Sonographic diagnosis of an acute Stener lesion: a case report

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Abstract This case report describes the use of diagnostic ultrasound to diagnose a Stener lesion in a patient who presented for conservative care of thumb pain following a fall on an outstretched hand. Conventional radiographic images demonstrated an avulsion fracture at the ulnar aspect of the base of the first proximal phalanx. Diagnostic ultrasound revealed a torn ulnar collateral ligament of the thumb that was displaced proximal to the adductor aponeurosis, consistent with a Stener lesion. Dynamic imaging with ultrasound confirmed displacement of the fully torn ligament. Surgical repair followed the diagnosis. Diagnostic ultrasound in this case provided an accurate diagnosis obviating further imaging. This allowed an optimal outcome due to early intervention.

Keywords Stener lesion · Ulnar collateral ligament · Thumb · Adductor aponeurosis · Ultrasonography

Sommario Il caso che presentiamo descrive l'uso dell'ecografia nella valutazione della lesione di Stener in un paziente che si è presentato con pollice dolorante, a seguito di caduta a mano tesa. Le immagini radiografiche

convenzionali avevano mostrato una frattura da avulsione dell lato ulnare della base della falange prossimale. La diagnosi ecografica ha rivelato una rottura completa del legamento collaterale ulnare metacarpo-falangeo del pollice, ribaltato sull' aponeurosi dell'adduttore (lesione di Stener). L'imaging dinamico con ecografia ha confermato il ribaltamento del legamento lacerato. In seguito alla diagnosi è stata eseguita riparazione chirurgica. In questo caso la valutazione ecografica si è rivelata utile per una diagnosi accurata, evitando ulteriori indagini ed ha permesso di ottenere un risultato ottimale con l'intervento immediato.

Introduction

The ulnar collateral ligament (UCL) of the thumb spans the medial aspect of the first metacarpophalangeal joint (MCPJ) and stabilizes the joint against valgus stress [1]. Normally, the UCL lies immediately deep to the adductor aponeurosis (Fig. 1a, b, Online Resource 1). If sufficient hyperabduction and hyperextension forces are directed at the first MCPJ, compromise of the UCL is likely. Injury to the UCL of the thumb is common, estimated as high as 200,000 cases annually [2]. Varying degrees of ligamentous tears may be present, ranging from mild sprain to complete rupture [3]. Stener further described full-thickness tears as being non-displaced or displaced in relation to the aponeurosis of the adductor pollicis muscle, with the latter being given the eponymous term “Stener lesion” [4]. Less severe injuries may be treated conservatively, whereas Stener lesions require acute surgical intervention for optimal outcomes [5]. This case report features the dynamic capability of diagnostic ultrasonography (US) in evaluating a Stener lesion, thereby allowing for prompt surgical

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Fig. 1 **a** Illustration depicts deep skeletal and ligamentous structures of the left hand. Highlighted is the area of interest involved in a Stener lesion. **b** *Inset* reveals selected normal anatomy of the thumb. As depicted, the adductor aponeurosis (*double arrowheads*) is normally superficial to the ulnar collateral ligament of the thumb (UCL). Also labeled is the adductor pollicis muscle (AdP). **c** *Inset* reveals a Stener lesion. The ulnar collateral ligament (UCL*) is torn and dislocated from its normal position. In a Stener lesion, as illustrated, the UCL is displaced superficially relative to the adductor aponeurosis (*double arrowheads*). Also labeled is the adductor pollicis muscle (AdP)

intervention and a successful outcome. Furthermore, this report adds to the body of literature supporting US as the primary imaging modality in injuries of the UCL of the thumb and provides examples of dynamic imaging in injured and uninjured UCLs.

Case report

The patient gave written consent for educational usage of de-identified images and clinical data.

A 48-year-old female fell on an outstretched hand and suffered hyperabduction and hyperextension of her left thumb. She presented 2 days later with a chief complaint of left hand and thumb pain. Radiographs obtained 2 days following the injury revealed an avulsion fracture of the first proximal phalanx on the ulnar aspect at the MCPJ (Fig. 2). Diagnostic US (GE Logiq E9, GE Healthcare, Milwaukee, WI, USA) obtained 10 days following her injury revealed absence of ligamentous fibers at the ulnar aspect of the first MCPJ and a heterogeneous soft tissue mass proximal to the MCPJ representing the displaced and folded UCL (Fig. 3). Importantly, dynamic US during passive flexion of the interphalangeal joint demonstrated that the torn UCL was displaced from beneath the adductor aponeurosis (Online Resource 2). Based on the US examination, the injury was identified as a Stener lesion and surgical referral was initiated.

The patient had surgery 19 days after the initial injury. The surgical report confirmed the US findings and surgical repair was uneventful.

Fig. 2 Zoomed-in view of a conventional radiograph of the thumb demonstrates an avulsed fragment (*arrow*) from the base of the first proximal phalanx. Note the proximity of the normal sesamoid bone (*asterisk*)

Fig. 3 **a** Ultrasound image in the coronal plane along the ulnar aspect of the first MCP joint demonstrates an intact UCL (*asterisk*). The adductor aponeurosis (*arrowheads*) is superficial to the normal UCL. The proximal free edge of the aponeurosis is noted (*arrow*). Also labeled are the first metacarpal head (MC) and base of the first proximal phalanx (P). **b** Comparable US image demonstrates a heterogeneous soft tissue mass (*asterisk*) representing the displaced UCL proximal to the free edge (*arrow*) of the adductor aponeurosis (*arrowheads*)

Discussion

Tears of the UCL of the thumb may be partial or complete, displaced or non-displaced, and may include an avulsed fragment, usually from the proximal phalanx [3].

The Stener lesion can be simply defined as a displaced, full-thickness tear of the UCL at the first MCPJ. The torn ligament is displaced proximally and may sometimes rest superficial to the adductor pollicis aponeurosis (Fig. 1c, Online Resource 2) [4]. Distinction between displaced and non-displaced tears is clinically relevant because the adductor aponeurosis acts as a barrier to healing in displaced tears [1]. Although physical examination may demonstrate instability of the MCPJ with valgus stress testing, it cannot distinguish between displaced and non-displaced UCL tears [6]. Also, stress testing may transition a non-displaced tear into a displaced tear during valgus stress testing of the joint [7]. Additionally, the differential for post-traumatic first MCPJ pain includes fractures of the base of the proximal phalanx, joint effusion, flexor pollicis longus tenosynovitis, and extensor hood injury [6]. Therefore, diagnostic imaging is often utilized to render an accurate diagnosis.

Although magnetic resonance (MR) arthrography is currently considered the gold standard for evaluating injuries of the UCL [8], US has several advantages that make it a useful tool in the workup of UCL injuries. Ultrasound can identify partial or full-thickness tears and, importantly, can distinguish between displaced and non-displaced ligament tears [6, 9]. Recent studies have shown US to have 100 % sensitivity, specificity, and accuracy in identifying non-displaced tears [10] and differentiating between displaced and non-displaced tears of the UCL [11]. The dynamic capacity of US allows for easy identification of the adductor aponeurosis as it glides over the normally stationary UCL with passive flexion of the thumb at the interphalangeal joint (Online Resource 1), a technique that was thoroughly described by Melville et al. [11, 12]. In Stener lesions, dynamic examination easily demonstrates the proximal displacement of the UCL in relation to the adductor aponeurosis (Figs. 1c, 3b, Online Resource 2) [11, 12]. In addition to these positive aspects, US is more time and cost effective and less invasive when compared to MR arthrography [3, 9]. Another advantage is its capability to quickly image the contralateral (uninjured) side for comparison [6]. Moreover, US eliminates the need for stress radiography [13] as it can directly visualize the insertion of the UCL under stress maneuvers and with less force than would be required during physical exam or stress radiography [14]. Non-stress radiography may still be necessary in the workup of UCL injuries to detect avulsion fractures [15].

Limitations are inherent in a case report and generalization of the diagnostic findings and treatment outcomes will not necessarily apply to a larger population. Also, no other advanced imaging was performed, so no comparison could be made in that respect. However, the US diagnosis was confirmed at surgery.

In conclusion, dynamic US imaging was indispensable in this case demonstrating a Stener lesion and allowing for prompt surgical intervention and an optimal outcome. Considering the low cost and high diagnostic yield of a dynamic US examination, future work should continue to explore its benefits over MR arthrography in evaluating UCL injuries of the thumb.

Compliance with ethical standards

Conflict of interest The authors declare they have no conflicts of interest to disclose.

Informed consent The patient provided written informed consent for the inclusion of information that could potentially lead to her identification.

Human and animal studies The case presented does not include any experimental procedures involving humans or animals.

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