PART IX

Ligament Instability/Tears

Carpal 000
Dorsal Wrist Syndrome and Rotatory Subluxation of the Scaphoid

H. Kirk Watson and Jonathan Sorelle

INTRODUCTION

Dorsal perilunate synovitis was the term that we used in the late 60s and early 70s for patients presenting with wrist pain who had clinical findings consistent with a syndrome that the senior author (HKW) now calls dorsal wrist syndrome (DWS). The patients with chronic and more severe wrist pain underwent surgical exploration. At the time of surgery, an abnormal ridging on the dorsum of the scaphoid and lunate was noted in all cases. The ridge occurred most prominently at the dorsal distal aspect of the proximal pole of the scaphoid. A lesser ridge was usually present on the dorsal, distal, and radial aspects of the lunate. The ridging bone was pink to purple, representing reactive fibrocartilage material and was always soft and easily removed with a dental rongeur. One could readily tell when the denser bone was in contact with the rongeur. As rotatory subluxation of the scaphoid became a clinically recognized entity in hand surgery, the senior author began to look more closely at the relationship of the ligamentous supports between the scaphoid and the lunate. Tears of the volar aspect of the scapholunate interosseous ligament (SLIL) were identified in the more symptomatic patients with dorsal wrist syndrome. Evaluation of the SLIL to look for tears became a standard part of the surgical procedure. It became evident that SLIL tears usually begin volarly and extend dorsally as the severity of the injury increases.

DIAGNOSIS OF DORSAL WRIST SYNDROME

Symptoms

The history of dorsal wrist syndrome varies significantly, but the constant features are wrist pain, limited activity, and post-activity ache. Localization of wrist pain is not as important historically. Dorsal wrist ganglions are commonly associated with dorsal wrist syndrome and are a signpost of underlying pathology. Patients who have received a cortisone injection typically experience some improvement for 2 months, and then the symptoms gradually recur. Many patients are seen having had arthroscopic repairs of the triangular fibrocartilage.

Post-activity ache is a useful clinical tool in that the duration of symptoms following any particular activity is indicative of the amount of synovitis that has been produced at the time of the activity. Post-activity ache lasting more than 24 hours after normal but strenuous activity is indicative of carpal displacement sufficient to produce edema and inflammation of the synovium. This is typical of a wrist with a displacable scaphoid. Post-activity ache that lasts for 2 hours after chopping wood all day is a different situation from post-activity ache, which lasts for 3 days after an hour of tennis.

Physical Examination

Physical examination first reveals a positive finger extension test (Fig. 45-2). This test is performed by passively flexing the wrist, then asking the patient to actively extend all four fingers against resistance. If the test is positive, the patient is unable to maintain extension because of pain in the wrist. The finger extension test is an extremely effective part of the evaluation. In the senior author’s experience, a negative finger extension test all but excludes the possibility of any radial-sided wrist pathology such as rotatory subluxation of the scaphoid, dorsal wrist syndrome, Kienböck’s disease, carpal boss, scaphoid fracture, scapholunate advanced collapse (SLAC) wrist, or any other abnormality in the load column of the index and middle finger metacarpals, capitate, scaphoid, lunate, and radius. A positive finger extension test is usually associated with a positive articular-nonarticular (ANA) test (Fig. 45-3), which is synovitis and tenderness at the articular, nonarticular junction of the scaphoid. Scaphotrapeziotrapezoid (STT) joint synovitis is not usually present in dorsal wrist syndrome. A positive scaphoid shift (Fig. 45-4) may or may not be elicited, depending on the degree of synovitis at the time of the examination and the degree of instability or tearing of the SLIL tear. There is tenderness over the scapholunate joint dorsally. Carpal boss testing is negative when forcibly malaligning the index and middle metacarpals; either depressing the one while extending the other or vice versa. There is no evidence of symptoms arising from tenosynovitis of the first or second extensor compartments. The patient may or may not have pain with forced wrist flexion or extension.

Imaging

Radiographic examination of dorsal wrist syndrome is usually normal but may demonstrate osteophyte formation on the distal dorsal ridges of the scaphoid and lunate in the lateral projection with or without evidence of rotatory subluxation of the scaphoid (Fig. 45-5). Contralateral wrist films may be useful in identifying inconsistencies for comparison. Magnetic resonance imaging results are typically negative or may indicate minor abnormalities in other parts of the wrist.

Clinical Stages

Three-day injury: A minimal sprain, such as falling from a chair on the dorsiflexed wrist, will produce pain from stretching of the synovium with or without minor tearing of synovium and joint edema. In this case, no significant tear of any major support ligaments occurs. The injury usually clears in about 3 days.
**FIGURE 45-1** Scaphoid instability produces a sequence of events that create a spectrum of disorders ranging from wrist sprain and dorsal wrist syndrome (DWS) to rotatory subluxation of the scaphoid (RSS) and a scapholunate advanced collapse (SLAC) wrist. The findings of carpal tunnel syndrome (CTS), ganglia, and post-activity ache (PAA) are often indicators of more severe underlying wrist pathology. Note that the development of ganglia seems to require a more intact joint; ganglia are absent with major joint displacement and destruction. (Illustration created by Steve Criado.)

**FIGURE 45-2** Finger extension test. The patient’s wrist is held passively in flexion; the examiner then resists active finger extension. Radial wrist disease causes pain and prevents powerful finger extension.

**FIGURE 45-3** Articular-nonarticular test (ANA). The articular-nonarticular junction of the scaphoid is acutely painful when palpated with the examiner’s index finger firmly against the radial aspect of the patient’s wrist just distal to the radial styloid with the wrist in ulnar deviation. Pressure in this area with the wrist in radial deviation is distal to the ANA and not symptomatic.

**FIGURE 45-4** Scaphoid shift.
Three-week injury: A more severe dorsiflexion injury ruptures blood vessels in the synovium and may cause a partial SLIL tear with or without injury to the volar radioscaphocapitate or long radiolunate ligaments and other volar extrinsic ligaments. The main ligamentous supports of the scapholunate joint remain intact, but hemarthrosis occurs. Clinically, this manifests as a wrist “sprain” that usually requires about 3 weeks to clear, but without any lasting sequelae. The repair activity in the tissues lasts a good deal longer than the symptoms. Because the ligament tears are partial—that is, incomplete—healing of each ligament is expected with or without treatment.

Three-month injury: A significant forced dorsiflexion injury ruptures the SLIL with or without concomitant tears of extrinsic ligaments such as the radioscaphocapitate or long radiolunate ligaments and tear of synovium results in a hemarthrosis and soft tissue swelling. This is the injury described by Mayfield and Johnston, which may result in different combinations of ligament tearing as the injury load pattern is dispersed through the wrist. The healing process is associated with a painful and unusable wrist joint for the first month. This is usually followed by significant residual symptoms for the second month and low-grade symptoms during the third month. Depending on the degree of tear and the type of immobilization, the patient’s wrist may heal and become asymptomatic and fully usable. More commonly, there is some residual scapholunate instability of varying degrees, which in turn influences the incidence of recurrent wrist pain under loading. Twenty-five percent of normal adults demonstrate some tearing of the SLIL and clinical laxity of the scaphoid support. The wrists of 1000 people who were not patients were examined bilaterally by the same three hand surgeons. Twenty-one percent demonstrated unequivocal unilateral positive scaphoid shift (Watson test). Thirty-seven percent of these “normal” people had some symptoms. Bilaterally positive scaphoid shift wrists were excluded. From this study, we have felt comfortable saying that nearly 35% of normal adults have sustained some permanent injury to the scaphoid support system.

Treatment Protocol

Our protocol for dorsal wrist syndrome has remained essentially unchanged (Fig. 45-6).

As always, the need for surgery is based primarily on the patient’s level of symptoms and activity limitations. When there is a documented history of a recent injury, wrist immobilization and nonsteroidal anti-inflammatory medications and restricted activity are indicated for up to 3 weeks for symptomatic relief; however, cortisone injections are contraindicated. With more severe injuries, 6 weeks or more of casting are appropriate to allow time for ligamentous healing.

Treatment in the first 3 months after injury is primarily immobilization. This excludes the obvious major acute injury, which requires surgery. Between 3 and 6 months, patients are allowed to perform all normal daily activities including full stress as the tissues “hear” the activity input as a stimulus to ligament strengthening. If the patient remains symptomatic beyond 6 months, surgical treatment is considered.

**SURGICAL TREATMENT**

**Indications**

The following are indications to consider:

- Interference with quality of life

**Range of symptoms:** An 18-year-old rated tennis professional with symptoms only during competition to a 65-year-old woman with constant ache and inability to garden for more than 20 minutes

**Contraindications**

Surgery is contraindicated in anyone who is able to get along adequately with his or her particular symptom. The patient should be made aware of the possible progression to a SLAC wrist.
**Surgical Management**

The sheath of the extensor pollicis longus tendon is opened, and the tendon is retracted radially. A soft tissue mass, consisting of capsule (ligament)-thickened synovium and often containing ganglia, is invariably found between the third and fourth compartments and is excised to reveal the underlying scapholunate joint. An occult ganglion is often identified on the dorsal SLIL surface and excised. Traction on the hand permits visualization of the volar portion of the SLIL. Flexion of the distracted wrist and placement of a probe (joker) within the radiocarpal joint between the scaphoid and lunate permit evaluation of the volar portion of the SLIL. Repair tissue and a synovial layer that possesses negligible intrinsic strength often bridge the partially ruptured SLIL. The probe readily separates this layer, and the scapholunate joint space is entered volarly. The probe is swept proximally and then dorsally, tracing the curve of the scapholunate joint until intact ligamentous fi

**RESULTS**

An occult ganglion is often identifi ed on the dorsal SLIL. Synovial tissue and excision of any bony ridging down to a cancellous surface. Our dorsal approach to the wrist involves a transverse incision, approximately 3 cm long, centered over the scapholunate joint at the level of the radial styloid.

**TABLE 45-1**

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<th>Classification of Scapholunate Interosseous Ligament Rupture</th>
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beneath the capitate makes the wrist susceptible to re-injury, which gradually advances the tear from volarly around dorsally until there is a static situation in which the scaphoid sits out of place and the wrist does not take the load. A common problem is the compensable injury, which is seen in the first week and demonstrates a static rotatory subluxation of the scaphoid on x-ray; yet the wrist has minimal swelling and does not demonstrate a recent major injury. The compensable injury may have ruptured the last of the SLIL, but the likelihood is that the injury produced symptoms in a wrist that already had significant rotatory subluxation of the scaphoid.

An acute complete rotatory subluxation occurring all at one injury manifests a major clinical response. The presentation mimics a major fracture of the wrist with hemarthrosis and swelling. It is only this picture that requires an early surgical approach in an attempt to repair the acutely ruptured ligaments. In the more typical situation, there is a terminal event for the interosseous ligament superimposed on a preexisting rotatory subluxation. At surgery, there is little or no ligament to repair because the cumulative injuries to the scapholunate interosseous ligament are old and the ligament attenuates and disappears.

Our current classification scheme describes five types of rotatory subluxation of the scaphoid: (I) predynamic, (II) dynamic, (III) static, (IV) degenerative, and (V) secondary. Predynamic instability is diagnosed when there are signs of scaphoid instability without radiographic abnormalities. A positive scaphoid shift, dorsal wrist pain, and limited range of motion, usually flexion, are typical findings at physical examination. Dynamic rotatory subluxation of the scaphoid is similar, but demonstrates radiographic findings when the scaphoid is stressed, such as with a clenched-fist view and radial or ulnar deviation x-rays. With static rotatory subluxation of the scaphoid, an increased scapholunate distance and an increased scapholunate angle, with or without a dorsal intercalated segmental instability (DISI) pattern, are observed radiographically without the need for joint stress.

The next phase in the pathologic evolution occurs when radiographic findings of degenerative changes at the radioscapohoid or STT joints (i.e., triscaphe arthritis) are present. Secondary rotatory subluxation of the scaphoid stems from carpal lesions other than SLIL tears, such as a collapsed wrist from Kienböck's disease or nonunion of the scaphoid. We differentiate rotatory subluxation of the scaphoid classifications because they can be used for treatment algorithms. Patients with predynamic or minimally symptomatic dynamic rotatory subluxation of the scaphoid are included in the dorsal wrist syndrome protocol. As soon as there is a significant symptomatic SLIL tear, our next phase of management is triscaphe (STT) arthrodesis.

Triscaphe arthrodesis has been our answer to the difficult problem of scaphoid stability after SLIL tears. It is extremely difficult to keep the scaphoid beneath the capitate under heavy loads. Rather than attempt ligamentous reconstruction, we feel that stability of the scaphoid can best be achieved by holding the scaphoid in position distally via the STT joint. Although we accept some degree of radial styloid beaking, advanced scapholunate degenerative arthritis is a contraindication to this surgery. STT fusion is a reliable procedure to return function to a young patient with high functional demands.

REFERENCES