often concurrent with PT instability and PTA, is a significant cause of ulnar palmar wrist pain. Paley et al. attributed 44% of such complaints to FCU enthesopathy, emphasizing the importance of considering associated conditions when diagnosing FCU tendinopathy.

DISCUSSION

PLC syndrome encompasses a spectrum from instability to Pisotriquetral Arthrosis (PTA), where early detection and intervention for PLC instability can impede PTA progression. The pisiform tracking test serves as a valuable diagnostic tool for identifying PLC syndrome. In instances of severe PLC syndrome refractory to conservative measures, pisiformectomy with soft tissue preservation remains the preferred treatment approach.