13 Ultrasound of the Scapholunate Ligament

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Rupture of the scapholunate ligament is a frequent but often neglected lesion in common traumatology. Left to hazardous symptomatic treatment, it leads to a complete and inevitable progressive destabilization of the entire carpus, causing intracarpal arthritis [1, 2]. Its diagnosis is difficult, and a thorough and targeted exploration is needed. Conventionally, the clinical examination looks for a forced scaphoid projection and pain on palpation of the scapholunate interval [3]. Radiological examinations then look for signs of static instability (scapholunate diastasis, scaphoid horizontalization, and ring sign). But these examinations reveal very little or very poorly the predynamic or dynamic instabilities [4]. Some authors even recommend the use of arthrography and arthroscopy to ensure diagnosis [5].

Ultrasound is a simple, noninvasive, comparative, and dynamic tool. With the development of high-frequency linear probes, ultrasound allows a fine study of surface structures. Some authors already use it in combination with clinical examination of the wrist [6–8].

We describe a specific dynamic ultrasound sign of the scapholunate ligament rupture in the same way as stress tests for other ligaments (e.g., varus for the lateral collateral ligament of the ankle or for an anterior drawer for the anterolateral cruciate ligament of the knee).

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13.1 How to Carry Out Ultrasound Examination?

The clinical examination in consultation is the "pivot shift test" of the scaphoid known as Watson's test: search for the protrusion felt by the examiner or the patient.

Ultrasound examination of the dorsal portion of the scapholunate ligament is performed in consultation in a comparative way. The patient's wrist is closed in pronation, and the elbow is placed on the table, in a slight palmar flexion thanks to a gel vial placed below (Fig. 13.1). The high-frequency probe (between 12 and 18 MHz) is arranged on the wrist for a cross section on Lister's tubercle. The hockey-stick probe is not wide enough to allow dynamic examination.

The probe then shifts slightly distally to show the scapholunate ligament that is measured (Fig. 13.2): it must be hyper- or isoechogenic and measured between 2 and 4 mm. A "V"-shaped anechogenic space is suspected of rupture.

There should be no hypoechogenic border on the bone because the scaphoidian and lunarian view cannot see cartilage physiologically. If a border is visualized, then one must think about an image of the head of the capitate revealed by the semilunar palmar tilt *(dorsal intercalated segmental instability)*.

The examiner then exerts pressure on the head of the third metacarpal without moving the probe. In case of scapholunar lesion, the capitate

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"herniates" between the two bones on the screen of the ultrasound graph (Fig. 13.3) because it interposes between the two bones. Figure 13.4 **illustrates** the desired behavior of carpal bones.

Fig. 13.1 Installation of the examiner and patient

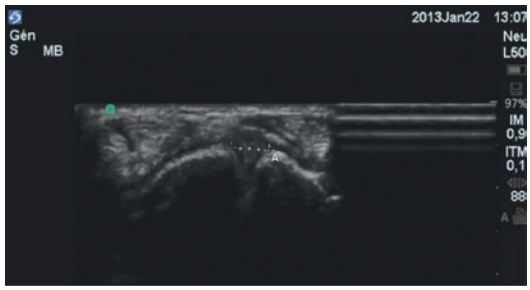


Fig. 13.2 Ultrasound cross section of the scapholunate ligament (Edge, Sonosite 6–15 MHz)

The following radiological assessment is systematically carried out in the radiology department: frontal and strict profile radiography, ulnar inclination radiography [9], and radiography of the closed fist face of both wrists [10].

The normal length of the dorsal part of the scapholunate ligament is 1.7 mm (±0.4) according to Boutryl et al. [7]. This measure is useful for static stages but does not have a range in dynamic stages. A ligament stress test is therefore useful for the scapholunate ligament as is available for lateral ankle sprain (forced varus) or for the anterolateral cruciate ligament of the knee (Lachman test).

In the test described, the slight bending of the wrist allows the clearing of the dorsal part of the scapholunate, which is the thickest and strongest part; it is stretched in extension making it more

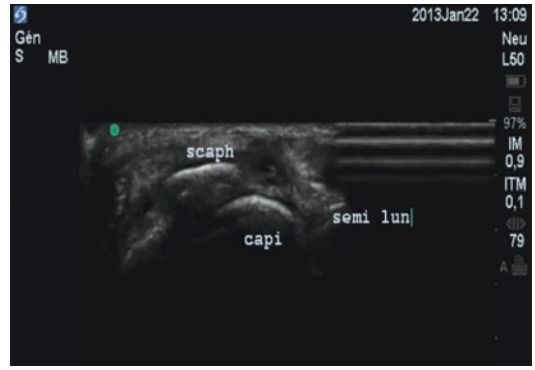
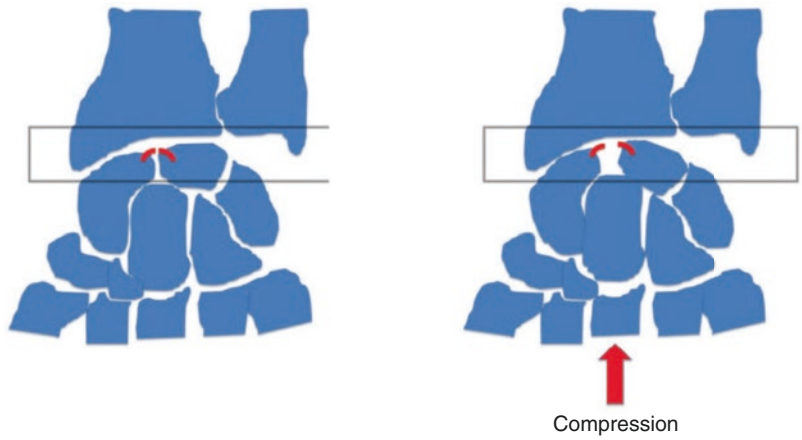


Fig. 13.3 The same cut with axial compression on the third metacarpal

Fig. 13.4 Diagram of the behavior of carpal bones before and with compression



exposed during trauma [2] and is fully visualized in 97% of cases [7].

Jacobson et al. [11] analyzed in a cadaveric study that the scapholunate ligament was not visualized in the event of rupture and the interosseous space became hypoechogenic; ultrasound scanners cannot quantitatively measure echogenicity, making this test unreproducible.

The test described is dynamic and allows to explore all stages of scapholunar rupture especially the sprain stage which is the most difficult to diagnose. It can be used in consultation with ease as the ultrasound is easily accessible and feasible by the clinician.

The test is painless, and the patient also looks at the screen: one easily understands the difference in the behavior of the carpal bones by comparing the dynamic images of the two wrists.

This test is also applicable to the operating room under general or local-regional anesthesia since the compression is carried out passively by the examiner. Thus, it can be used notably after repair of a joint fracture of the distal radius or after repair of the scapholunate ligament.

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