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3.3. Clinical neuromusculoskeletal pain syndromes of the wrist

Introduction

Diagnosing wrist pain syndromes can be approached through a systematic assessment of each of the tissues that compose the wrist: skin, muscles and tendons, bones and joints, blood vessels and nerves. This methodology tends to prolong the anamnesis and physical examination substantially. A more practical method in the context of intense daily clinical activity is to classify these pain syndromes by topographic area so that the differential diagnosis is narrower and the examination is more selective.

This chapter explains how to clinically diagnose the principal pain syndromes of the wrist, which we divide into three groups by location: radial pain, central pain, and ulnar pain. We will also suggest which complementary imaging tests and other diagnostic techniques can be used to confirm the clinical suspicion. While readers should already be familiar with the anatomy of this region, we will review certain anatomical structures as appropriate. Acute injuries such as fractures and dislocations are excluded from the differential diagnosis.

Radial wrist pain

Radial side pain is more frequently the result of osteoarticular lesions than in other locations on the wrist, and osteoarthritic processes – both primary and secondary to previous lesions – are common. Table 1 lists the main clinical disorders in this area. The two most common diagnoses producing radial wrist pain are osteoarthritis of the carpometacarpal (CMC) joint of the thumb (also known as thumb osteoarthritis) and de Quervain disease.

The common symptomology of these disorders is pain on wrist movement, which may persist during rest, along with limited mobility. Specifically, pain when making a pincer movement with the thumb suggests thumb osteoarthritis or de Quervain disease.

Simple inspection of the radial side of the wrist can provide valuable information. Swelling or dorsoradial deformity may indicate a chronic osteoarthritic process between the radius and scaphoid, as occurs in scaphoid nonunion advanced collapse (SNAC) or scapholunate advanced collapse (SLAC) patterns. A prominence or deformity at the base of the thumb is characteristic of thumb osteoarthritis. In the case of a volar ganglion, typically situated next to the flexor carpi radialis (FCR) tendon and the radial artery, the diagnosis is obvious.

Identification of tender points through palpation requires certain precision due to the proximity of anatomical structures where the pain might originate. A common example is the proximity of tenderness in thumb osteoarthritis, scaphotrapeziotrapezoidal osteoarthritis, and de Quervain disease (Fig. 1). In the case of scaphoid nonunion, palpation will be more painful on the volar side (scaphoid tubercle) in the distal third nonunion, in the anatomical snuff box in the middle third nonunion, and in the dorsum (distal to Lister’s tubercle) in the proximal third nonunion. Pain on dorsal palpation of the radioscaphoid joint is usual in early SNAC and SLAC degenerative processes, when the joint damage has not yet reached the second carpal row.

Table 1. Disorders of the wrist that cause radial side pain

Bone disorders:
• Scaphoid nonunion
Primary osteoarthritic disorders:
• Osteoarthritis of the carpometacarpal (CMC) joint of the thumb • Osteoarthritis of the scaphotrapeziotrapezoidal (STT) joint
Secondary osteoarthritic disorders:
• SNAC wrist (scaphoid nonunion advanced collapse) in early stages • SLAC wrist (scapholunate advanced collapse) in early stages
Inflammatory disorders:
• De Quervain disease • Flexor carpi radialis (FCR) tendinitis • Extensor carpi radialis longus (ECRL) and brevis (ECRB) tendinitis • Intersection syndrome • Synovitis of the carpometacarpal (CMC) joint of the thumb
Other disorders:
• Volar ganglion • Wartenberg's syndrome • C6 radiculopathy

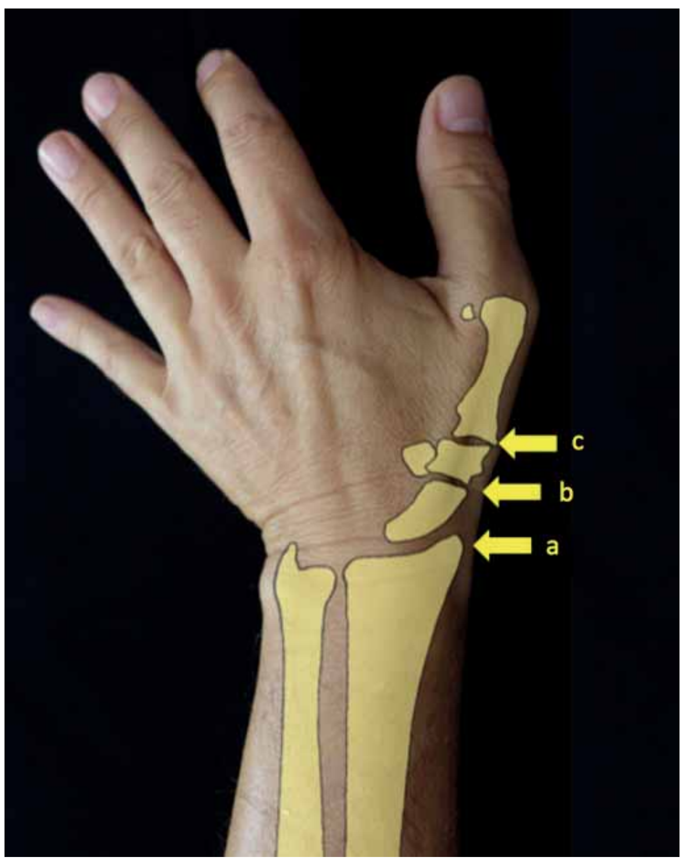

Figure 1. Proximity in the palpation of points of tenderness corresponding to: (a) de Quervain disease, (b) scaphotrapeziotrapezoidal osteoarthritis, and (c) thumb osteoarthritis.

Tendinopathy is not difficult to detect; extensor carpi radialis longus (ECRL) and extensor carpi radialis brevis (ECRB) tendinopathies are characterised by pain on palpation of the dorsal base of the second and third metacarpals, respectively; FCR tendinopathy (next to the scaphoid tubercle), by pain in the distal volar crease of the wrist; and de Quervain disease, by pain on the radial styloid. Intersection syndrome is really a bursitis produced between the ECRL and ECRB (in the deep plane) and the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) (on the superficial plane). While uncommon, intersection syndrome typically presents with tenderness about 2 cm to 3 cm from the radial styloid, proximally and dorsally. Moreover, it is usually accompanied by a characteristic crepitus.

Mobility is logically limited in disorders with osteoarthritic damage in the joint surfaces: thumb osteoarthritis, SNAC pattern, SLAC pattern, etc. These limitations vary considerably in tendinopathies, depending on the intensity of the pain symptomology.

The next step in the physical examination is to perform specific manoeuvres which aim to diagnose some pathologies with clinical certainty. In thumb osteoarthritis, examiners can attempt to provoke grinding between the joints by holding the patient's wrist in one hand and moving the first metacarpal dorsally and palmarly with the other, while applying an axial load on the trapezium. This is called the thumb CMC grind test (Fig. 2), whose purpose is to evoke a characteristic feeling of painful grinding.

Figure 2. Thumb CMC grind test.

By contrast, the absence of grinding in the presence of trapezium-metacarpal pain may be attributable to a synovitis secondary to instability in the joint; this generally appears in younger women. To assess the instability, the examiner should try to laterally subluxate the thumb, which reproduces the pain and reveals the prominence at the base of the first metacarpal.

De Quervain disease can be diagnosed by means of different manoeuvres. The best known is often ascribed to Finkelstein, although it was Eichhoff who first described it[3]. This procedure involves introducing the thumb in the palm, closing the fingers and performing a passive ulnar deviation of the wrist (Fig. 3). The test is considered positive if initiating the deviation produces intense pain on the radial styloid. Another useful manoeuvre consists of thumb abduction against resistance, with the wrist in a position of maximum flexion (Fig. 4). This technique also produces pain in a first dorsal compartment tendinopathy.

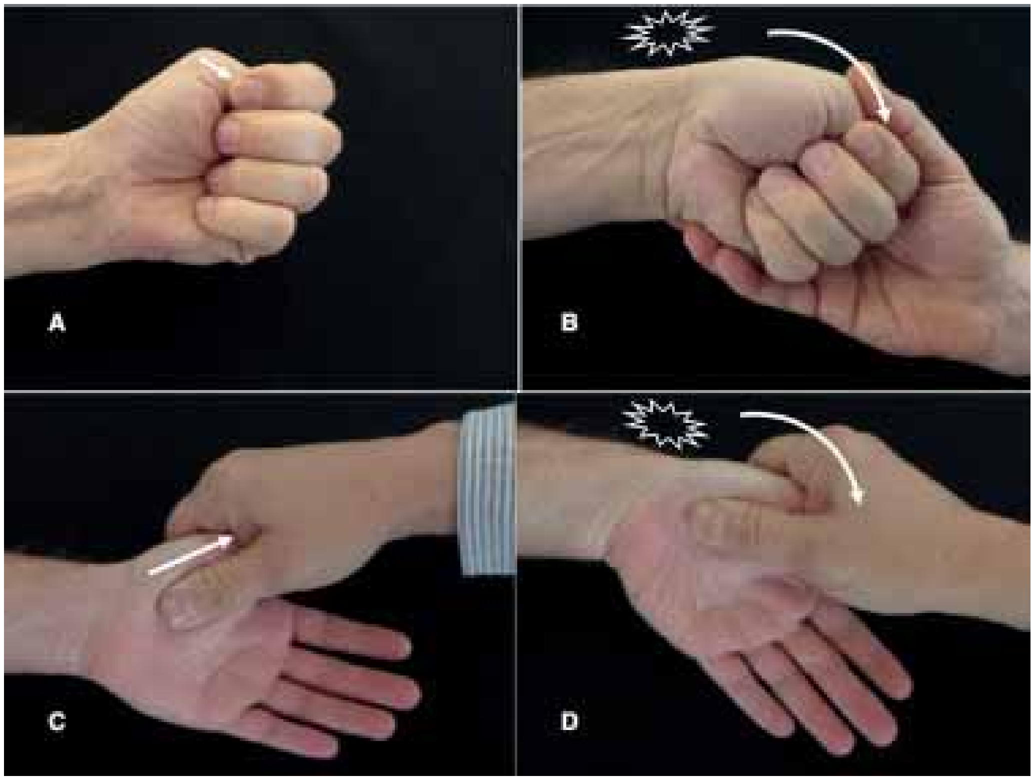

Figure 3. Eichhoff's manoeuvre (A,B) for de Quervain disease, differing from Finkelstein's manoeuvre (C,D), in which the examiner pulls and deviates the thumb towards the ulna.

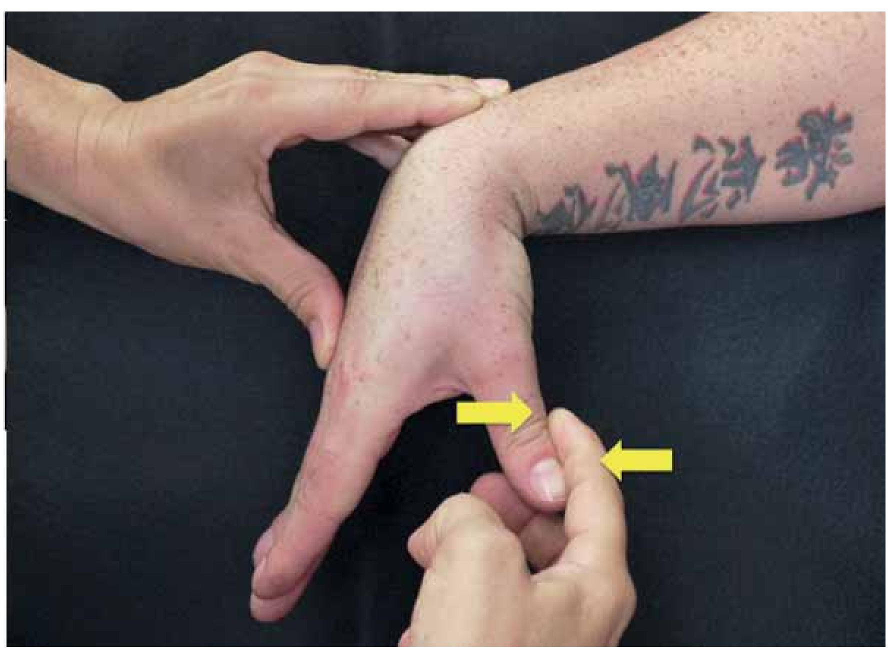

Figure 4. Thumb abduction against resistance, with the wrist at maximum flexion.

In the other types of tendinopathies on the radial side of the wrist, pain can be reproduced by passive stretching of the inflamed tendon or by provoking a contraction against resistance of the corresponding muscle.

Peripheral nerve compression on the radial side of the wrist is rare. Only the entrapment of the superficial branch of the radial nerve, on crossing beneath the brachioradialis tendon, can produce pain and paraesthesia in this dorsal radial area. This condition is known as Wartenberg's syndrome, and its symptomology can be replicated through percussion on the point of nerve compression. The percussion test involves exploring the radial edge of the forearm in a proximal direction. The compression point, indicated by provoking paraesthesias, tends to be located around the union of the distal and central third of the forearm. Differential diagnosis should be performed with a C6 nerve root disorder, whose dermatome is distally superimposed on the sensitive area of the superficial radial nerve.

With regard to complementary investigations, in all of the bone pathologies described it is necessary to do at least two basic radiographic projections: one anteroposterior and one lateral, which could also be supplemented with computed tomography (CT) scans. In the case of scaphoid nonunion, it is advisable to perform two additional radiographic projections: one anteroposterior in maximum ulnar deviation, and one oblique in 45º semipronation. In addition, it is recommendable to ask for a magnetic resonance imaging (MRI) with gadolinium enhancement to evaluate the vascular status of the proximal pole.

It is possible to diagnose radial tendinopathies without complementary investigations, although an ultrasound can be helpful to confirm the diagnosis. Finally, electrodiagnostic studies would be justified only if the examiner suspects that the C6 root is involved in the neurological symptomology of the radial side of the wrist.

Central wrist pain

The clinical disorders that usually present with central wrist pain are listed in table 2. In some cases, their classification in this group is questionable, but in all of them pain is localised more centrally than laterally.

The two most frequent causes of pain in this central zone are carpal tunnel syndrome (CTS) – on the volar side – together with occult dorsal ganglion (also known as dorsal wrist syndrome). The symptoms of CTS, like nocturnal paraesthesias in the median nerve territory, are so characteristic that it is difficult to mistake the diagnosis. On the other hand, occult dorsal ganglion is frequently overlooked. When the dorsal ganglion is large and therefore obvious, it often presents without pain, representing only an aesthetic problem. However, in its initial phases there is a myxoid degeneration at the union between the dorsal scapholunate ligament and the dorsal capsule, which begins to cause pain. This situation is usually called occult ganglion, although other authors, such as Watson, prefer the term 'dorsal wrist syndrome'. In any case, this condition is a frequent cause of dorsal pain, and it should be kept in mind during the differential diagnosis.

Table 2. Disorders of the wrist that cause central wrist pain

Bone disorders:
• Kienböck's disease
Primary osteoarthritic disorders:
• Virtually nonexistent
Secondary osteoarthritic disorders:
• SNAC wrist in advanced stages • SLAC wrist in advanced stages
Ligament disorders:
• Scapholunate instability
Nerve compression disorders:
• Carpal tunnel syndrome (CTS)
Inflammatory disorders:
• Extensor tenosynovitis in rheumatoid arthritis
Other disorders:
• Occult dorsal ganglion (dorsal wrist syndrome) • Dorsal ganglion

Primary arthritis is virtually nonexistent in the central wrist area. The degenerative processes are always secondary, and characteristically, the radiolunate joint usually remains unaffected until a late phase. One exception is the rare Kiënbock's disease, discussed below.

Patients report different symptoms in the central wrist area. Pain and progressive loss of mobility is typical in bone and degenerative pathologies, while scapholunate instability provokes a sensation of painful wrist failure on making certain efforts. The symptomology of CTS is dominated by nocturnal paresthesias or numbness; occult ganglion, by pain on hyperextension of the wrist; and rheumatoid arthritis synovitis (now less common thanks to the efficacy of modern medical treatments), by constant inflammatory pain.

Inspection of the wrist in patients with central pain can reveal a dorsal deformity in cases with advanced SNAC or SLAC patterns; swelling of the extensor tendons distal to the extensor retinaculum in the case of synovitis; or a dorsal ganglion, which tends to be located centrally and also distally to the extensor retinaculum.

The search for points of tenderness through palpation can bring us closer to a clinical diagnosis. The anatomical reference that allows us to locate the diverse structures in the dorsum of the wrist is the prominence of Lister's tubercle in the radius. Immediately distal to the tubercle is the scapholunate interval, and from there it is possible to situate the rest of the structures.

With regard to the two most frequent pathologies of this area, in CTS the examiner palpates the central zone of the wrist's palmar distal volar crease, and in occult ganglion, the dorsal scapholunate interval. While the palpation is sometimes painless in CTS, requiring other diagnostic manoeuvres, it is extremely painful in occult ganglion.

In scapholunate instability, the palpation of the dorsal interval between these two bones is also painful, but as the instability evolves and the proximal pole of the scaphoid tends towards dorsal subluxation, the most intense pain point migrates to the radioscaphoid joint. As mentioned above, the SLAC pattern is the degenerative form of this instability. In its advanced stages, SLAC ends up affecting the midcarpal joint, as does advanced SNAC, and palpation of the capitolunate joint becomes painful. In necrosis of the lunate or Kiënbock's disease, the lunate is selectively tender to dorsal palpation.

There are several manoeuvres to support a clinical suspicion at this stage of the physical examination. In CTS, the examiner should try to reproduce the paraesthesia via the classic Phalen manoeuvre, maintaining the patient's wrist in hyperflexion with the elbow extended. The test is positive when paraesthesias appear in the median nerve territory after less than a minute. The purpose of the arm elevation test, which also lasts one minute, is the same, and this technique is superior to the Phalen manoeuvre in both sensitivity and specificity[1]. The recently described Scracht test[2] is another interesting option, although more research is needed to confirm its real utility.

For occult dorsal ganglion, Watson proposed the finger extension test[5], in which the patient is asked to place their elbow on the table, flexing the wrist and trying to extend the fingers against the resistance applied by the examiner on the dorsal aspect (Fig. 5). The test is positive when it provokes wrist pain. This manoeuvre should not be confused with the much more well-known scaphoid shift test, also described by Watson, for scapholunate instability. This test is performed by holding the scaphoid with one hand and moving the wrist with the other from the position of ulnar deviation to radial deviation. The hand holding the scaphoid should press the scaphoid tubercle firmly with the thumb while the index finger is positioned dorsally along its proximal pole, 1 cm distal to Lister's tubercle (Fig. 6). Upon reaching radial deviation, there may be an audible popping, a dorsal subluxation of the proximal pole, or simply a sensation of pain. This manoeuvre results in many false positives and should always be performed on the contralateral wrist. For scapholunate instability, the anteroposterior drawer test can be used. Holding the scaphoid with one pincer grip, and the lunate with the other, the examiner applies a shear load palmarly and dorsally, revealing an anomalous mobility or simply provoking pain, depending on the severity of the lesion.

Figure 5. Finger extension test. The patient tries to extend his fingers against resistance, with the wrist flexed, to detect occult ganglions.

Figure 6. Watson’s classic manoeuvre for scapholunate instability.

With regard to complementary tests, assessing central wrist pain (as with radial pain) requires at least two radiographic projections: one anteroposterior and one lateral. A CT scan can complement the information gathered from the radiographies, although in Kiënbock’s disease, the MRI with gadolinium enhancement is preferable because this disease is a bone necrosis.

For CTS, it is routine (although not indispensable) to order an electrodiagnostic study that can confirm the diagnosis and also inform us about the severity of the compression. Likewise, an MRI can also confirm a suspicion of occult dorsal ganglion or the incipient myxoid degeneration at its origin. Finally, scapholunate instability requires both static and dynamic radiographic studies, which are usually completed with an MRI arthrogram of the wrist.

Ulnar wrist pain

The pain in this area of the wrist has earned quite a bad name due to its diagnostic complexity. Numerous pathologies can cause ulnar pain (table 3), but an anamnesis and thorough physical examination rarely fail to generate a reliable diagnostic suspicion. For the sake of practicality, we will focus on the most frequent pathologies.

Table 3. Disorders of the wrist that cause ulnar side pain

Bone disorders:
• Hook of hamate nonunion • Dorsal chip fracture of the triquetrum nonunion
Primary osteoarthritic disorders:
• Ulnocarpal impaction syndrome • Ulnar styloid impaction syndrome • Pisotriquetral chondromalacia/osteoarthritis • Proximal pole of the hamate chondromalacia
Secondary osteoarthritic disorders:
• Distal radioulnar joint (DRUJ) osteoarthritis
Inflammatory disorders:
• Extensor carpi ulnaris (ECU) tendinitis • Flexor carpi ulnaris (FCU) tendinitis • DRUJ synovitis in rheumatoid arthritis
Ligament disorders:
• Triangular fibrocartilage complex (TFCC) lesions • DRUJ instability • Lunotriquetral instability • Midcarpal instability • Carpometacarpal instability
Nerve compression disorders:
• Cubital tunnel syndrome or ulnar neuropathy at the elbow • Guyon's canal syndrome
Other disorders:
• Hypothenar hammer syndrome

Whereas pain on the radial side of the wrist usually has an osteoarticular origin, on the ulnar side it comes from the soft tissues. Unless another cause can be proven, the main culprit of ulnar wrist pain is the triangular fibrocartilage complex (TFCC) injury. To understand its pathology, a detailed study of the anatomy and biomechanics is absolutely essential. From a clinical perspective, it is good to know that TFCC injuries frequently occur after falls onto the wrist. If they are not diagnosed promptly, these lesions can result in sequelae ranging from simple ulnar pain all the way to distal radioulnar joint (DRUJ) instability in complete avulsions. In addition, TFCC often shows degenerative changes in adulthood, mainly in the articular disc, so it can become painful even if no trauma occurs. Regardless of whether TFCC is a traumatic sequela or a degenerative pathology, it requires special attention during the differential diagnosis of ulnar-sided wrist pain.

Following the usual diagnostic process, the symptomology reported by the patient is the first consideration. Ulnar pain when loading the wrist is the most common and unspecific. Pain during pronosupination, and especially during supination, suggests a TFCC problem. If the pronosupination is also limited and provokes a sensation of friction, it may be DRUJ osteoarthritis. Intensification of the pain during an ulnar deviation is suggestive of an impaction syndrome, which is closely related to TFCC degenerative pathology. Pain that occurs when using the wrist but not when resting could indicate instability. Any audible snapping reinforces this suspicion. Changes in sensitivity on the ulnar side of the wrist (paraesthesias, dysaesthesia, hypoesthesia) impose the need to examine the patient neurologically in order to establish a differential diagnosis between cervical radiculopathy and ulnar neuropathy at the elbow or (more rarely) Guyon's canal syndrome.

Inspecting the ulnar side of the wrist can allow detection of a prominent ulnar head on the dorsal aspect, which is suggestive of a DRUJ subluxation due to instability or as the result of a sequela from a radial fracture (secondary ulnar plus). It could also indicate swelling in the DRUJ due to articular synovitis or extensor carpi ulnaris (ECU) tenosynovitis.

Palpation of the ulnar side of the wrist will reveal some characteristic features that can help to situate the rest of the anatomical structures. Beginning on the dorsum, the clearest prominence is the ulnar head. The pain resulting from pressure on it may be related to a TFCC problem, the ECU tendon or the DRUJ. To differentiate between them, the examiner will move distally to the ulnar head, looking for the small depression that corresponds to the TFCC. The patient can then tense the ECU tendon for palpation, or the examiner can explore in a radial direction to fully palpate the DRUJ. Painful pressure on the dorsal TFCC is not very specific, as it can affect several adjacent structures. If the examiner wants to provoke pain selectively on the TFCC, the wrist should be positioned in maximum supination, and pressure should be applied to the hollow that is distal to the ulnar head and palmar to the ECU, directly on the ulnar edge (Fig. 7). This point has come to be known as the 'ulnar snuff box', and it corresponds to the foveal insertion of the TFCC.

Returning to the dorsum, after palpating the small TFCC depression, the examiner can move on distally to the lunotriquetral interval and the ulnar side of the lunate. While painful palpation on both bones can raise a suspicion of chondromalacia due to impaction, pain at the lunotriquetral interval suggests a lesion of the interosseous ligament that can be traumatic or degenerative, depending on the patient's context. From there, a distal exploration will take the examiner to the dorsum of the hamate bone, where very occasionally it is possible to detect a source of pain at the proximal pole (chondromalacia due to impaction with a type II lunate, as described by Viegas) or in its most distal area (sequela of an unconsolidated dorsal avulsion fracture).

On the volar ulnar aspect of the wrist, one characteristic feature is the pisiform bone. Tenderness from direct application of pressure or with lateral displacement is suggestive of pisotriquetral chondromalacia. Upon asking the patient to flex the wrist against resistance, it is easy to palpate the flexor carpi ulnaris (FCU) tendon, which is inserted in the pisiform and which is occasionally affected by inflammatory processes. Distally and radially to the pisiform, at about 1.5 cm, the examiner can palpate (with some difficulty) the hook of hamate in the middle of the hypothenar region. Its location is useful for two reasons: it can be a source of pain (hook of hamate nonunion), or it can serve as a point of reference to palpate Guyon's canal (between the pisiform and the hook of hamate). After this exploration to identify points of tenderness in the ulnar side of the wrist, the examiner can use the most adequate manoeuvres to confirm the diagnostic suspicion.

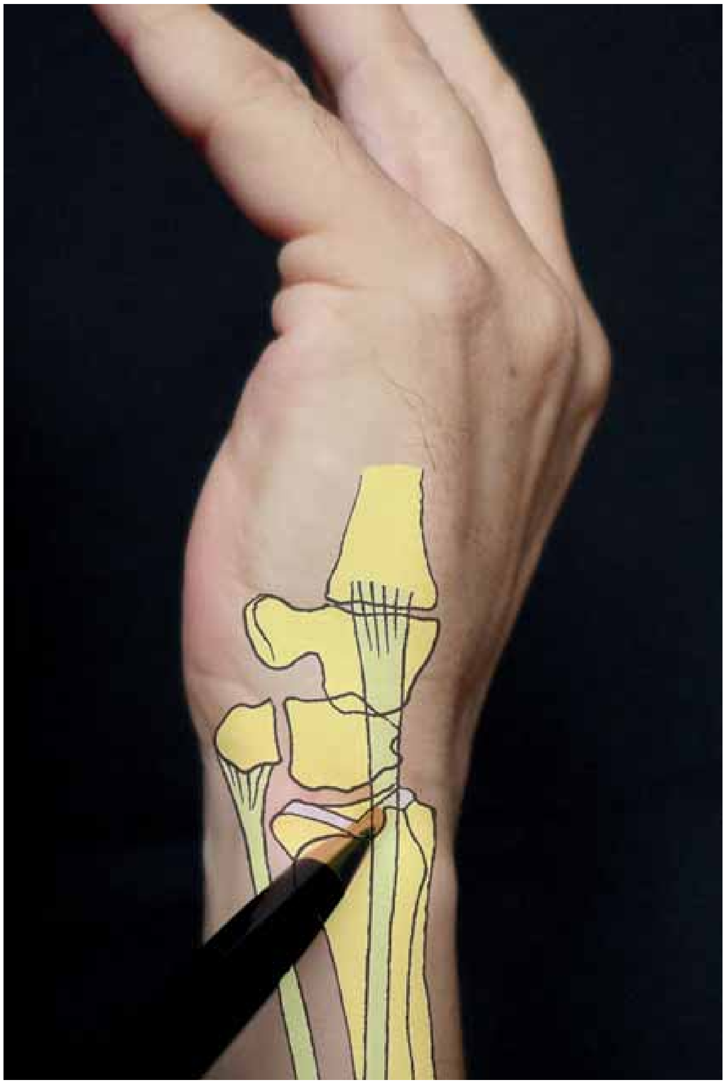

Figure 7. With the wrist in maximum supination, the foveal insertion of the TFCC becomes accessible to palpation immediately distal to the ulnar head, at the point indicated with the pen.

The TFCC grind test, also known as ulnocarpal stress test, is best in the case of a suspected TFCC tear or ulnocarpal impaction syndrome. With the wrist in ulnar deviation and the elbow well supported, an axial load is applied to the hand at the same time as a pronosupination movement (Fig. 8). The test is positive when it results in pain and a sensation of grinding or popping. Another useful test to explore the TFCC is the TFCC shear test: the pisiform and the ulna are pushed in opposite directions (Fig. 9). This manoeuvre is positive when it replicates pain, which suggests a TFCC injury, but it can also provide additional information; if grinding or crepitus are noticeable, it could be DRUJ arthritis, whereas excessive mobility suggests DRUJ instability. The ballottement test is used to confirm the latter. The examiner provokes an anterior and posterior displacement of the radius relative to the ulna (Fig. 10), repeating it in various positions (neutral, pronation, and supination) and comparing it with the contralateral wrist. An excessive displacement, without a firm end point, is indicative of DRUJ instability.

Figure 8. TFCC grind test. With the wrist in ulnar deviation and the elbow well supported, an axial load is applied to the hand at the same time as a pronosupination movement.

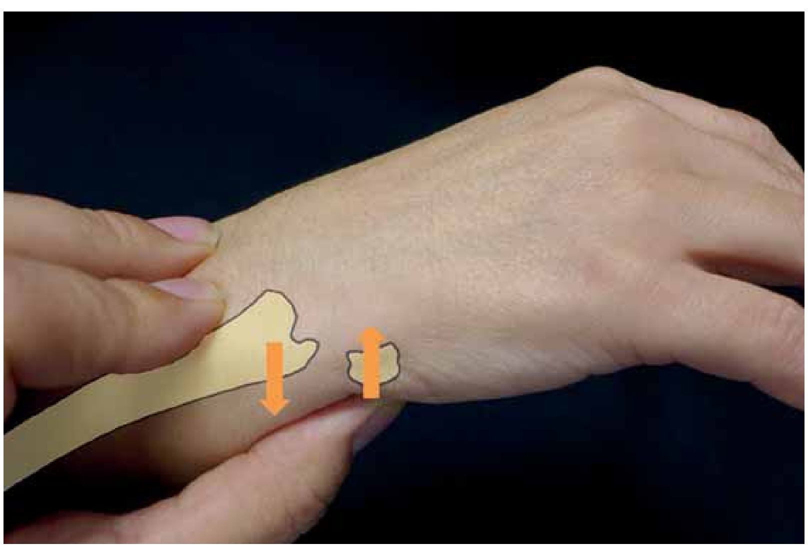

Figure 9. TFCC shear test, in which the pisiform and the ulna are pushed in opposite directions.

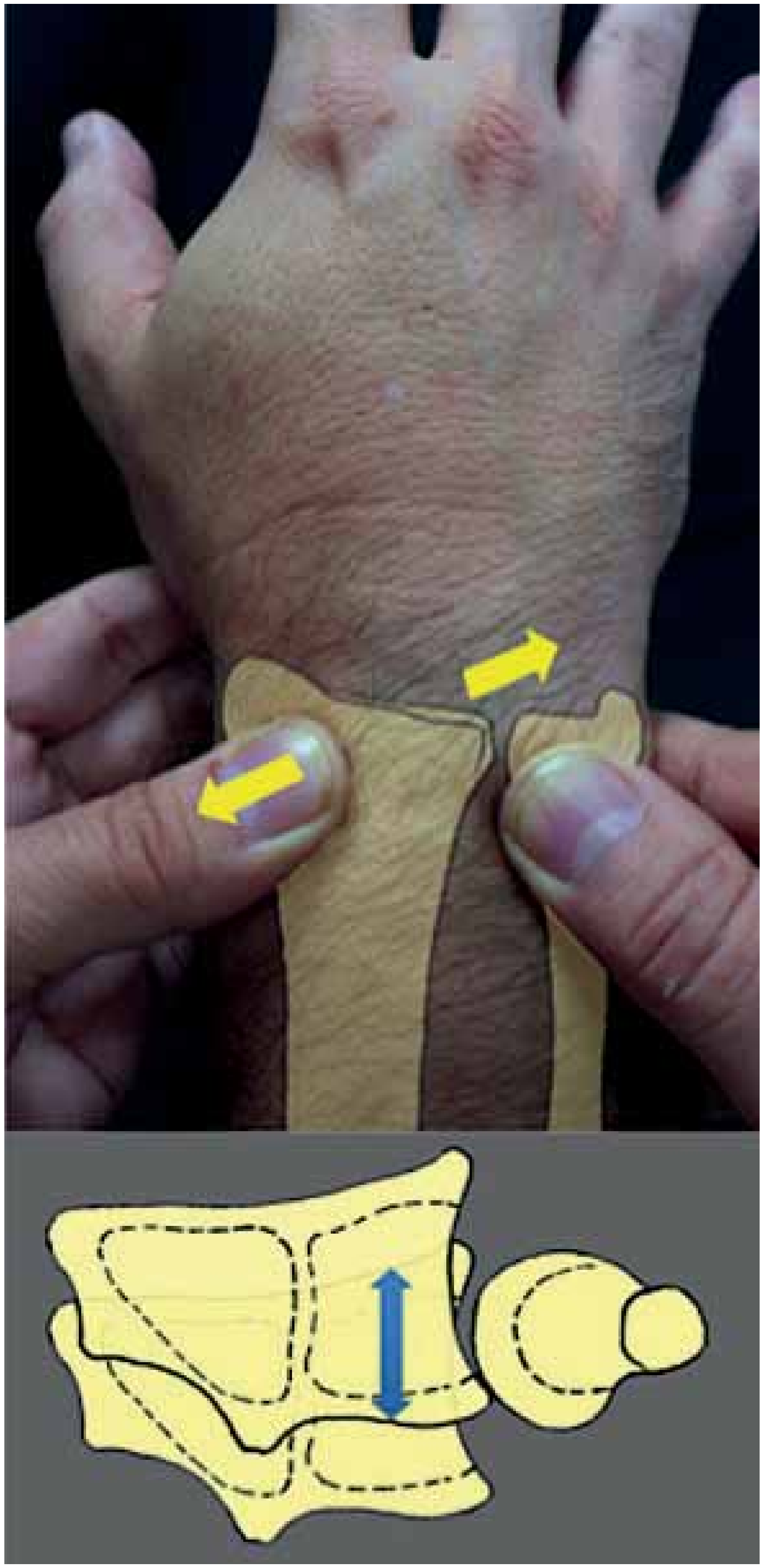

Figure 10. Distal ulna ballottement test, to detect DRUJ instability.

There are a number of manoeuvres that can be employed for the differential diagnosis of carpal instabilities on the ulnar side. The lunotriquetral ballottement test consists of firmly holding the lunate with one hand, while the other holds the pisotriquetral unit, and performing a dorsopalmar displacement between the two. An excessive or painful displacement suggests an interosseous lunotriquetral ligament tear. Midcarpal instabilities can be palmar or dorsal; both cause a popping sound when transitioning from the radial to ulnar deviation, although different biomechanical mechanisms are at play. To test midcarpal instability, examiners can use the anteroposterior drawer test, holding the radius with one hand and the second carpal and metacarpal row with the other. The distal carpal row is then alternately moved toward the dorsum and then the palm in order to provoke a subluxation of the capitate bone over the lunate, which is usually produced in the palmar direction (Fig. 11) and is indicative of palmar midcarpal instability.

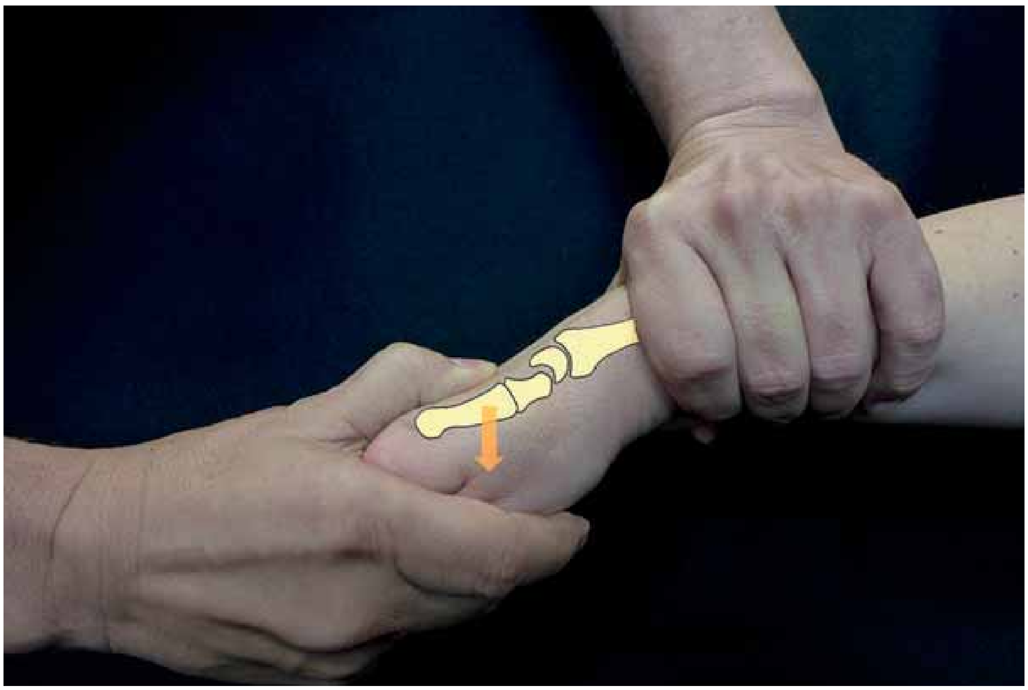

Figure 11. Manoeuvre of subluxation of the capitate bone over the lunate, in palmar midcarpal instability.

The hook of hamate pull test consists of asking the patient to flex the fifth finger against resistance. As the flexors of the fifth finger use the hook of hamate as a pulley, the lateral force created is painful when there is nonunion at the hook. Finally, the ECU synergy test[4] has been developed relatively recently to differentiate between ulnar pain caused by ECU tendinopathy and of intra-articular origin. The test is based on the synergetic contraction of the ECU and some intrinsic muscles of the hand. With the wrist supinated, the examiner holds the patient's thumb and index finger together while the patient tries to separate them (Fig. 12). The contraction of the abductor pollicis brevis provokes a contraction of the ECU, and as a consequence ulnar pain if the ECU is inflamed.

Figure 12. ECU synergy test. The contraction of the abductor pollicis brevis provokes a contraction of the ECU, and as a consequence ulnar pain if the ECU is inflamed.

With regard to complementary tests in the study of ulnar pain, the MRI is important because most of the problems are in the soft tissues. The MRI arthrogram is better than the conventional MRI, offering more precision in the diagnosis of TFCC and ligament lesions. However, it is also imperative to have conventional anteroposterior and lateral radiographies in neutral prono-supination to assess the state of the DRUJ and to determine the existence of ulna plus variance that would indicate an ulnocarpal impaction syndrome. The electrodiagnostic study is recommended to detect ulnar nerve compression disorders and carry out a differential diagnosis with cervical radiculopathy.

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