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Review Article

Pisiform ligament complex syndrome and pisotriquetral arthrosis: A review of epidemiology, diagnosis, and non-surgical interventions

NIKHIL YADAV

B. Pharm, Anand Engineering College, Agra, Uttar Pradesh, India

Address for correspondence:
Nikhil Yadav, B. Pharm, Anand Engineering College, Agra, Uttar Pradesh, India
Nikhilyadav2888@yahoo.com

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Abstract

Ulnar palmar wrist pain near the pisiform produced by injury to PLC components that results in Pisotriquetral (PT) joint instability and subsequent arthrosis is known as Pisiform Ligament Complex (PLC) syndrome. A degenerative joint condition affecting the articular surfaces of the pisiform and triquetrum is PT joint osteoarthritis. The PT joint seldom develops primary osteoarthritis, and the majority of arthritic problems in this joint are post-traumatic in origin and preceded by chronic PT joint instability. The mechanism of PT joint osteoarthritis therefore cannot be understood in isolation because it overlaps and interacts with those of other diseases. Pisotriquetral Arthrosis (PTA) is a more catholic word for the arthritic diseases that affect this joint. Understanding the structure of PTA requires research into the anatomy and biomechanics of the pisiform and PT joint ligaments as well as the clinical subtypes of PLC syndrome.

Keywords: Pisotriquetral, Pisiform ligament complex, Joint osteoarthritis

INTRODUCTION

According to Harris in 1944, the pisiform, with the exception of humans, possesses a secondary ossification centre and an epiphysis, suggesting that it is similar to the os calcis. In humans, the pisiform is cartilaginous at birth and develops later. One, and incredibly infrequently, a second ossification centre. Os pisiforme secundarium, an auxiliary ossicle, forms if the secondary centre is present but does not fuse to the remaining bone. According to Michelson research from 1945, the pisiform bone ossifies on average at the age of 8 years and 9 months and fully develops at 12 years old. The pisiform, the smallest carpal bone in the proximal carpal row, is situated palmar to the plane of the other three carpal bones. In contrast to other wrist articulations, its connection to the triquetrum appears to be distinct [1-3]. The Flexor Carpi Ulnaris (FCU) tendon is implanted with the virtually spherical pisiform, which functions as a sesamoid bone. The only carpal bone with a single articular surface and any tendinous insertions is this one.

The proximal and distal poles of the pisiform receive blood flow from ulnar artery branches. The triquetrum has three articular surfaces and is shaped like a pyramid. Its palmar articular surface, which articulates with the pisiform, is the smallest and oval in shape. The pisiform, which is close to the ulnar nerve and artery, contributes to the formation of the Guyon canal's medial wall.

LITERATURE REVIEW

The first known current interest in the anatomy and description of the PT joint was sparked by a brief anatomical study published by Kropp in 1945.

In 76% of the specimens, he noticed connectivity between the radiocarpal and PT joints. This ran counter to descriptions in most anatomy textbooks at the time, which suggested that the wrist and PT joint have independent articulations. This connectivity between the PT and wrist joints was validated by Weston in a condensed report on postmortem arthrography. In 88% of the dissected cadavers, Viegas and colleagues also discovered connection between the proximal wrist joint and PT joint. The FCU tendon, extensor retinaculum, abductor digiti minimi, Transverse Carpal Ligament (TCL), anterior carpal ligament, ulnar collateral ligament, Triangular Fibrocartilage Complex (TFCC), Pisohamate (PH) ligament, Pisometacarpal (PM) ligament, and PT joint fibrous capsule were among the ten soft tissue attachments to the pisiform that Pevny and colleagues described. Based on how the PH and PM ligaments attach to the pisiform, Yamaguchi and colleagues distinguished three different anatomic types of PH and PM ligaments. The phrase "Pisiform Ligament Complex" (PLC) was recently coined by Rayan and colleagues to refer to a collection of ligaments that bind to the pisiform and support its stability in various planes.

The PM, PH, radial PT, ulnar PT, and TCL are the primary ligaments that attach to the pisiform. The triquetrum, hamate, and base of the fifth metacarpal are connected to the pisiform by these ligaments. The radial and ulnar PT ligaments make up the fibrous tissue known as the PT joint capsule, which connects the pisiform to the triquetrum [4-6].

The pisiform, like the patella and quadriceps muscles, is a sesamoid bone that functions as a lever to improve the function of the FCU muscle rather than just being a focal point of ST attachments. The triquetrohamate ligament between the proximal and distal carpal rows is connected to it through its attachment to the hamate through the PH ligament. The FCU tendon is the only dynamic structure that exerts proximally directed force on the pisiform.

Radial/ulnar deviators and wrist extensors indirectly influence pisiform displacement by producing forces.

When the wrist moved, Weston saw that the pisiform moved quite a bit, which he attributed to a lax capsule.

According to Vasilas and colleagues, the PT joint space is between 1-4 mm wide at the neutral wrist position, and it widens with wrist flexion and narrows with extension. When Moojen and colleagues examined the pisiform's kinematics, they discovered that while it presses on the distal end of the triquetrum during extension, the pisiform travels away from it during flexion. The ulnar wrist deviation causes the triquetrum to show increased ulnar deviation and extension whereas the radial wrist deviation causes the pisiform to flex. Jameson and colleagues performed fluoroscopic and radiographic examinations on the wrists of healthy volunteers and discovered that the pisiform moves in four planes with respect to the triquetrum: proximal-distal (vertical gliding), anterior-posterior (gapping), uniaxial rotation (angulation), and ulnar-radial (horizontal gliding) [7].

At least three semi lateral wrist motion views, full wrist extension with the forearm in 30 degrees of supination, neutral wrist position with 30 degrees of supination, and full wrist flexion (active and passive optional) with 45 degrees of supination while the thumb is fully abducted are all part of the radiographic technique for PT joint evaluation used at the author's institute. PTA and pisiform pathology are visible in these pictures. Additionally, they can help the clinician understand the motion of the PT joint and its level of instability. When instability is detected, the average normal values for pisiform excursion, PT wedge angle, PT joint space, and PH distance might be utilised as comparison points. Carpal tunnel views are less helpful than semi lateral views and can visualise the pisiform from a different projection, but they are more difficult to get.

If more information about PT joint instability is required, real-time fluoroscopy performed during wrist flexion and extension and compared to the contralateral normal side can be helpful. Bone scans may show favourable results in cases of pisiform tumours and fractures, but they are useless for identifying PTA. PT loose bodies can be identified using trispiral tomography.

Pisiform hamate coalition, which is frequently bilateral, supplementary pisiform ossicle of the pisiform, and congenital lack of the pisiform, which is connected to ulnar insufficiency and ectrodactyly, are all examples of congenital malformations of the pisiform and PT joint.

These aberrations are uncommon and frequently symptomless. To avoid misdiagnosing the problem as PTA, pisiform fracture, or scaphoid dislocation, it is crucial to recognise the aberrant anatomy.

Ganglions were said to come from the PT joint or the pisiform intraosseously. Additionally, osteoid osteoma of the pisiform was documented, however the diagnosis was challenging and took some time. In one case report, surgically removing the nidus was curative. Pisiform primary malignant tumours and metastatic lesions are extremely uncommon. In one case report, avascular necrosis was thought to be the cause of painful pisiform expansion and total bone sclerosis. Despite not revealing a particular diagnosis, pisiform excision helped the patient's symptoms.

This most likely results from degenerative alterations in the FCU tendon close to where it inserts in the pisiform. According to research by Paley and colleagues, FCU enthesopathy accounts for 44% of patients' complaints of ulnar palmar wrist pain. However, FCU tendinopathy seldom manifests alone and frequently coexists with other diseases, particularly PT instability and PTA. The suspicion of further related illnesses must therefore be raised when FCU tendinopathy is diagnosed [8].

CONCLUSION

A continuum known as PLC syndrome extends from PLC instability to PTA. Early diagnosis and treatment of PLC instability may halt the development of PTA. The provocative manoeuvre known as the pisiform tracking test helps to identify PLC syndrome. For cases of severe PLC syndrome that do not respond to nonoperative treatment, psiformectomy with preservation of the soft tissue confluence continues to be the treatment of choice.

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