Physical Examination of the Wrist

Darryl Young, MD, BSc (H)\textsuperscript{a}, Steven Papp, MD, MSc, FRCS(C)\textsuperscript{b,\!*}, Alan Giachino, MD, BPHE, FRCS(C)\textsuperscript{c}

\textsuperscript{a}Department of Orthopaedics, University of Ottawa, The Ottawa Hospital, 501 Smyth Road, Room 3041, Ottawa, Ontario, Canada K1H 8L6
\textsuperscript{b}Department of Orthopaedics, University of Ottawa, Ottawa Civic Hospital, 1053 Carling Ave, Ottawa, Ontario, Canada K1Y 4E9
\textsuperscript{c}University of Ottawa, Suite 206, 1929 Russell Road, Ottawa, Ontario, Canada K1G 4G3

As with many joints, a focused history and well-performed physical examination of the wrist requires knowledge of anatomy and pathology of this area. Based on physical examination, one should be able to make a diagnosis or narrow the differential diagnosis dramatically. This examination is a summation of anatomical locations where symptoms are provoked by palpation and where signs, often with symptoms, are produced by manipulation. Negative findings elsewhere in the wrist are important. A final diagnosis may require diagnostic imaging (radiographs, bone scan, MRI, and the like) for confirmation. But only by having all three methods of assessment point to the same diagnosis is one assured of the correct diagnosis. A history of dorsoradial wrist pain with a physical examination indicating tenderness over the lunate and a triangular fibrocartilage complex (TFCC) tear seen with MRI does not lead to a secure diagnosis. The physical examination of the wrist is not unlike other joints, in that a systematic approach includes observation, range of motion, palpation and special tests.

Observation and range of motion

How the patient uses and holds the hand and wrist will give important clues as to the degree of pain and disability. Wasting of muscles and a shiny skin with discoloration may suggest reflex sympathetic dystrophy. Scars and other skin changes should be noted. All range of motion, both active and passive, should be documented Fig. 1. For example, if the past history indicates an old distal radial fracture, a lateral view may show a “dinner-fork” deformity. A pronation malunion can be assessed comparing both forearms (Fig. 2A, B). Usually, the patient holds both arms with a similar amount of proximal rotation. If one side pronates more distally, then the “peak at the palm sign” is present. CT scan confirms the pronation deformity in (Fig. 2C, D). Shortening of the radius can be assessed by a clinical test for ulnar variance (Fig. 3). Look for swellings and malalignment.

Palpation

Feeling for the exact localization of tenderness and structural abnormalities is the mainstay of the physical examination. It is essential to recognize three main principles:

1. The exact point of local tenderness is the location of the pathology.
2. If one knows the exact location, that is, the anatomical structure, one likely knows the diagnosis.
3. The diagnosis is arrived at by a summation of the positive and negative physical findings.

Special tests

Dynamic tests for instability, for articular and fibrous cartilage assessment, and for painful sensory feedback provide valuable information that may be missed with simple palpation alone.
Understanding the special tests of the wrist examination is complicated by the fact that there are often numerous descriptions of similar tests by different authors, sometimes even given the same name. Furthermore, as with other joints, the tests and interpretations of findings are often modified by clinicians over time to be different than in the original author’s description. In this section, the authors attempt to provide a comprehensive review of the original authors’ descriptions of special tests and how they define and interpret positive or negative findings. The senior author (AG) also provides his personal approach.

The approach to the wrist examination can be simplified by dividing it into four regions: radial, dorsal, ulnar, and palmar. The description of the wrist examination that follows uses this regional approach, starting radially and progressing around the wrist. For each region the authors describe a systematic approach of observation, palpation, and special tests. Provocative tests of instability are described separately at the end.

**Radial wrist examination**

**Palmar scaphoid**

To begin, start at the palmar radial aspect of the wrist. Sit comfortably with the elbows flexed and use the right hand as the dominant examining action hand for the patient’s right wrist and the left for the patient’s left. Curl one’s fingers about the radial aspect to the dorsum of the patient’s wrist while the thumb is palmar and points distally (Fig. 4A). Palpate the distal palmar tuberosity of the scaphoid. This is located immediately proximal to the thenar eminence and immediately radial to the flexor carpi radialis tendon (Fig. 4B). Use the opposite hand to move the patient’s hand/wrist unit into flexion-extension and radioulnar deviation. If one is palpating the distal pole of the scaphoid, this small bony lump will move, demonstrating that it is part of the carpus and not the radius. More importantly, the distal pole will become prominent palmarly with wrist flexion and with radial deviation as the scaphoid rotates into flexion. Alternatively, it will be less...
prominent with dorsiflexion and ulnar deviation as the scaphoid rotates into extension to line up with the long axis of the forearm. Find this bony landmark. Move the wrist through the ranges of motion to be convinced that the bony structure felt is indeed the tuberosity of the scaphoid. Tighten and loosen your grip on the patient so that the tip of the thumb forces the scaphoid tuberosity dorsally. The counterpressure is applied by the fingers of the same hand resting on the dorsum of the distal radius.

Rotate the patient’s forearm so that you can view the radial aspect of the wrist. Assuming you are examining the right wrist, continue to hold the patient’s hand with your left hand (to prevent dorsiflexion) and observe the dorsal translation of the patient’s wrist that occurs when pressure is exerted by the examining thumb with dorsal counter pressure. Once this has been mastered, move to the next step, which secures the anatomical localization of the examining thumb and introduces relevant carpal kinematics. With your left hand, hold the patient’s right hand dorsiflexed and ulnarly deviated. With the right hand and thumb in the above position, forcefully apply pressure to the scaphoid tuberosity, remove your

Fig. 2. Pronation malunion of distal radius fractures. (A) Full active pronation. (B) Limited supination on side of malunion (right). (C) CT scan revealing pronation malunion on right side. (D) Different patient who had pronation malunion demonstrating “peak at palm sign,” whereby the increased pronation results in more of the palm being visible on the affected side (left side).
left hand, and request the patient to radially deviate. Feel the tuberosity attempting to rotate volarly, but if sufficient pressure is applied, the tuberosity will not be able to rotate volarly, and thus the wrist will be unable to radially deviate. The patient will feel this restriction and may experience pain as a result of the increased forces that are generated at the radioscaphoid articular surface and in the scapholunate (SL) ligament. This aspect of the examination illustrates that if the scaphoid is prevented from flexing, the carpus cannot move into radial deviation.

To further illustrate this point, ease the pressure exerted by the thumb and allow the wrist to move into radial deviation. The thumb should feel the distal pole of scaphoid become more prominent as scaphoid flexion occurs. The same sensation should be felt with wrist flexion. Practice these maneuvers, because they constitute the basis for understanding the tests for scapholunate instability, assessment of chondromalacia of the scaphoid facet of radius, occult scaphoid fractures, and ganglions in the SL ligament. In addition, the feedback insures that one is definitely palpating the scaphoid tuberosity, thus securing the anatomical landmark.

*Flexor carpi radialis*

Adjacent and immediately ulnar to the scaphoid tuberosity is the tendon of the flexor carpi radialis (FCR). This can often be visualized proximally, and if not, it can be palpated. Follow it proximally by laying three fingers on it while
palmar and dorsiflexing a clenched fist. As one palpates distally, the distinct nature of the tendon becomes obscured as it passes by the scaphoid tubercle. Palpate this area carefully and feel the bony roof of the fibro-osseous canal that the tendon enters in the trapezium as it dives to insert into the base of the second metacarpal. FCR tendonitis can manifest as tenderness upon palpation distally near the fibro-osseous tunnel in the trapezium. There is usually localized pain with hyperextension of the wrist caused by tendon stretch and with resisted wrist flexion and radial deviation.

Scaphotrapezial joint

Immediately radial to this point and distal to the scaphoid tuberosity is the scaphotrapezial (ST) joint. At this location, place your thumb nail transversely and at 90° to the long axis of the forearm. Ask the patient to move his thumb. There will be an appreciation of movement distally while the scaphoid tuberosity remains still. This will be useful for localizing pain related to ST arthritis, a common cause of radial palmar wrist pain, and to localize the entry point for an injection into that joint. Localized swelling or tenderness may indicate synovitis or arthritis in this joint (Fig. 5). Likewise, stress loading can elicit pain in an arthritic ST joint. This can be performed by combining radial deviation of the wrist and dorsally directed force on the scaphoid tuberosity [1].

Radial artery

Just proximal to the scaphoid tuberosity and coursing obliquely across the palmar-radial aspect of the wrist is the superficial palmar branch of the radial artery (see Fig. 4). This small artery is variable in size. The pulse can be palpated. Lay two finger pulps on this area and feel the pulse. If small, this artery is often sacrificed in the Russe approach. Follow the pulse proximally to identify the pulse of the radial artery, then trace this radial artery pulse distally to discover that it disappears about a finger’s breadth proximal to the scaphoid tubercle. It is at this point where it courses deep to the first dorsal wrist compartment and is surrounded by fat in the snuffbox.

First dorsal compartment

Move the thumb into abduction and adduction and observe the prominent tendons of the first dorsal compartment, abductor pollicis longus (APL) and extensor pollicis brevis (EPB). These form the radial-palmar limit of the snuffbox. Palpate them with the thumb and index fingers and trace them proximally to determine that they are firmly secured to bone in a fibro-osseous tunnel on the distal radial surface. This is the first dorsal compartment. The tendons will not move medially or laterally here because they are firmly held in the sheath. It is this fibro-osseous sheath that is the source of symptoms in de Quervain’s disease.

Next determine where the two tendons insert. Palpate both the palmar and dorsal edge of these tendons while you firstly abduct then adduct the thumb metacarpal, while holding the metacarpophalangeal (MCP) joint stationary and slightly flexed. Determine which side of this tendon mass is most active during this maneuver and where the active motion tendon inserts. Then, keep the

Fig. 5. Scaphotrapezial (ST) joint arthritis. (A) Swelling localized to the ST joint (arrow). (B) Radiographic evidence of ST arthritis (arrow).
thumb metacarpal still at the carpometacarpal (CMC) joint and extend and flex the MCP joint while feeling these tendons. Again determine which side of the tendon mass is moving and where it inserts. This exercise clearly demonstrates that the palmar tendon inserts into the proximal radial base of thumb metacarpal, and that the dorsal tendon moves the thumb MCP joint.

Deep to this first compartment, just distal to where the fibro-osseous sheath ends, is the radial styloid process. Palpate this with the thumb and index finger and determine the level of the distal tip by using your thumbnail. Learn what the dorsal ridge of the radial styloid feels like. In many wrist pathologies, this area will develop osteophytes, which will be palpable, tender, and occasionally visible as a lump. Pain localized over the radial styloid can be caused by intrinsic radiocarpal joint pathology, undisplaced fracture, or radiocarpal ligamentous sprain. Extrinsic soft-tissue pathology, such as de Quervain’s tenosynovitis, intersection syndrome, and radial neuritis, are nearby but easily differentiated with a competent examination.

de Quervain’s tenosynovitis

Tenosynovitis of the first dorsal compartment manifests as pain, swelling and tenderness of the APL and EPB tendons directly over the fibro-osseous tunnel, located just proximal to the radial styloid. Localized pain may be elicited with resisted thumb extension and abduction. Finklestein’s test helps confirm the diagnosis [2]. This is performed by having the patient grasp his or her own thumb into the palm. A positive test is when pain is elicited near the fibro-osseous tunnel as the patient’s wrist is brought from radial deviation into full ulnar deviation. This maneuver may be mildly painful in normal wrists.

Intersection syndrome

Intersection syndrome, also known as peritendonitis crepitans, is an overuse condition resulting in inflammation in the area where the muscle bellies of the APL and EPB cross the underlying extensor carpi radialis longus (ECRL) and brevis (ECRB) tendons [3,4]. The underlying pathologic abnormalities include stenosing tenosynovitis of the tendon sheath of ECRL and ECRB tendons [4] or APL bursitis [3]. It presents as pain, swelling, tenderness, and crepitus in the radiodorsal forearm about 4 cm proximal to the tip of the radial styloid, corresponding to the intersection of the first and second extensor compartments. Finklestein’s test is often painful with APL bursitis, although the pain is usually more proximal in the radiodorsal forearm [3].

Superficial branch of the radial nerve

Back to the area of the sheath of the first dorsal compartment, one can usually see the cephalic vein just dorsal to this sheath. Deep to this vein is the superficial branch of the radial nerve. Deviate the wrist ulnarly to put the nerve under a mild degree of tension, and with the tip of your thumb, a thumb’s breadth proximal to the snuffbox, drag the thumb transversely across the dorsolateral aspect of the radius. Apply mild to moderate pressure and do not move the thumb back and forth—drag it only in one direction. Feel the firm dorsal tissue on the radius, and as this is done, the superficial nerve will be bowstrung and snap back into its normal position. Proximally it will be singular, but close to the radiocarpal joint one should feel two or three small nerves as they snap back. In thin patients, you should be able to visualize the nerve as it relocates to its normal anatomical position (Fig. 6). Realize that it is not tender. Pathology in the nerve will produce symptoms. Radial neuritis (Wartenberg’s cheiralgia or cheiralgia paresthetica) is an inflammation of the radial nerve secondary to injury such as stretch, compression, or direct blow. It manifests as pain and tenderness 1 to 2 cm proximal to the radial styloid, and radicular pain distally along the course of the superficial radial nerve elicited by percussion. Pain in this structure is much more likely related to a traumatic neuroma.
**First carpometacarpal joint**

In line with the first compartment tendons, and just proximal to where the APL inserts, is the first CMC joint. It is between the distal aspect of the trapezium and the metacarpal. It is easier to localize radially, whereas the ST joint is localized volarly. When pathology is present in the first CMC joint, subluxation may be present, and slight longitudinal traction on the thumb with gentle pressure directed ulnarly on the base of the first metacarpal will reduce the subluxation. Usually this is accompanied by palpable crepitus and a painful sensation. If the subluxation is more than 2 or 3 mm, the outline of the thumb will form a slight step, called the “shoulder sign” (Fig. 7). Also, an axial load on the thumb may reproduce symptoms in the setting of degenerative disease of the first CMC joint. The grind test is a variation of this, in which an axial load is applied through the first metacarpal while the examiner’s other hand is placed at the CMC joint and shifts the metacarpal base medially and laterally [5]. Exacerbation of the patient’s pain and palpable crepitus indicate degenerative disease. Symptoms may be increased with rotation of the metacarpal effected by flexing the MCP joint and using the proximal phalanx as the lever for rotation. Try to establish by history which end (articular surface) of the trapezium is most painful. Flexion/extension of the wrist with the thumb immobilized will cause motion at the ST joint. Motion of the thumb with the wrist immobilized will mainly cause motion at the CMC joint.

**The snuffbox**

Distally in the snuffbox, the palmar border is formed by the first dorsal compartment tendons. The dorsal border is formed by the combined second and third compartments. The proximal border is the distal radius and the distal border the base of the first and second metacarpals. Spend a moment and find these limits. The snuffbox contains fat, the radial artery traversing obliquely, and the wrist joint capsule. Through this capsule the waist of the scaphoid can be readily felt when the wrist is ulnarily deviated (Fig. 8). The junctional point along the radial border of the scaphoid, where the proximal articular surface changes to nonarticular surface, is referred to as the scaphoid articular-nonarticular (ANA) junction. With the wrist in ulnar deviation, the ANA junction can be palpated with the examiner’s index finger placed just distal to the radial styloid. Whereas mild tenderness is present there in normal wrists, scaphoid instability or synovitis is said to result in more severe pain [5,6]. Asymmetry on bilateral examination is important.

Move to the dorsal border of the snuffbox and realize that this border consists of both superficial and deep components. The extensor pollicis longus (EPL) forms the superficial border and heads toward the thumb. Deep to this is the ECRL tendon. Extend the interphalangeal (IP) joint of the thumb and feel the EPL. Dorsiflex the wrist and feel the ECRL. Follow the ECRL distally to its insertion in bone. Make a clenched fist and put the tip of the index finger into the V that forms

---

**Fig. 7.** First carpometacarpal arthritis. (A) Radial subluxation of the base of the first metacarpal giving the “shoulder sign” (arrow). (B) Anteroposterior (AP) radiograph of the same hand.
distally between the ECRL and ECRB. Determine the exact insertion of these tendons. The ECRL inserts into the base of the second metacarpal, but does it insert into the center, the radial border, or the ulnar border? The ECRB inserts into the base of the third metacarpal, but again, exactly where? Feel for the answer, and be sure you agree that it is clearly the radial aspect of the base for both (Fig. 9A).

Extend the IP joint and abduct the thumb. The EPL should stand out visibly and be easily palpable through its course to the mid-dorsal radius, where it courses about the ulnar aspect of Lister’s tubercle. Feel this definite short oblong bump with the tendon moving next to it. Feel the beginning of the radiocarpal joint just 2 to 3 mm distal to this tubercle. Move the wrist into dorsi- and palmar flexion and be certain that the “lump” remains stationary.

Next, hold the hand and apply thumb pressure in the interval between the two arms of the V made by the ECRL and ECRB. Flex and extend the wrist. In flexion, appreciate a smooth firm bump becoming prominent in this interval. This is the dorsal proximal pole of the scaphoid covered by capsule (Fig. 9B). It should be firm and not...
painful to press on. Scaphoid impaction is a condition in which repetitive hyperextension of the wrist causes impingement of the scaphoid onto the dorsal lip of the radius. A tender dorsal osteophyte or spur on the dorsal radial lip or dorsal scaphoid rim may be palpable, and extension of the wrist may be limited or painful [7].

**Dorsal wrist examination**

*Scapholunate interval*

Move ulnarly and place your thumb just distal to the dorsal lip of radius in line with the long metacarpal. Flex and extend the wrist and feel a poorly defined hard lump becoming prominent in flexion. This is the dorsal pole of lunate (see Fig. 9B). It is covered by capsule, extensor digitorum longus, tenosynovium, and retinaculum, and is not felt very distinctly—but it is felt. Pressure on this area is generally not painful unless a fracture or Kienbock’s disease is present. Appreciate the hard fullness felt with palmar flexion, and move back and forth between the dorsal pole of the lunate and proximal pole of the scaphoid. Palpate the intervening SL area. Appreciate the slight valley that exists. This area should not be painful unless there is a recent SL ligament tear or a chronic occult ganglion. This is usually the area where the dorsal ganglion becomes obvious.

*Fourth and fifth extensor compartment*

The extensor digitorum communis (EDC) tendons (fourth compartment) and their tenosynovium is easily appreciated by flexing and extending the fingers at the MCP joints. This can be done as a unit, but is better appreciated if done in rhythmical consecutive fashion. Similarly, place the fingers in a “piccolo” fashion longitudinally between the EDC and head of ulna, and flex and extend the little digit. The tendon of the extensor digiti minimi (EDM) can be felt moving. Tenosynovitis is a common source of pain, swelling, and tenderness in the dorsum of the wrist. Ganglion cysts and vestigial wrist extensor muscles (extensor digitorum brevis manus) are less common but may have a similar presentation.

*Carpometacarpal joints*

Sprains of the second through fifth CMC joints can be associated with localized tenderness and swelling. Stressing the joint by flexion, extension, and rotational forces may add additional information [8]. A bony prominence at the base of second or third metacarpal, often involving the CMC joints, is called a carpal boss. The cause and significance of this prominence is unknown, and caution is suggested when considering any surgical treatment.

**Ulnar wrist examination**

*Dorsal ulnar structures*

Palpate the unocarpal space with pressure directed toward the proximal ulnar aspect of the lunate, best done with the wrist is in flexion. If this is painful, it may indicate chondromalacia on the ulnar aspect of lunate, and suggests the diagnosis of ulnocarpal impaction (UCI) or a TFCC tear. To test this diagnosis, a “grind test” is done [1, 9]. Hold the dorsal and palmar aspect of the patient’s metacarpal region in one hand (Fig. 10) and use the supporting hand to stabilize the distal forearm. The wrist is deviated ulnarly and put through a series of repetitive maneuvers that combine ulnar deviation and a proximally directed force with alternating pronation and supination. A positive test will produce a click or feeling of crepitus or be subjectively painful. Such a positive test may indicate a TFCC tear or UCI.

With the forearm pronated, palpate ulnar and distal to the ulnar head. Deviate the wrist radial

---

Fig. 10. The “grind test” for ulnocarpal impaction or TFCC tears. The wrist is ulnarly deviated and axially loaded with alternating pronation and supination.
and ulnar, and feel the tendon of the extensor carpi ulnaris (ECU) become prominent on ulnar deviation. Trace this tendon distally to its insertion into the dorso-ulnar base of the fifth metacarpal. Trace the tendon proximally to the sheath of the ECU, which begins at the distal aspect of the ulnar head. Feel that the ECU is ulnar when the forearm is pronated, but is relatively central when supinated. The ECU has not actually changed its position relative to the ulna, but rather the hand and radius has changed. Dorsiflex the wrist while the forearm is supinated, and appreciate that the ECU is more prominent than when the forearm is pronated. Tenderness along the tendon sheath or pain and weakness with resisted wrist extension and ulnar deviation suggest tendonitis.

The ulnar styloid (US) is best felt when the forearm is pronated. It is distal to the ulnar head and palmar to the ECU. It is slightly obscured by the ECU when the forearm is supinated. It should not be tender to palpate unless there has been a recent fracture or ulnar styloid-triquetral impaction (USTI) is present. To search for clinical support for this diagnosis, a USTI provocative test[10] is performed. This USTI test is based on the fact that the US is ulnar in pronation, and is more central and dorsal in supination (Fig. 11). Because the ECU is held firmly to the ulnar head by its subsheath, the US has the same relationship to the wrist as we have just appreciated for the ECU. Thus it is evident that to approximate the US to the triquetrum, one needs to bring the US closer to the carpus by supinating the forearm, and bring the carpus closer to the US by dorsiflexing the wrist. Therefore, begin the test with the wrist dorsiflexed and the forearm pronated, and simply add one motion, supination, while maintaining dorsiflexion (Fig. 12). A typical positive test will produce pain at the US when one approaches full supination. In a small series of patients with USTI, Topper and colleagues[10] reported that the USTI provocative test was positive in all patients preoperatively, and negative in all following partial ulnar styloidectomy. To support the diagnosis, the US should also be tender exactly over its tip. This is tested in pronation and neutral wrist flexion. The patient may indicate from the history that this test produces pain. The pain with the hand in the back pocket, repetitive page turning, or the distal supinated hand on the ice hockey stick may be historical evidence of a positive USTI provocative test.

The lunotriquetral (LT) joint can be localized as a depression just distal to the radial side of the ulnar styloid, because the head of the ulna articulates with one half of the lunate and one half of the triquetrum. Direct palpation of the LT joint may be tender when LT pathology is present; however, more information can often be obtained by the numerous LT stress maneuvers discussed later.

In the same general area, but located ulnarly and midway between the pisiform and US, palpate deeply with the tip of one’s finger. This test may be slightly uncomfortable, but if there is more discomfort than expected, it may indicate pathology in the ulnotriquetral ligaments. Berger calls this the foveal sign[11]. The dorsal superficial branch of the ulnar nerve obliquely traverses this same area (Fig. 13). It can be bowstrung and palpated in the same fashion as one does

Fig. 11. The position of the US in relation to forearm rotation. (A) AP radiograph with the forearm in pronation, demonstrating that the US is located ulnarly. (B) AP radiograph with the forearm in supination, demonstrating that the US is located dorsally and centrally.
for the superficial branch of the radial nerve. Develop the ability to palpate and move these superficial nerves, and by patient feedback determine if symptoms are related to it. To facilitate the palpation of this nerve, radially deviate the wrist. This will place the branches under tension. Then drag one’s thumb across the nerves perpendicular to its course. It is usually easy to palpate as it crosses the ECU near the insertion into fifth metacarpal. In addition, realize that a pathological process, such as neuroma, will likely show signs of decreased sensation over the appropriate area served by that nerve.

**Distal radioulnar joint**

Instability or degenerative disease of the distal radioulnar joint (DRUJ) is often associated with diminished or painful pronosupination. Instability can occasionally be appreciated on inspection, looking laterally at the wrist in full pronation and supination. A dimple sign may be appreciated. The piano key test for DRUJ instability could be done with one hand or two. With this test, the examiner depresses the ulnar head palmarly while the pisiform is stabilized with a dorsally directed force. A positive piano key sign is when the ulnar head springs back into position like a piano key when the forces are released [12]. Additional information can be obtained from testing both the palmar and dorsal displacement of the ulnar head in pronation, neutral, and supination, and comparing it with the opposite side. This is referred to as the distal ulna ballottement test [13]. In addition, press the ulnar head against the sigmoid notch as it translates, to appreciate the status of the articular cartilage as well as the ligamentous stability. This is referred to as the ulnar compression test [1].

**Palmar ulnar structures**

Hold the pisiform between the index finger and thumb. Flex and extend the wrist and move the pisiform medially and laterally while applying dorsally directed pressure, compressing the pisiform on the triquetrum, to search for articular cartilage crepitus or pain associated with pisotriquetral degenerative joint disease. This is referred to as the pisotriquetral grind test [1].

![Fig. 12. The UST provocative test. (A) Starting position of pronation and wrist extension. (B) While maintaining wrist extension, the examiner moves the forearm into supination. (C) The final position of full supination produces localized pain at the ulnar styloid in USTI.](image-url)

![Fig. 13. Anatomy of the ulnar side of the wrist. Dorsal superficial branch of the ulnar nerve (arrowheads) in relation to the ulnar styloid (*).](image-url)
Palpate the hook of the hamate just distal and radial from the pisiform. It is localized by placing the IP joint of the examiner’s thumb over the more superficial pisiform, with the tip of the thumb directed toward the metacarpal head of the long finger. Deep palpation with the tip of the examiner’s thumb reveals the hook of the hamate. This can be tender in the setting of fracture or nonunion of the hook of the hamate. Remember that this is the area of the ulnar nerve, and deep palpation onto this nerve is usually painful.

Palpate the flexor carpi ulnaris (FCU) proximally from the pisiform. It is most prominent by having the patient make a clenched fist during mild wrist flexion. Tenderness along the tendon sheath or pain and weakness with resisted wrist flexion and ulnar deviation suggest tendonitis.

With the tip of the thumb on the radial palmar side of the pisiform, add deep pressure. The uncomfortable sensation is related to pressure on the ulnar nerve. Although one cannot objectively feel this nerve, this means of localization will be of value for assessing symptoms or injecting local anesthetic.

The palmar wrist examination

The palmaris longus (PL) tendon is central and superficial in the palmar distal forearm. It stands out with a flexed grip, and can be visualized and palpated. It may be absent. At the wrist crease between the PL and FCR, an astute examiner can often palpate a fine snapping of the palmar cutaneous branch of the median nerve. This subtle finding is aided by tensioning the nerve with dorsiflexion of the wrist and then drawing the tip of the examining digit across the interval with slight deep pressure. Finally, circumferential wrist compression with the thumb and index will produce pain when a synovitis and effusion is present.

Provocative tests of carpal instability

Scapholunate instability

Watson [14] described the first test of SL instability, called the scaphoid shift maneuver, in 1978; however, it was not until 1988 that Watson and colleagues [15] first published a detailed description and interpretation of the maneuver. They stressed the point that the scaphoid shift is a provocative maneuver rather than a test, because it does not offer a simple positive or negative result, but rather a variety of findings, with emphasis being on asymmetry on bilateral examination [5,15]. The maneuver is performed starting with the wrist in slight extension and ulnar deviation. The examiner grasps the wrist from the radial side, placing a thumb on the palmar prominence of the scaphoid while wrapping fingers around the distal radius for counterpressure. The wrist is then passively moved into radial deviation and slight flexion by the examiner’s other hand. The examiner’s thumb resists the attempt of the scaphoid tuberosity to rotate volarly, creating a dorsally directed subluxation stress. This subluxation stress causes the proximal pole of the scaphoid to “shift” dorsally in relation to other bones of the carpus and the distal radius, even in normal wrists. The degree of the shift is related to the amount of examiner pressure, the degree of scaphoid flexion, the amount of ligamentous laxity, and the status of the SL ligament. A ruptured SL ligament allows the proximal pole to move more dorsally and frequently rest on the dorsal lip of the radius. The maneuver is best done with the patient’s wrist flexed, because this causes the scaphoid to be angled to such a degree that the proximal pole may be only partially constrained by the bony architecture of the dorsal lip of the radius (Fig. 14). As the thumb pressure is withdrawn, there may be a palpable “clunk” as the scaphoid returns to its normal position. Pain that replicates the patient’s symptoms or asymmetrical laxity when comparing with the contralateral wrist are considered significant findings.

The scaphoid shift is perhaps the most studied provocative test of the wrist examination. Radiographic displacement of the scaphoid has been shown to correlate with clinical grade of subluxation [16]. Likewise, objective evaluation of displacement using a customized instrument has been shown to correlate with clinical grade of subluxation [17]; however, Watson and other authors agree that it is a subjective test, and that experience is required to determine the clinical significance of the degree of scaphoid mobility elicited [5,15–17]. There are many reports of “positive” scaphoid shifts in normal patients who have no symptoms or history of wrist trauma [6,17–19]. This calls into question the positive predictive value of the test. Watson and colleagues [6] examined 1000 random individuals who had no prior wrist complaints, and found that 21% had unilateral increased scaphoid mobility on the scaphoid shift test. Only 37% of these had associated symptoms. Similarly, Easterling and Wolfe [19] examined 100 uninjured asymptomatic patients, and found that
32% had bilateral and 14% had unilateral increased scaphoid mobility on the scaphoid shift test, with a palpable “clunk” on release of the pressure on the scaphoid tubercle. There was an association between positive tests and generalized ligamentous laxity. None of the patients had a painful shift, thus supporting Watson and colleagues’ [15] emphasis on the clinical significance of reproducing the patient’s symptoms. The importance of a pain associated with the scaphoid shift is also supported by radiographic evidence of greater displacement of the scaphoid correlating with painful shifts compared with painless shifts [16].

The scaphoid shift maneuver is usually considered a test for SL rupture and scaphoid instability; however, this test is also important for assessing the articular cartilage status of the proximal pole of scaphoid and radial facet, with a gritty sensation or clicking suggesting condromalacia or loss of articular cartilage [15]. It will also produce symptoms when an occult dorsal ganglion or an occult scaphoid fracture is present. Because the test produces a dorsal displacement of the scaphoid and traction on the SL ligament, if an occult dorsal ganglion is present, the test will generally be painful [20]. Likewise, thumb pressure produces a force that begins on the tuberosity of the scaphoid and travels up the longitudinal axis of the scaphoid. This test will produce a painful stimulus if any fracture exists, and should be considered a mandatory test for all cases diagnosed as “clinical scaphoid fracture.”

The scaphoid thrust [21,22] and the scaphoid lift [1] are additional tests of scapholunate instability that have been described. They involve slight variations in the technique of loading the distal pole of the scaphoid, and are not as well-studied as Watson’s original scaphoid shift test.

**Lunotriquetral instability**

The LT compression test [1,23] loads the LT joint in an ulnar-to-radial direction, eliciting pain with LT instability or degenerative joint disease. The examiner’s thumb applies a radially direct pressure on the triquetrum just distal to the US at the “ulnar snuffbox,” the space between the tendons of FCU and ECU. This maneuver is similar to the radiocarpal glide test described later for radiocarpal instability (Fig. 15).

LT ballottement tests and LT shear tests demonstrate instability by exerting pressure in opposite directions upon the adjacent carpal bones. The LT ballottement test, as described by Reagan and colleagues [24], is performed by grasping the lunate between the thumb and index finger of one hand while applying alternating dorsal and palmar loads at the pisotriquetral unit with the thumb and index finger of the other hand (Fig. 16). The test is considered positive if the maneuver elicits pain, crepitus, and increased anteroposterior laxity at the LT joint. A variation of this ballottement test was also described by Masquelet [25]. The LT shear test, as described by Kleinman [26], is performed by applying a dorsally directed load on the pisotriquetral unit with the examiner’s thumb to create a shear force at the LT joint.

Triquetral lift maneuver [27] is similar to the scaphoid lift maneuver in that the examiner resists
the normal dorsal translocation of the triquetrum as the wrist moves from ulnar deviation into radial deviation. The patient’s hand is placed in full pronation, and the examiner places his or her thumb over the dorsal aspect of the triquetrum, resisting the dorsal lift of the triquetrum as the wrist is brought from ulnar deviation into radial deviation. Resisting the lift stresses both the LT joint and the triquetrohamate joint, eliciting pain if instability is present.

Radiocarpal instability

The anteroposterior drawer test [28] can be used to assess for instability of either the radiocarpal or midcarpal joints. The examiner stabilizes distal forearm with one hand while the other hand grips the metacarpals, applying longitudinal traction and an anteroposterior force. A “drawer” is elicited though the radiocarpal or midcarpal joint, and compared with the contralateral side.

The radiocarpal glide will test the articular surface of the proximal carpal row and the extrinsic ligaments (see Fig. 15). The examiner’s thumb exerts a radially directed force on the triquetrum. A radial shift of the proximal carpal row relative to the distal radius may be appreciated in the setting of radiocarpal instability. Crepitus may be felt in the setting of articular pathology of the radiocarpal joint.

Midcarpal instability

The catch-up clunk test was first described Lichtman and colleagues [29]. With the forearm in pronation, the patient actively moves the wrist back and forth from radial deviation to ulnar deviation. Normally as the wrist moves from radial to ulnar deviation, the proximal carpal row rotates smoothly from flexion to extension while the distal row translates from palmar to dorsal. With midcarpal instability, the proximal row remains flexed and the distal row remains volarly translated longer than normal during ulnar deviation. As ulnar deviation progresses, the soft-tissue and bony restraints cause a sudden “catch-up” of the proximal row into extension and the distal row into dorsal translation, which is often an audible or palpable “clunk” [30]. This abnormal carpal motion has been confirmed using videofluoroscopy [31]. The catch-up clunk test is not specific for midcarpal instability because a similar clunk may be present in radiocarpal instability [27,32].
in which the proximal row may suddenly sublux dorsally with ulnar deviation [32]. Lichtman and colleagues [31,32] later added a provocative maneuver referred to as the midcarpal shift test (Fig. 17). With the wrist in neutral ulnoradial deviation, the examiner stabilizes the forearm in pronation with one hand, and with the other hand applies a palmarly directed pressure at the level of the distal capitate, noting the ease and extent of palmar translation. The wrist is then axially loaded and passively ulnar deviated. The test is positive if a painful catch-up clunk occurs with ulnar deviation that reproduces the patient’s symptoms. The presence of palmar translation or a clunk alone without the reproduced symptoms are not considered positive, because they can occur in normal asymptomatic patients [30,32]. The test is very subjective; however, Lichtman and colleagues [32] later developed a grading system (Grades I–IV) to help quantify the severity of the palmar translation and catch-up clunk. The validity of the test is supported by studies showing the correlation between clinical grading and objective mechanical measurements of displacement [30,32].

The anteroposterior drawer test [28], as previously described for radiocarpal instability, can also be used to assess for instability of the midcarpal joint. Additionally, a pivot shift test [33] of the midcarpal instability has been described, but is not as well studied as the midcarpal shift test.

Capitolunate instability

Capitolunate instability is rare and can be tested with a dorsally directed force to the hand. The dorsal capitate-displacement apprehension test to demonstrate capitolunate instability was described by Johnson and Carrera [34]. The examiner stabilizes the distal forearm with one hand, while exerting a dorsally directed force on the capitate with the thumb of the other hand. Apprehension and discomfort with dorsal subluxation of the capitate are considered a positive test. Johnson and Carrera’s original description of the test includes fluoroscopy to directly visualize the degree of dorsal subluxation of the capitate. Other authors have described similar dorsal capitolunate displacement tests that load the capitate at different locations, such as through the scaphoid tuberosity [35] or the metacarpals (Fig. 18) [33]. Apergis [36] described a positive wrist hanging test, in which hanging the wrist over the end of the table with the forearm supinated causes

Fig. 17. (A–D) The midcarpal shift test.
discomfort. This was positive in two thirds of patients who had capitulunate instability. All of the wrists in that same series had a palmar sag appearance [36].

The finger extension test (FET) is a sensitive but nonspecific indicator of carpal pathology [5]. With the wrist passively flexed, the examiner resists active finger extension. This loads the carpal joints. Pain in the dorsal aspect of the wrist or weak extension indicate an abnormal test. A normal FET is rarely seen with carpal instability (radiocarpal, midcarpal, or scaphoid rotatory instability) or Kienbock’s disease [5], although an abnormal test does not provide information regarding the specific pathology.

Differential lidocaine injection

Differential lidocaine injections can be incorporated into the physical examination to help localize the source of pain [27,37].

Summary

The clinical examination of the wrist is still in a state of evolution. The significance of each maneuver, including the sensitivity and specificity of detecting distinct pathology, needs to be further clarified. Furthermore, the addition of other tests will likely be forthcoming.

References


