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REVIEW

Ulnar-Sided Wrist Pain: Systematic Clinical Approach and Principles of Treatment

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Abstract: The source of ulnar-sided wrist pain is difficult to determine because the history and physical examination findings of various illnesses frequently coincide, and are multifactorial. Pain on the ulnar side of the wrist can be identified on the basis of the tissue from which it arises. Knowledge of the anatomy of the ulnar side of the wrist is required for correct diagnosis, as in numerous diagnostic tests. Given the complex nature of disease diagnosis, various methods have been proposed. This article discusses systematic methods for obtaining a patient's medical history, physical examination, and treatment principles to assist surgeons in determining the source of common ulnar-sided wrist pain.

Level of Evidence: D

Plain Language Summary:

- Multiple conditions can cause ulnar-sided wrist pain. To diagnose and treat the ulnar aspect of the wrist, it is important to understand its anatomy and diseases.
- Pain on the ulnar side of the wrist can generally be characterized by the tissue from which it originates.
- Thorough physical examination and imaging can narrow the differential diagnosis and may be valuable for confirming the diagnosis.
- Nonsurgical treatment includes immobilization, therapy, and corticosteroid injections, while surgical intervention is determined by an individual diagnosis.

Keywords: wrist pain, triangular fibrocartilage, distal radio-ulnar, physical examination, diagnostic tests

Introduction

The ulnar-sided wrist pain is a common complex problem that was considered a black box in hand and wrist surgery. Due to the diverse structures involved, it often presents a diagnostic and therapeutic challenge. The pathology can originate from various anatomical regions, including osseous, ligamentous, tendinous, and neurovascular components. However, there are overlapping pathologies which often present with similar symptoms, which make a differentiation among them is difficult without a structured evaluation. Jain et al[1] proposed a three-storey model, with an ulnar styloid in the middle storey to simplify the mapping of ulnar wrist pathologies. After identifying the patient's most uncomfortable location on their wrist, a systematic clinical approach should be conducted to accurately identify the underlying cause and tailor an effective treatment plan.[1]

This article offers a structured, comprehensive assessment of ulnar wrist pathologies which is also summarized as a diagnostic algorithm. Moreover, this article includes the treatment possibilities ranging from conservative treatments such as physical therapy, wrist support, and medications to surgical interventions such as minimally invasive surgery utilizing the advancement in wrist arthroscopy techniques or open procedures for ligament and tendon repair (or

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reconstruction), salvage procedures, and joint replacement surgeries. By integrating a region-specific assessment with targeted treatment strategies, clinicians can optimize patient outcomes and restore wrist function efficiently.[1]

Essential Anatomical Landmark

To diagnose and treat the ulnar aspect of the wrist, it is important to understand its anatomy and disease. Although there is no clear definition of the ulnar side of the wrist in medical literature, it can be defined as the ulnar of the fourth ray (ring finger) arbitrary line extending to the proximal wrist crease.[1]

Osseous structures in the DRUJ were not particularly significant. There are four different sigmoid notch configurations: flat, sloped, C-shaped-, and S-shaped. The DRUJ is mainly stabilized by soft tissue (accounting for 80% of stability).[2] Soft tissue stabilizers include the palmar and dorsal radioulnar ligaments. The superficial fibers of the radioulnar ligament were inserted at the base of the styloid process, and the deep fibers of the radioulnar ligament were inserted at the ulnar fovea. The DRUJ capsule, ulnocarpal ligament, interosseous membrane, and TFCC provide static stabilization, whereas the Pronator Quadratus muscle and the ECU Tendon provide dynamic stabilization (Figure 1).[2]

This article discusses systematic methods to obtain a patient's medical history and perform physical examinations to help orthopedic surgeons diagnose ulnar-sided wrist pain. Given the complexity of disease diagnosis, various methods have been presented. The ulnar styloid is a key landmark in Jain's three-storey method to identify the pain source. Based on that model, we can simply divide the ulnar wrist into three parts: The upper part (distal to ulnar styloid: CMC and midcarpal level), the middle part (surrounding the styloid: proximal carpal, ulno-carpal, luno-triquetral area, and ECU tendon), and the lower part (DRUJ level and FCU tendon Figure 2).[1]

Basics of Wrist Clinical Examination

Before assessment, the patient was asked in detail about his or her main problems. Clinical history included the following: age, handedness, employment, extracurricular activities, prior injuries, and prior surgery. It is crucial to determine the mechanism of injury and whether a patient has been exposed to repeated stress or vibrating instruments. Patients should explain the nature, location, and duration of the pain as well as any position or motion that aggravates or relieves the symptoms. Physical examination included inspection, palpation, range of motion and grip strength evaluation, passive joint mobilization, and provocation tests.[3]

The initial assessment can be conducted by inspecting the structure. Always check for DRUJ instability in patients complaining of ulnar-sided wrist pain by comparing both wrists to detect any discrepancy in ulnar head prominence. Next, the patient was asked to place his/her elbow on the table, hand pointed to the ceiling, and forearm neutral, as if preparing for arm wrestling (Figure 3).[4] This setting allows forearm rotation control, comparison with the contralateral side, and patient's facial response to different tests.[3]

Chronically painful wrists can sometimes be diagnosed based on bone abnormalities. For example, a prominent distal ulnar and fork-shaped distal radial deformity indicates a malunited distal radius with a ruptured radioulnar ligament. Palpation helps diagnose wrist pathologies by isolating the anatomical structures. All palpable anatomical landmarks, especially the ulnar styloid, ulnar head, ECU tendon, DRUJ, foveal area, and other structures, should be pressed with the index finger, thumb, or ballpoint pen to locate tender areas. In this position, the patient was asked to indicate the most painful area using a single finger of the opposite hand.

Given the number of examinations performed in each patient, it was impossible to perform each examination. Therefore, clinical orientation is crucial. Tenderness over any anatomical feature is indicative of a specific clinical diagnosis. With the wrist flexed at 30 °, the lunotriquetral interval was palpated between the fourth and fifth compartments, one fingerbreadth distal to the distal radioulnar joint. The extensor carpi ulnaris tendon is palpable along the distal ulna and most palpable distal to the ulnar head. The extensor carpi ulnaris insertion was located far from the wrist joint, at the base of the fifth metacarpal. The pisotriquetral joint is palpated volar to the triangular fibrocartilage complex, and the pisiform is mobilized between the examiner's thumb and the index finger.[4]

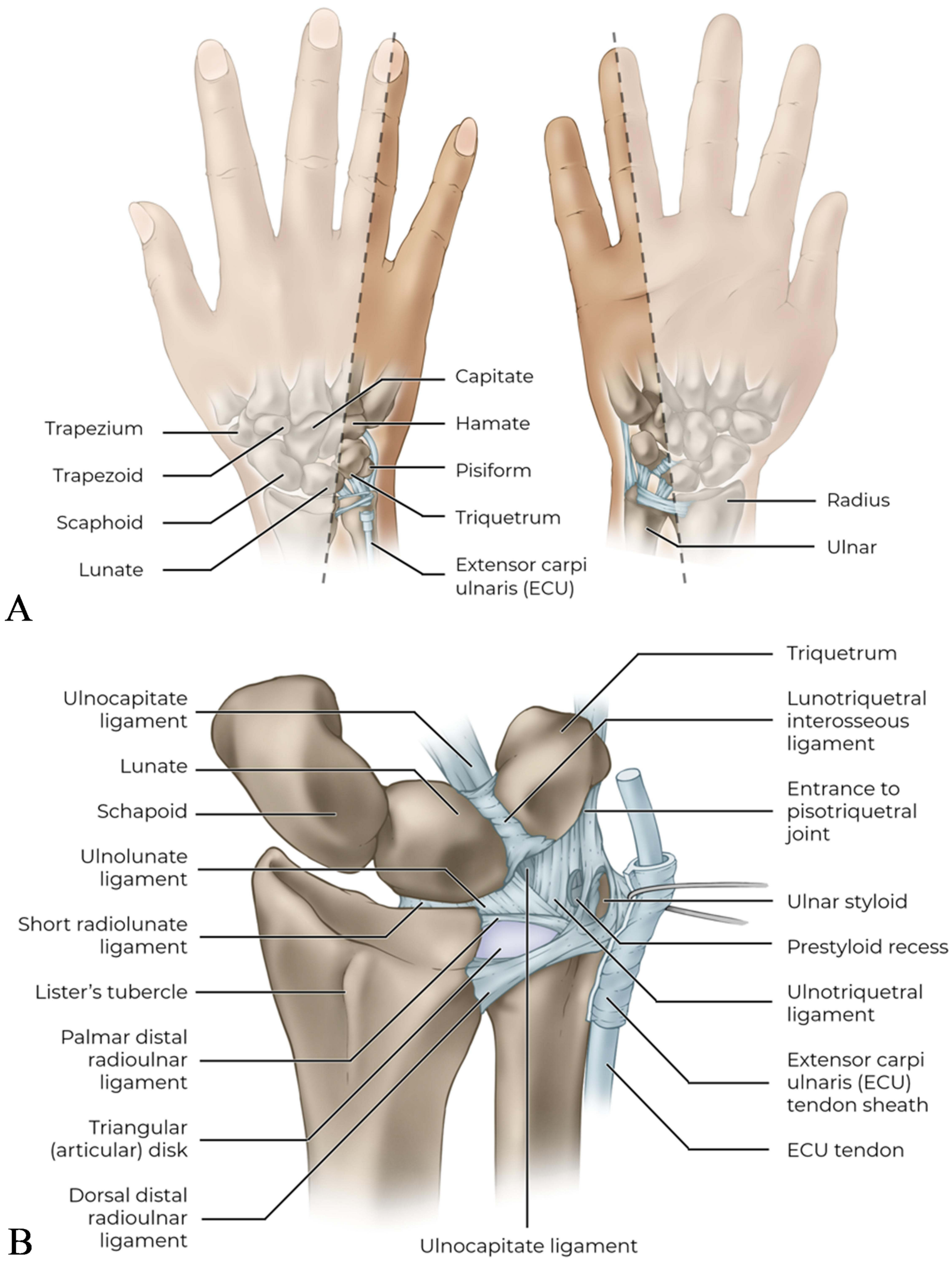

Figure 1 (**A**) Topographical and anatomical landmark for ulnar wrist pain. (**B**) Wrist osseous and triangular fibrocartilage complex anatomy.

Diagnostic Tools

Complementing clinical evaluations included plain radiographs, dynamic radiographs, Ultrasound, CT scans, MRI examinations, and wrist arthroscopy.

Ultrasound (US) is useful but operator-dependent. US imaging is a non-invasive, cheap, and radiation-free diagnostic test which allows for dynamic evaluation. It can be used conveniently for superficial structures such as those in the upper extremity.[5] For ulnar wrist pathologies, US imaging can be used to detect tendon rupture, adhesions, tendonitis, compressive peripheral neuropathy, and blood flow in the ulnar wrist. It also describes any masses or fluid accumulation.[6,7]

Plain radiographs of the wrist should be obtained in all patients with acute or chronic wrist pain. Distal ulnar displacement, dorsal angulation of distal radius fractures greater than 20° mm, radius shortening greater than 5 mm, DRUJ widening, and/or ulnar styloid fracture may suggest accompanying DRUJ instability.[8]

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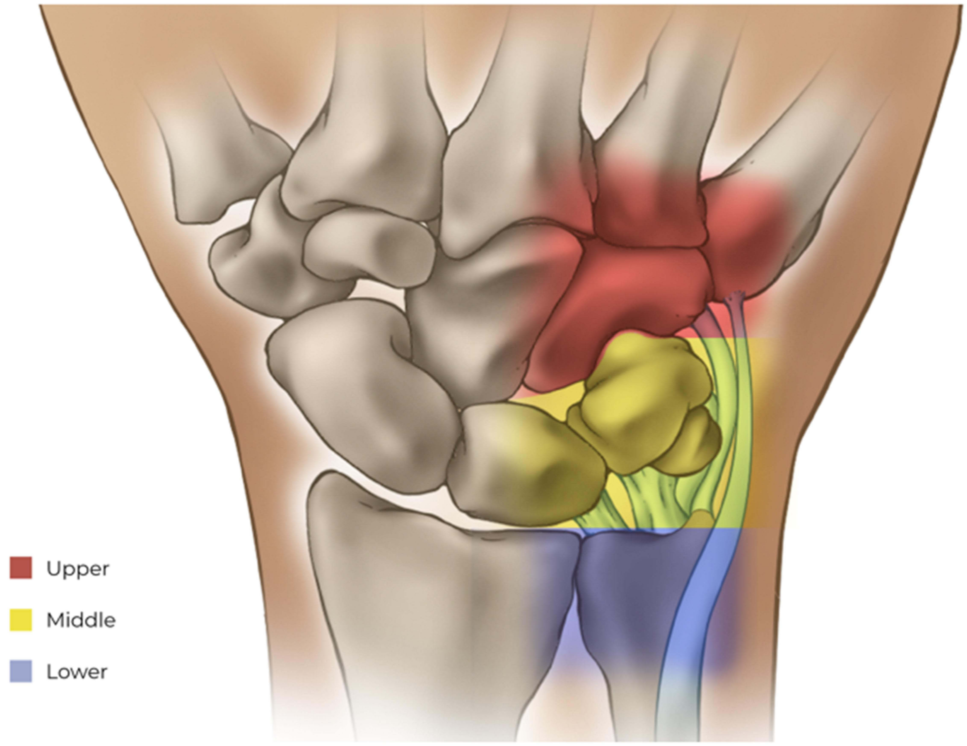

Figure 2 Three-part model of ulnar wrist pain, adapted from Jain's three storey concept.

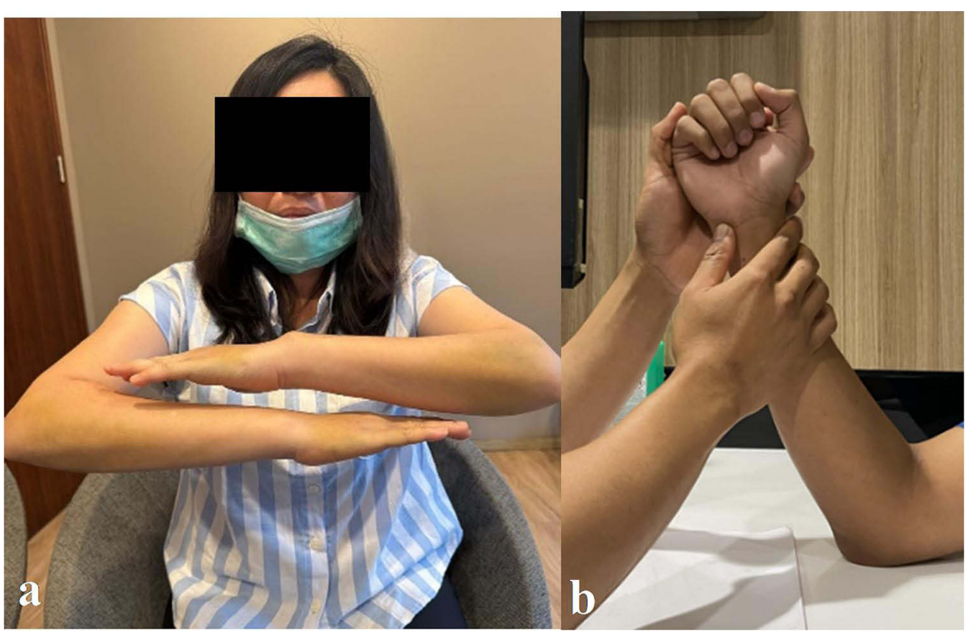

Figure 3 Position for wrist examination; (**a**) Crossed arms position, inspect ulnar prominence discrepancy. (**b**) Elbow on the table, finger to the ceiling, forearm in neutral rotation.

Radiographs of the wrist, especially true posteroanterior views (shoulder abducted to 90°, elbow flexed to 90°, and forearm at neutral rotation), are important in measuring the ulnar variance, and lateral views (the palmar aspect of the pisiform is at the central third of the interval between the volar cortex of the scaphoid tubercle and the volar capitate)[9] are the first steps in the imaging process. Specialized imaging should be considered based on the suspected pathology. When pisiform pain is elicited, the piso-triquetral joint can be scanned with a lateral wrist view, and the wrist is supinated at 30° to align the joint with the X-ray beam. The carpal tunnel view is also important in suspected hook of hamate fractures.[8]

Fluoroscopy is beneficial for assessing dynamic instability that manifests as aberrant carpal motion in individuals who report an abrupt shift or clunk with wrist deviation. In lunotriquetral (LT) ligament injury, when the wrist moves from radial to ulnar deviation, the triquetrum catches up and extends.[1]

CT can help diagnose undetectable carpal fractures. For DRUJ pathologies, both wrists must be assessed with the forearm in the same position, and imaging in a neutral position, pronation, and supination may be required. Bilateral axial CT can be used to assess the DRUJ congruency.

MRI enhanced the evaluation of ulnar wrist pain. It helps define the soft tissue anatomy and osseous pathology. Regarding the identification of TFCC tears, MRI[10] has a sensitivity of 100% and a specificity of 90% for the detection of a tear, but only a specificity of 75% for the detection of the tear location. Haims et al[11] discovered a decreased sensitivity of MRI using a 1.5-T magnet (54% to 73%). The stronger MRI magnets improve the diagnostic sensitivity and specificity for TFCC tears.[12] Using a 3-T magnet, Magee detected TFCC tears with a sensitivity of 89% and a specificity of 100%.

It is not necessary to use contrast to describe the internal wrist and hand abnormalities. It is frequently helpful to distinguish solid from cystic lesions in the presence of palpable soft tissue abnormalities and to detect active synovitis in the presence of inflammatory arthropathy, either to make the initial diagnosis of the condition or to monitor the effectiveness of treatment. At our institution, the most common indication for intravenous contrast is to better characterize suspected infections. Some institutions have used contrast imaging to assess whether the bones demonstrate signs of osteonecrosis.

The use of wrist arthroscopy in the management of intra-articular wrist diseases is becoming increasingly important. Thus, wrist arthroscopy alone may not be the "gold standard" for diagnosis. This must be combined with thorough clinical examinations and imaging studies. If two of these three factors are unremarkable, isolated arthroscopic findings are not beneficial.[13]

Common Ulnar Wrist Pathologies and Their Principles of Treatment

Lower Part

Arthritis of DRUJ

Distal radioulnar joint incongruity or instability of the DRUJ can cause arthritis. Pain at the dorsal facet of the DRUJ or forearm rotation was a symptom. The increased DRUJ ballottement in neutral prono-supination was compared with that in the other wrists. Reduced pronosupination, crepitus, and pain in the radioulnar compression during pronation and supination of the DRUJ are characteristics of DRUJ arthritis (Figure 4). Non-surgical options should be considered before proceeding with the surgical treatment. Initial treatment should include activity modification, physical therapy, NSAIDs, corticosteroid injections, and immobilization.[14]

Resection arthroplasty is a primary surgical treatment for symptomatic DRUJ arthrosis. DRUJ kinematics are consistently altered following distal ulnar resection,[15] and patients should be told that, despite the fact that surgery can alleviate their symptoms, it may be unreasonable to expect completely normal function following surgery. Therefore, the type of resection arthroplasties, such as the Darrach operation, hemi resection technique, and Sauvé-Kapandji procedure, should be adjusted to each patient's needs and degree of disease.[14] DRUJ implants offer alternative salvage options. The implants used to replace the DRUJ range from partial ulnar head replacement to self-contained systems.[14]

Flexor Carpi Ulnaris Tendinopathy

FCU tendinitis is distinguished from pisotriquetral arthritis, which is characterized by localized discomfort and tenderness that are increased by dorsal pisiform rubbing against the triquetrum.[4] Its pathophysiology is similar to that of other synovial tendons. Rest, splinting, and anti-inflammatory medications are the first-line treatments. Tendon debridement is rarely performed in such cases.[1]

Calcific tendinitis of the flexor carpi ulnaris (FCU) near the wrist is an uncommon cause of ulnar wrist pain. Owing to the rarity of this condition, most cases are misdiagnosed as infections, tendinopathies, or fractures.[1,16]

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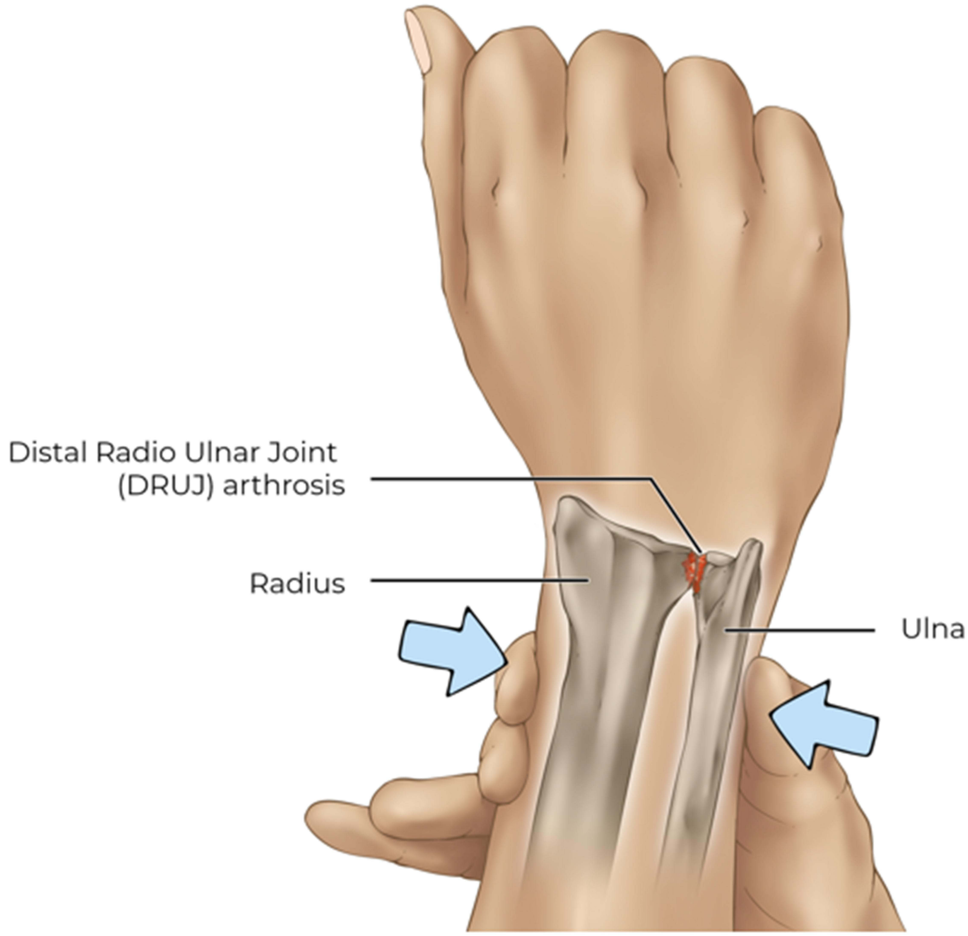

Figure 4 DRUJ Compression test. Arrows indicate the direction of force from The Examiner's fingers, generating compression over the DRUJ. Observe how the examiner's fingers are positioned proximally away from the ulnar head and radial styloid.

Middle Part

TFCC Injury and DRUJ Instability

The most common cause of ulnar-sided wrist pain is traumatic or degenerative TFCC tear. Traumatic tears can occur when an axial load is applied to a wrist that is extended and deviated ulnarly or when an axial stress is applied at the extremes of forced forearm rotation. The most prevalent finding on physical examination was foveal discomfort. However, it is often difficult to distinguish between the fovea tenderness and ECU tenderness due to their proximity. Thus, a detailed physical examination is required.[17,18]

The optimal location for palpating the TFCC is the soft spot between the ulnar styloid, FCU, volar surface of the ulnar head, and pisiform. Tay et al called this point fovea and found that there was a positive ulnar fovea sign, which is the most reliable clinical indicator of a peripheral ulnar-sided TFCC rupture (Figure 5). The sensitivity of this sign was 95.2% with a specificity of 86.5% for TFCC injury.[19] Yang et al[20] revealed ulnar foveal sign can be positive in several diagnoses. It had a sensitivity and specificity of 89% and 48% for TFCC injuries, and 85% and 37% for ulnar abutment syndrome, respectively.

A "click" or "crepitus" or an intra-articular grinding may be associated with forearm pain. Rotational movements with resistance are often weak and can reproduce patient complaints.[21] A piano key test was used to diagnose the DRUJ-related problems. Pain was present when a dorsal-to-volar load was applied 4 cm proximal to the DRUJ across the ulna, with the patient's hand flat on the table Additionally, the patient was instructed to push himself up from the armchair using his hands. This test result was positive if repeated ulnocarpal pain was induced.[17] The piano key test for diagnosing subtle instability of the DRUJ has interobserver reliability issues. Some researchers have modified this technique to increase accuracy using

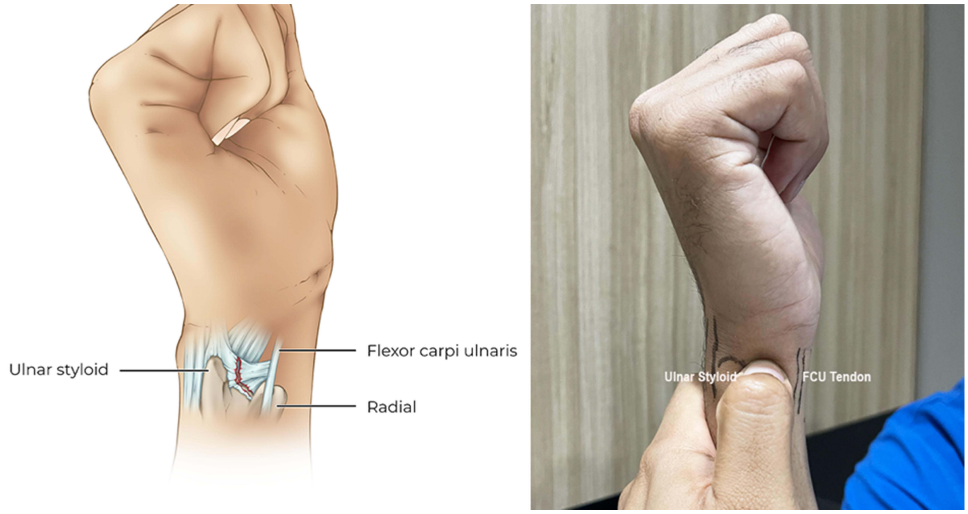

Figure 5 Location of fovea sign is best palpated on the soft spot between ulnar styloid and FCU tendon.

radiostereometry, a precision-calibrated radiography technique that has not been used for wrist or DRUJ joints but has been utilized to evaluate stability and kinematics in the knee and hip joints, or using an Electromagnetic Sensor System (EMS).[22,23]

The ballottement test is a straightforward and reliable method for assessing DRUJ laxity (Figure 6).[24] This test involves passive anteroposterior translation of the ulna on the radius in neutral rotation, full supination, and pronation and is compared to the contralateral side. Abnormal translation of the ulnar head is suggestive of total TFCC disruption. The authors recommended evaluating the resistance at the end of translation. A "firm" endpoint is unlikely to develop symptomatic instability despite laxity and a "soft" endpoint is more likely to cause clinical instability. That volar dorsal instability test is to predict the anatomical site of ligament disruption, which will affect the management, especially for surgical planning. If the deep portion of the radioulnar ligament is affected, then we do the foveal repair.[17,24]

The "grind test", also known as the "ulnocarpal stress test", was used to investigate the capacity of the TFCC to withstand rotational shear stress. The examiner held the patient's hand with metacarpals while stabilizing the distal forearm. An axial load was applied to the hand during ulnar deviation. The forearm was rotated from supination to pronation. Grinding, discomfort, crepitus, and sometimes a click indicated TFCC tears or ulnar carpal impaction syndrome. Nakamura et al demonstrated that the specificity for predicting ulnar-sided pathology is 100%.[25]

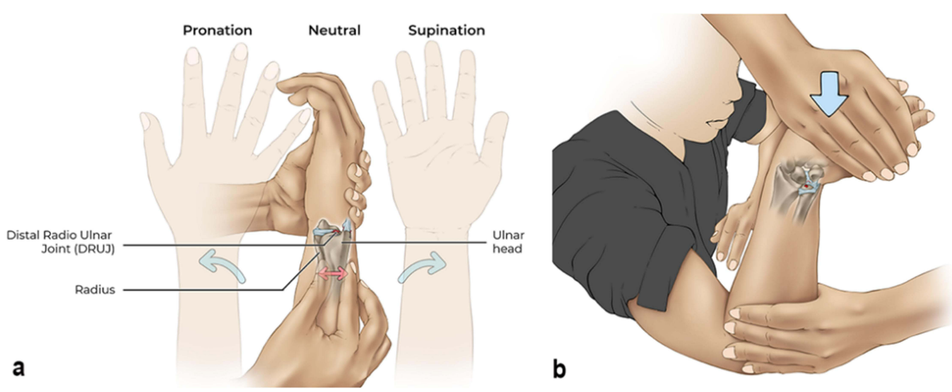

Figure 6 (**a**) Ballottement tests are done in neutral forearm position and in prono-supination (blue arrows). The radius and radiocarpal joint are stabilized by the examiner and the distal ulna is shucked volarly and dorsally (red arrows). Note that the examiner's thumb and index finger are away from the ulnar head. (**b**) Grind test: The examiner holds the distal forearm still with one hand and holds the wrist with another hand. The patient's wrist is positioned in ulnar deviation relative to the forearm (blue arrow indicated the direction of force applied by examiner) and the forearm is rotated by the examiner. This test causes the carpus to grind over the TFCC.

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The purpose of the surgical procedure was to achieve stable and pain-free range of motion. The appropriate treatment for a TFCC tear is largely determined by the type of tear, its location, and the presence or absence of distal radioulnar joint instability. The Palmer[26] classification is the most well-known classification of triangular fibrocartilage complex pathology. However, more recently, Atzei and Luchetti[21] described a classification system that differentiates between proximal and distal triangular fibrocartilage complex tears and their effect on joint stability.

Central tears of Palmer class 1A or 2C may be amenable to arthroscopic debridement because the central region is relatively avascular and has low healing potential.[27] Several arthroscopic and open procedures have been described for individuals with repairable TFCC (Palmer's 1B, 1C, or 1D).[28–32] When treating TFCC tears, it is necessary to evaluate whether foveal or peripheral detachment is present because the latter may imply DRUJ instability.[33] Trampoline and hook tests were performed to assess the integrity of TFCC ligamentous structures of TFCCs.[34] The trampoline test evaluates the TFCC compliance by applying compressive stress with a probe and observing TFCC bouncing.[34] The hook test was used to evaluate the integrity of the peripheral TFCC by inserting a probe into the pre-styloid recess and then administering radially directed traction force. A positive hook test indicated inadequate TFCC foveal insertion when the TFCC was lifted from the ulnar head (distal and radial) using the probe. Conversely, a negative hook test indicated that foveal attachments were firm. The hook test has been used as a reference test in many recent studies to determine when a proximal TFCC ruptured.[34] Reconstruction of the dorsal and palmar radioulnar ligaments using a tendon graft through the bone tunnels in the radius and ulna may be used to treat persistent instability.[35] The DRUJ instability algorithm is illustrated in Figure 7.

Kakar et al[36] proposed their evidence-based recommendation for care based on the literature review. Their study suggests a moderate recommendation (grade B) for arthroscopic TFCC capsular repair for symptomatic patients without DRUJ instability. There is limited evidence (recommendation grade C) to do foveal repair in TFCC injury with DRUJ instability, which consisted only of a few case series and biomechanical studies.[36]

Lunotriquetral Joint Injury

The most common finding of lunotriquetral joint injury was tenderness over the LT ligament.[1,17] Other commonly performed tests include the triquetrum ballottement test described by Regan et al, which involves moving the lunate in the volar and dorsal directions. The thumb and index finger of one hand were placed on the triquetrum and pisiform, whereas the thumb and index finger of the other hand were positioned on the lunate and radial wrist. The lunotriquetral joint is stressed when the two hands move in different directions.

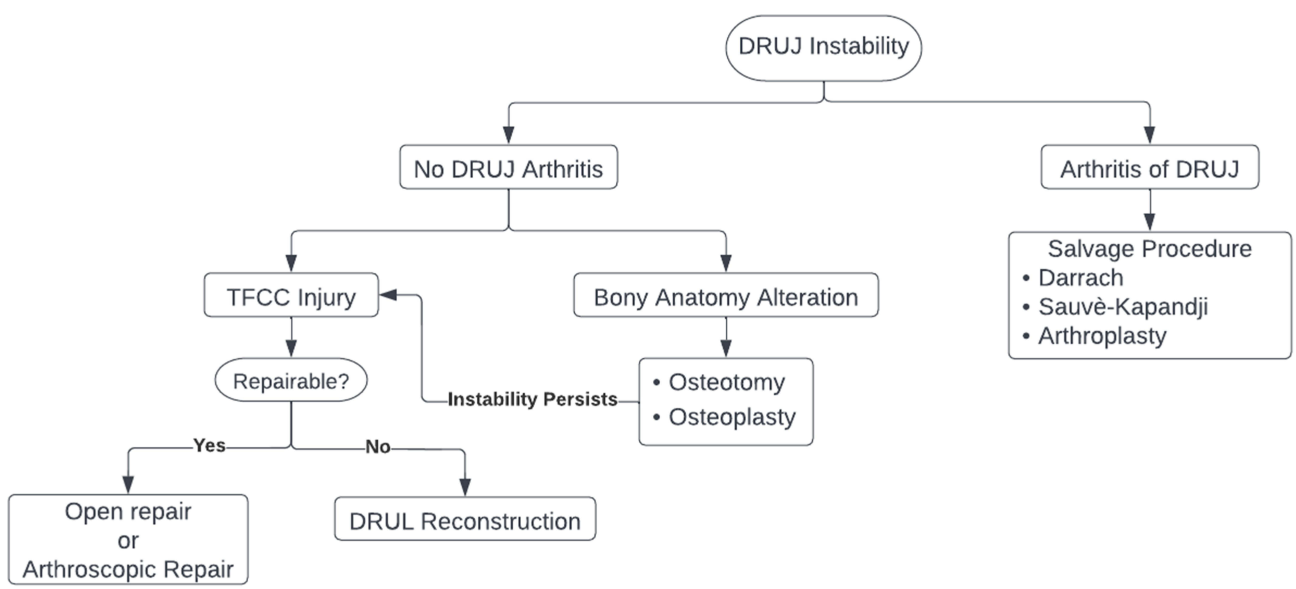

Figure 7 Treatment algorithm for the management of distal radioulnar joint (DRUJ) instability.

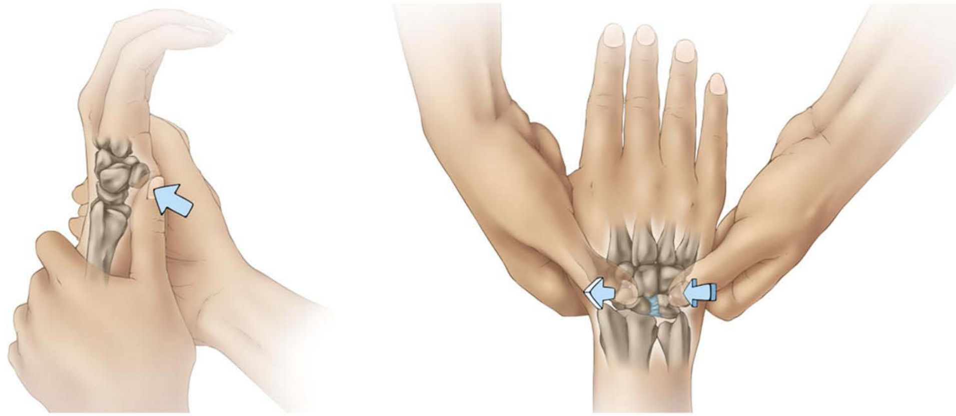

Figure 8 (Left) Kleinman Shear Test and (right) Regan Test.

The Kleinman shear test stressed the lunotriquetral joint with a greater sensitivity (Figure 8). One hand stabilizes the pisiform and triquetrum, whereas the other stabilizes the lunate and radial columns of the wrist. The lunotriquetral interval can be controlled by rotating the triquetrum while keeping the lunate and radial wrists still.[17] The Derby relocation test consisted of a direct question: "Does the wrist seem unstable or loose?" followed by three distinct tests (available on the journal's website, www.jhandsurg.org). The Derby relocation test has a 77% sensitivity value and an 89% positive predictive value.[37]

Unlike SL injuries, lunotriquetral tears rarely exhibit radiographic gaps. Lateral views help detect VISI deformity and the lunate-triquetrum angle. Owing to the differences in MRI sensitivity and specificity, MR arthrography should be favored because it can show contrast material crossing the LT ligament defect into the radiocarpal joint from the midcarpal joint.[38] Numerous surgeons prefer arthroscopy because it permits visualization, probing, and ligament repair. It also provides information on the TFCC and chondral injuries that occur simultaneously.[39]

Conservative care is the primary treatment for isolated, stable lunotriquetral ligament injuries. Cast immobilization in the neutral position may result in ligament healing and pain relief. Injections of midcarpal corticosteroids may be used as late treatment for lunotriquetral ligament rupture without instability. This can provide temporary or long-lasting pain relief. Temporary pain relief may be an indicator of beneficial treatment outcomes. Successful immobilization, which is indicated by long-lasting pain relief, should be followed by physical therapy, which includes motion exercises of the wrist as well as muscle proprioceptive and strengthening exercises.[17]

Tears of the lunotriquetral ligament that have failed conservative treatment should be arthroscopically addressed. Arthroscopic debridement alone may improve lunotriquetral ligament injuries.[40] In addition to pinning, direct lunotriquetral ligament repair, lunotriquetral reconstruction, and lunotriquetral arthrodesis are therapeutic options for lunotriquetral ligament injuries.[41]

Ulnocarpal Impaction Syndrome

Ulnocarpal impaction syndrome is a disorder characterized by wrist pain caused by the abutment of the distal end of the ulna or the TFCC to the carpus.[42] Typically, positive ulnar variance and TFCC and LT ligament damage are observed.[43] Ulnocarpal impaction syndrome can occur even if ulnar variance is neutral or negative. When the ulna was elongated by 2.5 mm, the axial stress increased by 18.4–41.9% and decreased to 4.3% when it was shortened.[44]

Pronated grip is typically painful. Increased ulnar variance is the major cause of ulnar impaction, and acquired causes include malunited distal radius fractures with shortening, distal radius physeal damage, Galeazzi fractures, and radial head excision.[42] The Ulnocarpal Stress Test is positive when axial stress on the ulnar side produces ulnar wrist pain during passive supination-pronation with the wrist at maximum ulnar deviation, which is a useful provocative test as described by Nakamura et al.[25] This test detects tears in the TFCC, LT damage, and ulnocarpal impaction. Radiographs showing ulnar variance with sclerosis, subchondral cysts in the lunate and

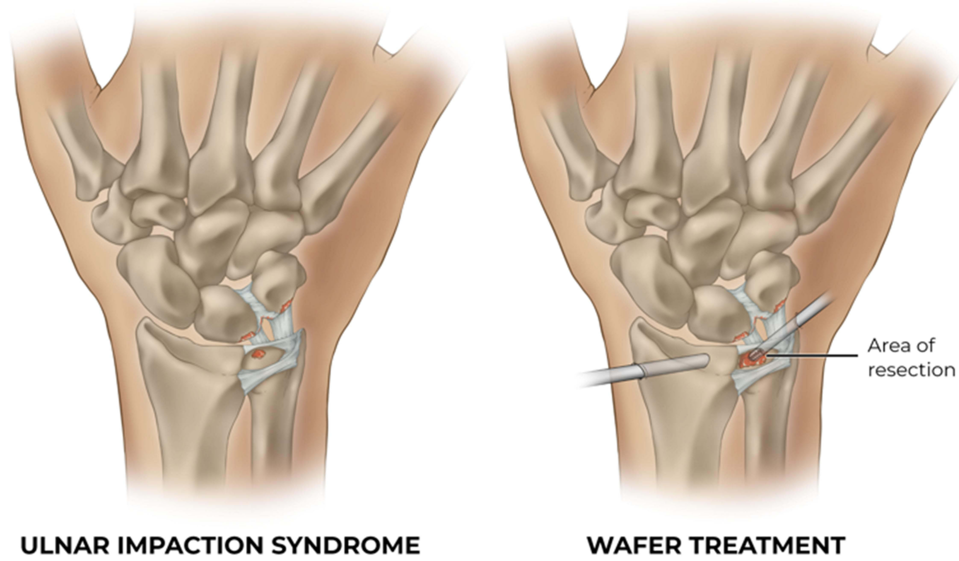

Figure 9 (Left) Ulnar impaction syndrome with damage on the ulnar corner of the lunate, proximal-ulnar side of triquetrum, LT Ligament Injury, and TFCC Injury. (right) Treatment of ulnar impaction syndrome with resection of distal ulna using arthroscopy (Wafer technique).

triquetrum, and kissing lesions.[45] On T1- and T2-weighted images, subchondral sclerosis appears as areas of low signal intensity, whereas subchondral cysts appear as well-defined areas of low and high signal intensities, respectively.[38]

Conservative therapy consists of splinting and anti-inflammatory medication. The treatments included ulnar shortening and the Wafer procedure. Ulnar shortening is preferred for ulnar variances > 4 mm.[46] This procedure cannot be performed in the presence of DRUJ arthritis. Wafer treatment aims to create a 2-mm negative ulnar variance. Arthroscopy can also be used to evaluate cartilage degeneration, TFCC tears, and LT ligament tears (Figure 9).[1]

Extensor Carpi Ulnaris Tendinopathies

In ulnar-sided wrist pain, pathology of the extensor carpi ulnaris tendon must be considered. There are two major types of tendinopathy: (1) constrained tendinopathies, in which a thickened, overused tendon is entrapped, and (2) unconstrained tendinopathies, in which a ruptured ECU sub-sheath allows the ECU to sublux in the volar direction, preventing it from achieving full stabilization potential (Figure 10).[47]

Most restricted tendinopathies lack history of trauma. Pain during resisted thumb abduction (ECU synergy test) was suggestive of ECU tendon synovitis. It is based on the synergy between the ECU and intrinsic muscles.[48] Isometric contraction of the abductor pollicis brevis requires synergistic ECU contraction to maintain wrist tension balance.[48]

Stenosing tenosynovitis is primarily characterized by excruciating pain during passive flexion and radial deviation (inverted Finkelstein's test).[47] The ECU synergy test is a straightforward and unique diagnostic procedure for the examination of persistent dorsal ulnar-sided wrist pain, in which isolated tension is applied to the ECU without significantly stressing adjacent tissues. The ECU synergy test was performed by having the patients rest their arm with the elbow flexed at 90° and the forearm fully supinated on the examination table The hand was held in a neutral position with the fingers fully extended. The examiner grasped the patient's thumb and long finger with one hand, while palpating the ECU tendon with the other. The patient abducts his thumb radially against resistance. Direct palpation demonstrates the presence of both flexor carpi ulnaris (FCU) and extensor carpi ulnaris (ECU) muscle contractions as tendon bowstrings under the fingertips. A positive test result for ECU tendonitis would indicate the reproduction of pain along the dorso-ulnar portion of the wrist. The sensitivity, specificity, positive predictive value, and negative predictive value of the ECU synergy test are 73.7%, 85.7%, 82.4%, and 78.3%, respectively.[48,49]

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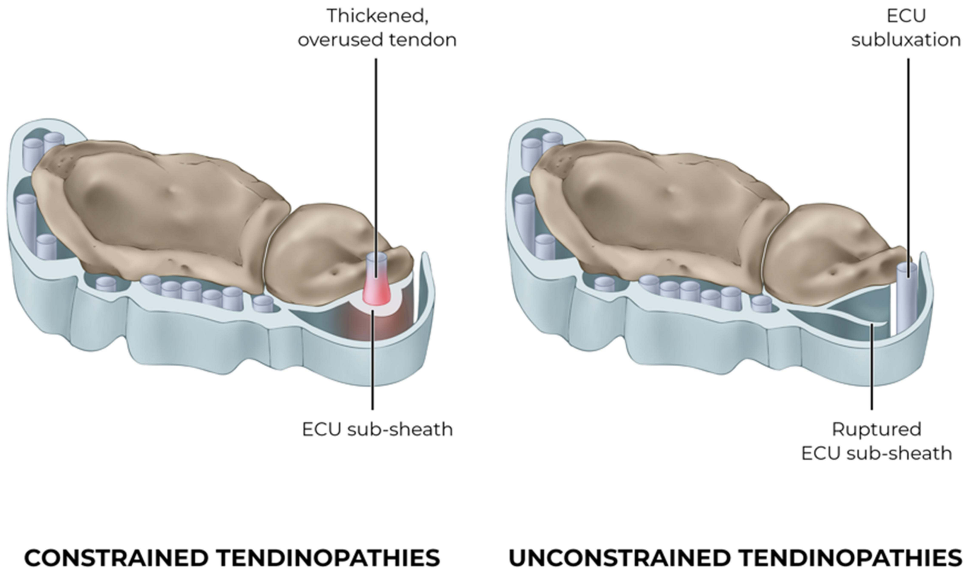

Figure 10 The Two types of Extensor Carpi Ulnaris Tendinopathies according to Garcia-Elias.[47]

Most patients with acute ECU dislocation have hypersupination injury of the forearm, ulnar deviation, wrist flexion, and ECU contraction.[47] Patients can perform this by flexing both hands back-to-back, with the forearm supinated and the ulnar border of the hand compressing the chest (heart test). Most ECU instabilities respond to this test with audible tendon clicking, indicating tendon dislocation.[47] For most ECU tendinopathies, medical history review and clinical examination using the contralateral side as a control are sufficient. Imaging studies are needed to confirm this suspicion and to guide treatment.[47] If we need only confirm our suspicion and plan therapy, ultrasonography is the best method.[47,50]

The treatment for ECU tendinopathy is usually conservative, or surgery if the conservative treatment failed. And the treatment is varied between unconstrained and constrained. The aim of treatment for constrained ECU tendinopathies is to prevent further deterioration and rupture. In unconstrained tendinopathies, the goal is to restore the natural anatomical relationship between the ulna and the ECU. Thus, identifying and treating the root causes of this problem is crucial.[47]

Overuse tendinosis, which is caused by the constrained pathology, generally exhibits favorable responses to conservative treatment. Avoiding the repetitive stresses and the application of an above-elbow resting splint, with the forearm in pronation and the wrist in slight extension and ulnar deviation, usually leads to a rapid reduction in pain and discomfort. Three weeks in a splint, along with anti-inflammatory medication and a structured muscle re-education program, typically resolves most of these issues. If the symptom was so severe or there was a lack of significant symptom reduction by immobilization only, steroid injection may be beneficial. However, in the absence of success by conservative means, it is necessary to evaluate the potential for contracture of the ECU sub-sheath or any other thickening process of the sub-sheath, such as ECU tendovaginitis, which demands surgical release. Symptomatic unconstrained ECU tendinopathy usually warrants surgery, including open tendon relocation and repair of the sub-sheath or reconstruction of a new sub-sheath whenever direct repair is not possible, such as in chronic ECU dislocation. We summarized the diagnostic algorithm of ulnar-sided wrist pain in Figure 11.

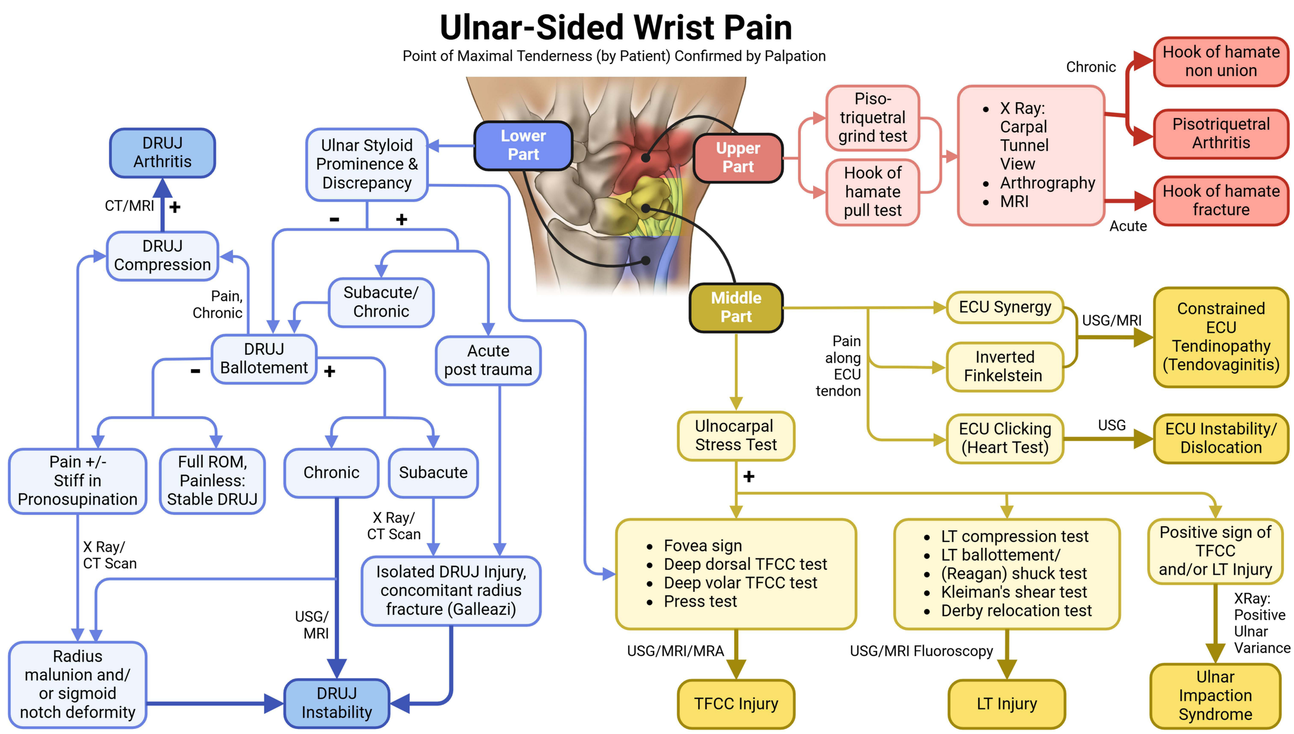

Figure 11 Ulnar-Sided Wrist Pain Diagnostic Algorithm.

Other Causes of Ulnar Wrist Pain

Other causes of wrist pain on the ulnar side include neurogenic and vascular. The dorsal cutaneous branch of the ulnar nerve can cause neuroma and pain in the ulnar wrist. Acute laceration on the ulnar side of the wrist should not be overlooked, and the patient's sense of touch should be evaluated to rule out the cause of pain.[4]

Guyon's canal nerve compression manifests as fatigue, weakness, lack of coordination, and diminished sensation in the ring and tiny fingers, but not in the dorsum of the hand, because the dorsal sensory nerve branch arises more proximally. The diagnostic tests included nerve conduction and electromyography. A mass effect, ulnar artery thrombosis, or hamate fracture can compress the ulnar nerve in the Guyon's canal.[4]

Hypothenar hammer syndrome, or ulnar artery thrombosis, is caused by repetitive stress on the artery, as observed in plumbers and other high-impact workers.[51] Neoplasms or cysts of the triquetrum, distal ulna, and hamate should be considered uncommon sources of pain and discomfort. Simple bone cyst and giant cell tumors are the most prevalent disorders. Radiographs and MRI resonance imaging can aid in diagnosis.

Conclusion

Due to the wide variety of causes and symptoms associated with ulnar-sided wrist pain, it is easily confused by the subject. Diagnosis can be made with the help of a thorough medical history, physical examination (anatomy and surface markings), and appropriate imaging.

Ethical Approval

This literature review did not involve human subjects and did not require an IRB review.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest in this work.

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