Imaging of hand injuries: Make it easy on yourself

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Learning objectives

1. To discuss some of the most common as well as less frequent hand injuries addressing not only the diagnosis but also the management of specific lesions.
2. To review the anatomy related to the region of interest for each lesion.
3. To illustrate these lesions using different imaging modalities, particularly ultrasound and magnetic resonance (MR) with associated surgical findings in some cases.
Background

Hand injuries are common. The complexity of the hand and the similarities in clinical presentation of different injuries make understanding of hand anatomy and function as well as knowledge of the spectrum of imaging features indispensable for proper diagnosis and treatment.

This pictorial review will address the imaging findings as common as well as less frequent bone and soft tissue lesions of the hands.
GLOMUS TUMOR

Glomus tumors represent 1-5% of the soft-tissue tumors in the hand [1,2].

Glomus bodies are present in the stratum reticularis of the dermis throughout the body, but they are highly concentrated in the digits, palms, and soles of the feet. Up to 75% of the glomus tumors occur in the hand, and approximately 65% of these are in the fingertips, particularly in the subungual space [1].

At pathologic examination, glomus tumors are hamartomas developed from the neuromyoarterial glomus bodies which are highly specialized arteriovenous anastomosis responsible for thermoregulation [1,2].

Clinical manifestations include intense, often pulsating pain, spontaneous or provoked by mild trauma, and temperature sensitivity [1,3].

Usually, these tumors present like a small, reddish blue nodule measuring 3 to 10 millimeters in diameter, and the most common location is the subungual region of the distal phalanges (Figures 1 and 2) [4].

Anatomy of the nail apparatus

The nail apparatus is an integral part of the digital tip and consists of four different components: the germinal matrix, nail bed (sterile matrix), nail plate, and nail folds. The nail matrix can be subdivided into a proximal section and a distal section, which underlies from the proximal nail plate, to the distal border of the lunula. The nail bed is the distal continuation of the germinal matrix and it does not produce nail plate substance (sterile matrix). The nail plate is firmly attached to the nail bed and is a resistant sheet of compacted keratinized cells. The nail folds help direct nail growth and consist of two lateral folds and one proximal fold. The subungual space is a potential space beneath the nail and includes the nail matrix, nail bed, and dermis, which is composed of two layers: the papillary dermis (deep layer) and the reticular dermis (superficial layer). This space is very small (1-2 mm thick) and is rich in glomus bodies and blood vessels, with dense innervations, especially in the reticular dermis. Various types of tumors can affect the subungual space and includes benign solid tumors (glomus tumor, subungual exostosis, soft-tissue chondroma, keratoacanthoma, hemangioma, lobular capillary hemangioma), benign cystic lesions (epidermal and mucoid cysts), and malignant tumors (squamous cell carcinoma, malignant melanoma) [1].
Imaging features

At ultrasonography (US), a glomus tumor usually manifests as a nonspecific, solid, hypoechoic mass beneath the nail (Figures 2 and 3), hypervascular at color Doppler imaging (specific for the diagnosis), and can be associated with erosion of the underlying phalangeal bone [1, 4]. A negative study should not rule out the presence of a small-sized tumor, and investigation should proceed with surgical exploration in the setting of a well-established clinical suspicion [4].

Magnetic resonance (MR) imaging features include intermediate or low signal intensity on T1-weighted images, marked hyperintensity on T2-weighted images, and strong enhancement after the injection of gadolinium-based contrast material (Figure 4 and 5) [1, 4].

Treatment

Treatment of glomus tumours is purely surgical. The major concerns are the risk of nail deformity and recurrences (Figure 6) that range from 4% to 15% related by various authors.

Two main approaches for the surgical excision of glomus tumours are transungal and lateral (lateroungual or laterodigital Keyser-Littler approach) (figure 5). Transungal approach provides a better view of the whole subungual region and makes precise and complete excision possible. It is also useful when the exact location is not known beforehand.

Incomplete surgical removal may lead to persistent/recurring pain. Reports have indicated a higher rate of the nail plate deformity with transungal approach when compared to lateral approaches. This may be because of the nail bed incongruities created during the excision, or formation of adhesions between matrix and PNF. Careful handling of tissues during surgery and meticulous repair of the defect created by excision can largely prevent this outcome [5].

TENOSYNOVIAL GIANT CELL TUMOR

Tenosynovial giant cell tumor (localized and a diffuse form) is a mostly benign proliferative process. In the past, it was also known as pigmented villonodular tenosynovitis (PVNTS) of the tendon sheath, localized or focal nodular synovitis, or giant cell tumor of the tendon sheath [6].
Tenosynovial giant cell tumor represents a benign, hypertrophic synovial process characterized by villous, nodular, and villonodular proliferation and hemosiderin pigmentation. These components vary in predominence from lesion to lesion [7].

Although uncommon, hands and wrists are the sites most affected by the giant cell tumor (65%-89% of cases) [6,8].

Clinical symptoms include a soft-tissue mass and pain, whereas joint dysfunction or swelling are unusual [6].

Patologically, it manifests as a circumscribed, lobulated, cauliflower-like, nodular soft-tissue mass that is attached to the tendon sheath [7].

**Anatomy**

The tendons of the wrist are divided into two main groups: the flexor tendons and the extensor tendons. The extensor tendons are divided into six compartments and each compartment have its own separate tenosynovial sheath [6].

**Imaging features**

At US, it usually appears as a homogeneous hypoechoic mass adjacent to a tendon. The adjacent tendon is usually normal. There is often internal vascularity visible at Doppler imaging (Figure 8) [6].

At MR imaging, tenosynovial giant cell tumor appears as a focal mass, often adjacent to or surrounding a tendon. It has intermediate or low T1 and T2 signal intensity and shows enhancement with contrast medium administration (Figure 9). Heterogeneous high T1 and T2 signal intensity can also be seen in these lesions. If there is hemosiderin deposition within the mass, it can show susceptibility artifact (blooming) on gradient-echo [6].

**Treatment**

Treatment of PVNS is required to prevent progressive loss of function and destruction of the involved joint (in diffuse intraarticular disease) or the tendon or bursa (in localized extraarticular disease). Treatment options include surgical resection, radiation therapy, pharmaceutical modulation of the disease, or a combination of these approaches . Surgical excision is the preferred method of treatment for all forms of PVNS
and can be performed by arthroscopy or open arthrotomy. Open arthrotomy with synovectomy increases the likelihood of complete resection of disease but usually requires immobilization and a longer recovery (Figure 10) [7].

EXTENSOR TENDON INJURIES

Injuries to the extensor mechanism of the finger are common because it consists of thin, superficially located structures. These anatomic structures predispose tendons to lacerations and also to closed tendon injuries, including avulsion [9,10].

Injury patterns are differentiated into open or closed, sharp or blunt, traumatic or degenerative lesions. Closed tendon injuries are quite common including the "mallet finger", the "boutonnière deformity", avulsions and injuries to the connexus intertendineus [11].

Anatomy

The extensor tendons reach the hand by passing through fibro-osseous tunnels or dorsal compartments in the wrist. Near the midportion of the metacarpals, the extensor tendons are interconnected by the juncturae tendinum, which prevent independent extension of the digits.

At the metacarpalphalangeal (MCP) joint, these extrinsic tendons are stabilized over the dorsum of the metacarpal head by the extensor hood [9].

The extensor tendons are divided into six compartments. Each compartment has its own separate tenosynovial sheath (Figures 11 and 12)[6].

The first compartment contains the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) tendons. The APL originates at the mid-ulna and inserts onto the base of the first metacarpal bone. It serves to abduct and extend the thumb. The EPB tendon originates at the lateral epicondyle of the distal humerus and inserts at the base of the first proximal phalanx. It extends the proximal phalanx across the first carpal-metacarpal joint [6].

The second compartment contains the extensor carpi radialis longus and extensor carpi radialis brevis tendons. The extensor carpi radialis longus originates from the supracondylar lateral distal humerus and inserts at the base of the second metacarpus. The extensor carpi radialis brevis tendon originates from the lateral epicondyle of the distal humerus and inserts at the base of the third metacarpus. Both of these muscles extend and abduct the hand at the level of the wrist [6].
The third compartment contains the extensor pollicis longus tendon, which originates at the mid-ulna and inserts at the base of the first distal phalanx. In combination with the EPB tendon, it extends the thumb at the first carpometacarpal and first interphalangeal joints.

The fourth compartment contains the extensor digitorum and extensor indicis tendons. The extensor digitorum tendon originates from the lateral epicondyle of the distal humerus, divides into four distinct tendons, and then inserts onto the middle and distal phalanges of the second, third, and fourth fingers. It serves to extend the hand at the wrist and extend the fingers at the metacarpophalangeal (MCP) joints. The extensor indicis originates from the posterior ulna and inserts onto the middle phalanx (anatomically the extensor expansion) of the second digit, helping to extend the second digit [6].

The fifth compartment contains the extensor digiti minimi tendon, which originates from the lateral humeral epicondyle and attaches onto the middle phalanx (extensor expansion) of the fifth finger. It extends the fifth finger at the MCP and interphalangeal joints [6].

The sixth compartment contains the extensor carpi ulnaris (ECU) tendon, which originates from the lateral humeral epicondyle and posterior ulna. It inserts onto the base of the fifth metacarpal and serves to extend and adduct the hand at the level of the wrist [6].

The extensor mechanism of the fingers is also divided into topographic zones, which extend from the forearm to the distal phalanx providing a background for understanding and predicting the results of injuries at any level. The type of injury, deformity, and surgical outcome will be different according to the affected anatomic regions. The most widely accepted system is the Verdan's zone System that is divided into 8 zones [10].

**Imaging features**

The modalities of choice for evaluation of finger soft tissues include MR imaging and US [12].

In general, normal ligaments and tendons have low signal intensity on MR images, and appears as long bright echogenic fibrillated structures at US. Disruption manifests as increased signal intensity at MR images [9], and hipoecogenicity at US (Figures 13 and14).

**Treatment**
Treatment may be either conservative or surgical, according to the type of lesion (partial or complete laceration), location and symptomatology.

In total laceration, the treatment of choice is tendinous surgical suturing (Figure 15) [9]. In partial lesions, splinting of the joint may be performed, but surgical reconstruction is the treatment of choice for chronic symptomatic cases.

SAGITTAL BAND LESION (BOXER'S KNUCLE)

Sagittal band injuries occur as a result of a direct blow or forced flexion of the finger, often with ulnar deviation. At physical examination, the patient will often have swelling at the dorsal aspect of the MCP joint and an inability to fully extend the finger (Figure 16) [12].

Tendon dislocation can occur also in individuals who have inflammatory joint disorders (eg, rheumatoid arthritis) that attenuate or disrupt the sagittal bands, and in individuals with congenitally deficient or absent sagittal bands. [13]

Boxer's knuckle refers to sagittal band disruption, enabling extensor tendon instability, which can be associated with MCP capsular tears and even articular cartilage damage. The term "boxer's knuckle" came about due to a high incidence of the injury among boxers, often incurred when landing a punch [14].

Anatomy

The extensor hood is an aponeurotic sheet overlying the MP joint. It comprises the central extensor tendon and two distinct transverse peripheral fibers termed sagittal bands.

The ulnar sagittal band and the radial sagittal band arise from the palmar plate and the intermetacarpal ligament at the neck of the metacarpal bone. The sagittal bands have a superficial thin layer that crosses the dorsal surface of the tendon and unites with fibers on the other side, and a thicker deep layer on both sides of the tendon that forms a groove to hold tendon in place [13].

Imaging features

Dynamic US performed with the patient alternately extending and flexing the MCP joint depicts the position change of the common extensor tendon as it occurs (Figure 17) [12, 13].
Magnetic resonance images shows deformity of the sagittal band with increased T2 signal intensity of the soft tissues at the site of injury and disruption of the thin low-signal-intensity sagittal band with intervening fluid signal intensity in complete tears [12].

Treatment

The treatment in acute injuries is splinting of the MCP joint in extension. Surgical intervention may be required in chronic injuries that are symptomatic [12].

FLEXOR TENDON INJURIES

The flexor tendons are less commonly injured than the extensor tendons, because they are more protected by their deeper location within the hand. Laceration of the tendons within their midsubstance is more common than avulsion at osseous insertions [13].

As in the extensor tendons, the injuries may be partial or complete. Clinical diagnosis of partial lacerations is difficult because the physical signs are nonspecific. Clinical diagnosis may be easy in complete lacerations, but assessment of the degree of proximal retraction of the tendon may be difficult, as the tendon can sometimes be displaced as far as the palmar fold [9]

Anatomy

The digital flexor tendons pass through the carpal tunnel before spreading out in the palm toward their respective fingers. Each finger has two flexor tendons: the flexor digitorum superficialis (FDS), which inserts on the midportion of the middle phalanx, and the flexor digitorum profundus (FDP), which lies volar to the FDS and inserts on the volar base of the distal phalanx [9]. The floor of the fibro-osseous canal is the volar aspect of the phalanges and the volar plates of the MCP and interphalangeal joints. The fibrous portion of the canal consists of five

annular pulleys (A1-A5), which are transverse, well-defined areas of thickening of the tendon sheath, and three cruciform pulleys (C1-C3),

which are formed by crisscrossing fibers of the components of the annular pulley [6,9]

Imaging features
Ultrasonography and magnetic resonance imaging can help to differentiate between complete and partial lacerations, with an appearance similar to that of extensor tendon injuries (Figures 18, 19 and 20) [13].

MR imaging is an accurate method to diagnose tendon disruption and to visualize the locations of the ends of the lacerated tendon. This technique may also provide additional information about the degree of injury, thus allowing differentiation of partial and complete lacerations [9].

**Treatment**

The treatment of choice for complete lacerations is surgical repair. It remains controversial the best treatment for partial tendon lacerations, therefore conservative treatment is recommended in several cases [9].

**VOLAR PLATE INJURIES**

Volar plate avulsion injuries are caused by joint hyperextension or dislocation, most commonly at the PIP joint [12]. They can be isolated or associated with other injuries such as collateral ligaments tears [14], and are categorized into three types: type I, avulsion of the distal aspect of the plate; type II, greater involvement of the surrounding soft tissues, which can cause subluxation of the joint; and type III, injury with associated fracture and dislocation [12].

Patients typically have tenderness along the volar surface of the joint and may have great difficulty holding the finger in a hyperextended position [14].

**Anatomy**

The proximal interphalangeal (PIP) joint is a hinged joint with a bicondylar anatomy that allows a wide range of flexion and extension movements. The main stabilizers of the joint are the surrounding soft tissues, especially the collateral ligaments and the volar plate [9].

The volar plate is a thick fibrocartilaginous structure that constitutes the palmar aspect of the PIP joint capsule. Distally, it is firmly attached to the volar lip of the base of the middle phalanx, and it prevents hyperextension of the PIP joint [9,12].

**Imaging features**
At MR images, the volar plate appears as a low-signal intensity structure best seen in a sagittal plane [9]. MR imaging findings of injury to the volar plate include nonhomogeneous signal intensity on T1- and T2-weighted images, together with thickening and contour irregularities. Disrupted attachment with a gap is observed when avulsion of the volar plate takes place, also seen at US (Figures 21, 22, and 23) [9].

Treatment

Surgery is required for avulsion fractures involving at least 40% of the articular surface, marked joint subluxation, and volar plate interposition in the joint space [12].

COLLATERAL LIGAMENTS INJURIES

Collateral ligaments injuries are related to axial loading and dorsiflexion. The radial collateral ligament is frequently injured, usually at its proximal insertion. Most injuries are incomplete tears associated with minimal instability.

Anatomy

The ligaments that surround each MCP, PIP, and distal interphalangeal (DIP) joint are all similar in configuration. For each joint, there is both a radial collateral ligament (RCL) and an ulnar collateral ligament (UCL), each of which is further subdivided into a proper collateral ligament and an accessory collateral ligament. The proper collateral ligament is taut in flexion, whereas the accessory collateral ligament is taut in extension. These components of the collateral ligaments are difficult to distinguish on conventional images [9,12].

Imaging features

MR and US images may show diffuse ligament swelling and thickening with intrasubstance tears. In complete tears, both imaging modalities can demonstrate ligament detachment or frank discontinuity with extracapsular fluid leakage (Figures 24, 25 and 26) [14].

Treatment
Surgery is required for those who fail to recover with conservative treatment and for index finger RCL injuries [12].

**FINGER PULLEY INJURIES**

Lesions of the pulley system are recognized with increasing frequency due to the growing popularity of activities, such as rock climbing, that impose extensive stress on the supporting structures of the hand and fingers [9].

The A2 annular pulley is the most commonly injured pulley ("climber’s finger"), followed by A3, A4, and A1 [12,14].

In annular pulley tears, the flexor tendons instead of coursing along the concavity of the phalanges, lie at a variable distance from the bone. As a consequence, the ruptured pulley can be ascertained by identifying the site of maximal volar bowstringing: In A2 pulley tears maximal volar displacement is seen over the proximal phalanx, whereas in A4 pulley tears bowstringing occurs over the middle phalanx [14].

**Anatomy**

The pulley system is made up of five annular and three cruciate pulleys through which the flexor tendons glide [14]. The main function of the annular pulleys is to fix the tendon sheaths to the bony skeleton, thus stabilizing the tendon during finger flexion and avoiding palmar "bowstringing". The cruciform pulleys are designed to permit deformation of the tendon sheath during flexion without impingement of the tendon itself [9].

**Imaging features**

US and MR imaging allow the assessment of pulley system lesions. It can be directly demonstrated by increased intrasubstance signal intensity and edema within the pulley itself or disruption of its fibers (Figures 27 and 28) [12].

**Treatment**

Surgery is required for A2 annular pulley tears, otherwise, conservative management is appropriate [12].
RHEUMATOID TENOSYNOVITIS

The tendons about the wrist are surrounded by a synovial sheath, and are at risk for synovium-based inflammatory processes, including reumathoid arthritis (RA), an autoimmune process usually centered on the synovium of the wrist and hands [6,15].

Dorsal extensor compartments of the wrist are more commonly involved than the volar compartment in early rheumatoid arthritis. The extensor carpi ulnaris tendon seems to be the most frequently involved [15].

There is no single clinical manifestation, laboratory test result, or imaging finding that allows a diagnosis of rheumatoid arthritis to be made with certainty. As with other autoimmune rheumatic diseases, diagnosis depends on the aggregation of characteristic signs and symptoms, laboratory data, and radiologic findings [12].

Imaging features

At US, tenosynovitis appears as thickened echogenic areas often surrounded by tenosynovial fluid (Figure 29). Power Doppler US is a useful tool to show hyperemia associated with the inflammation [6].

At MR imaging, RA involvement of the tendons manifests with synovial hypertrophy, soft-tissue thickening and inflammatory changes as well as presence of tendon sheath fluid. This may eventually result in formation of a discrete tenosynovial pannus. The inflamed synovium can demonstrate intense enhancement after administration of contrast medium. Attenuation of the tendon is a worrisome sign for possible impending rupture [6].

Treatment

The management of rheumatoid arthritis is conservative and involves two main steps:

(a) starting treatment as early as possible, and (b) assessing disease activity frequently to achieve tight control.

To prevent irreversible damage to joints, the diagnosis must be confirmed or excluded within a few months of the onset of synovitis (preferably within 3-6 months of the onset of joint symptoms) [12].
FOREIGN BODY

Accidental penetration of foreign bodies in the hand is common particularly in labor class and most of the times they are removed without any sequelae. However, if missed initially, these foreign bodies may get retained in the tissues to remain asymptomatic or result in wide range of complications including pain, abscess, chronic discharging wound, necrotizing fasciitis, bone and joint destructive lesions, granulomas with impairment of tendon mobility or triggering of digits, migration, delayed tendon ruptures, neurodeficits, pyogenic granulomas, and vascular events. Missing the foreign bodies is not uncommon and this entity is deemed as one of the major causes of medical litigation [15, 16].

In general, current literature states that neurovascular (or potential) injury, tendon laceration, cosmetic deformity, functional impairment, and chronic pain are indications for wound exploration and foreign body removal. Contraindications to removal include deep embedding or inaccessibility, unacceptable iatrogenic risks to neurovascular structures during the retrieval process, minute size, inert material, and asymptomatic presentation [17].

Imaging features

Ultrasound imaging is useful particularly in the detection of non-radiopaque foreign bodies (not seen in conventional radiography), and can provide guidance for removal of foreign objects if they are not readily found at surgery (Figure 30). Computed tomography (CT) and magnetic resonance imaging may be used in rare instances if other studies have failed to detect a suspected foreign object, particularly a small wood or wood-like fragment. CT and MR are the best studies to evaluate complications of retained foreign bodies [18].
Images for this section:

**Fig. 1:** Glomus tumor visible on the nail surface (red arrow).

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**Fig. 2:** In (A) glomus tumor visible on the nail surface (red arrow). US images demonstrate the glomus tumor beneath the nail plate (B). In (C) the Power Doppler shows internal vascularity of the nodule (red arrow).

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**Fig. 3:** Ultrasound image shows focal thickening in the ulnar side of the distal phalanx of the right fourth finger with erosion of cortical bone (red arrow).

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Fig. 4: Coronal (A) and axial (B) Fat Sat PD-weighted MR image demonstrates small glomus tumor as a hyperintense, well-defined nodule at the distal phalanx of the right fourth finger (red arrows).

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**Fig. 5:** (A and B) axial in Fat Sat PD-weighted MR image demonstrate glomus tumor as a hyperintense, well-defined nodule at the distal phalanx (red arrows). Same lesion demonstrated in Fat Sat PD-weighted MR image sagittal plane (red arrow in C) and in T1 MR image coronal plane (red arrow in D).

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Fig. 6: Images from the same patient show recurrence after surgery.

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Fig. 7: Surgical excision of a glomus tumor.

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Fig. 8: Axial ultrasound images without (A) and with Power Doppler examination (B) shows Giant Cells tumor as solid, lobulated nodule (N), with increased vascularity, in the right fifth finger, surrounding the flexor tendon (T). Sagittal T1-weighted image (C) demonstrates the same aspect in correlation with ultrasound. External appearance (D).

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Fig. 9: Coronal T1 weighted MR image (A) shows giant tumor cell in the fifth finger. In (B) sagittal Fat Sat PD-weighted MR image demonstrate tumor contrast enhancement. Same lesion is also visible at US (C).

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Fig. 10: Surgical procedure to remove a giant cell tumor. (A and B) external appearance. (C) Giant cell tumor excision. (D) After the tumor removal.

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Fig. 11: Schematic drawing shows the six compartments of the extensor tendons and their tenosynovial sheath.

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Fig. 12: Schematic drawing demonstrates a simplified anatomy of the distal insertion of the extensor tendons.

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**Fig. 13:** Sagittal ultrasound images (A and B) show avulsion fracture of the extensor tendon of the distal phalanx (red arrows). FD = Distal phalanx, FM = phalanx media.

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**Fig. 14:** US images demonstrate ruptured long extensor tendon of the thumb (B) compared to normal contralateral appearance of this tendon (A). Axial sections show normal extensor tendon (C, red arrow) close to Lister’s tubercle (*) and absence of the extensor (D, red arrow) tendon in the same topography.

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Fig. 15: Surgical treatment for ruptured extensor tendon (tendon suture) (red arrow).

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Fig. 16: At the metacarpophalangeal joint, the extensor tendons are stabilized by the extensor hood and particularly by the sagittal band (A). Subluxation or dislocation of the extensor tendon occurs as a result of a tear in the sagittal band (B). ET, extensor tendon; SB, sagittal band.

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**Fig. 17:** US image shows rupture of the sagittal band of the third right finger/luxation of the extensor tendon (red arrow).

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Fig. 18: Ultrasound sagittal image shows flexor tendon avulsion fracture of the fifth finger (A) (red arrows). Normal aspect of the flexor tendon (B).

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**Fig. 19:** Sagittal (A) and axial (B) ultrasound images show flexor tendon fibrosis after dog bite (red arrows) evolving with numbness and flexion deficit.

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**Fig. 20:** US image shows partial rupture of the flexor tendon of the third finger after cutting accident (red arrow).

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**Fig. 21:** Sagittal ultrasound images show normal aspect of the volar plate of the fifth right finger (A) and rupture of the contralateral volar plate (B), (red arrows).

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**Fig. 22:** External appearance of the volar plate injury in the fourth finger (A). Sagittal Fat Sat, PD-weighted MR image (B) and ultrasound image (C) shows volar plate injury of the proximal interphalangeal joint (red arrows) in the same patient.

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**Fig. 23:** Ultrasound Image (A) and STIR MR image, sagittal (B) and coronal (C) view show volar plate injury of the DIJ (A and B) and collateral ligaments injury of the PIJ (C, red arrow) in the same patient.

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Fig. 24: Ultrasound images show torn ulnar collateral ligament of the right thumb’s metacarpophalangeal joint with proximal retraction of the ligament fibers which looks like a small mass (Stener lesion) (A and B) (red arrows). Normal aspect of the ulnar collateral ligament on the left (C) (yellow arrow).

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Fig. 25: Ultrasound image (A) and STIR MR image, coronal view (B) show collateral ligaments injury on the third finger (red arrows).

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Fig. 26: Coronal Fat Sat, PD-weighted MR image of the thumb shows ulnar collateral ligament rupture, proximal retraction of the stump associated with interposition of the adductor aponeurosis/adductor pollicis muscle (Stener lesion).

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**Fig. 27:** Axial (A) and sagittal (B) ultrasound images demonstrate flexor tendon thickened and hypoechoic secondary to the tendon-pulley conflict.

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**Fig. 28:** Ultrasound images demonstrate thickened A1 pulley (red arrows) of the thumb in sagittal (A) and axial view (B), and signs of tenosynovitis in (A) (yellow asterisk).

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**Fig. 29:** Ultrasound image shows synovial thickening of the fourth right finger (red arrows).

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**Fig. 30:** Axial Fat Sat, T1-weighted MR image (A) demonstrates linear hypointense focus located in the subcutaneous fat in the radial aspect of the left second finger (red arrow) corresponding to glass pieces (Pasteur pipette), also seen in axial ultrasound image (B).

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Conclusion

Imaging, particularly magnetic resonance, plays an important role in the diagnosis of hand lesions and radiologists should be familiar with the imaging features that may provide prompt recognition and proper characterization of specific injuries.
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