

Case Series

A case series of Stener's lesion of the first metacarpophalangeal joint

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ABSTRACT

Ulnar collateral ligament (UCL) injuries have a high prevalence however; these are usually being missed in the initial clinical evaluation. Depending on the chronicity of the injury there are two acronyms for UCL tear. One is the skier's thumb and the other is the gamekeeper's thumb. If the UCL of the first metacarpophalangeal joint (MCP joint) has a complete tear with entrapment of aponeurosis of adductor pollicis muscle between the MCP joint and torn ligament, is called a Stener's lesion. This is a rare clinical entity that requires early surgical correction because of entrapment. The mechanism of injury is the coerced abduction of the thumb from the index finger, causing ligament tears or sprain with or without ensuing avulsion fracture. The incidence of Stener's lesions associated with UCL rupture has been reported to be up to 52% per intra-operative finding. In Stener's lesions, the UCL tears from the base of the proximal phalanx (PP) then retracts proximally and displaces superficial to the adductor pollicis. Here we are presenting four cases of Stener's lesions, with the usefulness of magnetic resonance imaging (MRI) in diagnosing this entity, which can prevent possible long-term complications such as chronic pain, joint degeneration, and joint instability.

Keywords: UCL, Skier's thumb, Stener's lesion, Gamekeeper's thumb

INTRODUCTION

Ulnar collateral ligament (UCL) injury of the first MCP joint, earlier called Gamekeeper's thumb, was initially described in 1955 by Campbell et al as an occupational injury of Scottish gamekeepers.¹ The UCL of the thumb plays a salient role in preserving the lateral stability of the MCP joint of the thumb, resulting in fine movements like pinching and grabbing. The mechanism of injury is a coerced abduction of the thumb from the index finger, causing sprain or rupture of the ligaments with or without avulsion fracture, which can cause long-term problems if left untreated. There are two forms of injury; the skier's thumb and the game keeper's thumb. Skier's thumbs commonly occur in hyperextension injuries such as injuries during skiing, rugby, and other collision sports and are associated with twisted thumb injuries. This injury is reported even after a strong handshake. The game keeper's thumb is either a form of acute injury or due to repeated chronic valgus stress. Acute valgus stress on the first MCP

joint can cause a UCL tear with an avulsion fracture of the base of the PP known as a Stener's lesion.^{2,3}

CASE SERIES

Case 1

A volleyball player presented to our hospital for a left thumb injury that occurred during his game. The injury resulted from the volleyball being pushed into the left thumb after he had a high-speed catch and developed acute pain, swelling, and decreased range of motion. Before evaluating or testing for stability, radiographs were taken to exclude fractures of either the PP or metacarpal. After giving support to the injured hand through a splint, an MRI of the same hand was performed, this revealed complete avulsion of the base of the PP of the thumb and torn UCL distal attachment. The ligament was retracted and flipped to the adductor pollicis aponeurosis consistent with a Stener's lesion (Figure 1 A-D).

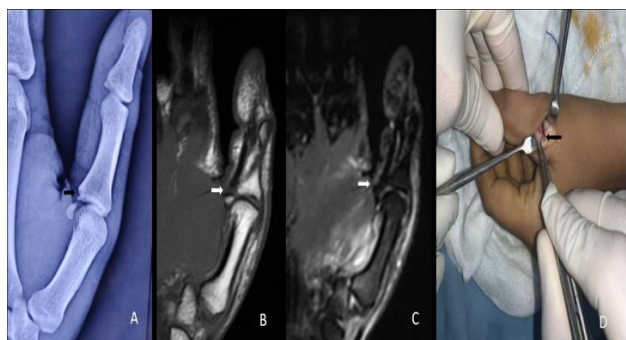


Figure 1 (A-D): A volleyball player presented with a left thumb injury during his game. Plain radiograph showing fracture of base of PP of left thumb (black arrow). MRI of left hand. T1 weighted image in coronal plane, PDFS sequence coronal plane illustrating ulnar collateral ligament avulsion with retraction and flipping of adductor pollicis aponeurosis (white arrow). Intra-op of dorso-ulnar approach for identification of avulsed ligament (held in forcep) (thick black arrow) for repair.

Case 2

A young boy in his 20s fell on his left hand while playing. He developed immediate swelling and redness and had instability of the MCP joint of his left thumb. Radiographs revealed a minimally displaced avulsed fracture of the base of PP. An MRI of hand was done, which showed complete avulsion of the distal attachment of the UCL of thumb, with retraction of UCL superficial to adductor pollicis aponeurosis, giving distinctive appearance of ‘Yo-yo on string’ sign (it is the sign denotes the typical appearance of torn, proximally retracted and superficially displaced UCL). There were few areas of bone marrow edema observed in the distal 1st metacarpal and base of PP of thumb. Features typical for Stener’s lesion (Figure 2 A-D).

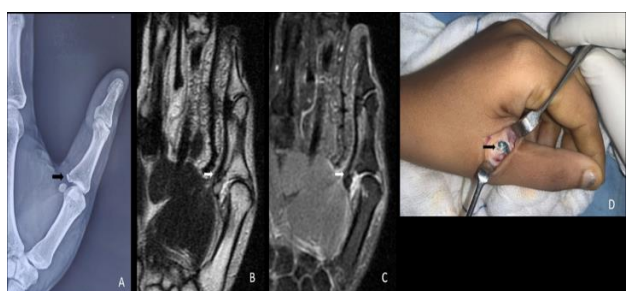


Figure 2 (A-D): A young boy fell on his left hand while playing, plain radiograph showing fracture of base of PP of his left thumb (black arrow). MRI of left hand, T2 weighted image coronal plane. PDFS sequence coronal plane illustrating fracture with surrounding marrow edema, ulnar collateral ligament avulsion with retraction, and flipping of adductor pollicis aponeurosis (white arrow). Fluid intensity is also noted around affected joint. Surgery done through dorso-ulnar approach and repair performed with an anchor suture (thick black arrow).

Case 3

A 29-year-old woman presented with a painful left thumb two days following a fall on her left hand in the bathroom. Clinical examination revealed a compromised UCL with significant radial deviation of the MCP joint on stress testing. Radiographs showed a bone fragment minimally displaced from the base of the PP. MRI confirmed the diagnosis as a Stener’s lesion (Figure 3 A-E).



Figure 3 (A-E): A 29-year-old woman presented with a painful left thumb two days following a fall on her hand. Clinical examination revealed a compromised UCL. Plain radiograph showing an undisplaced bony fragment from the base of the PP (white arrow). PDFS sequence in the coronal plane, T2W image in coronal plane confirming it as Stener’s lesion by illustrating the avulsed UCL ligament (white arrows). Intraoperative images showing the surgical approach for identifying the ligament and repairing by anchor suture.

Case 4

A 22-years-old female presented with left-hand pain and swelling with a history of falling over her outstretched hand while driving a scooter and an inability to use her left thumb. On clinical examination, soft tissue swelling, ecchymosis, pain on the base of her left thumb at the ulnar aspects, instability of the thumb, grip and pincer grasp weakness, and laxity with pain.

The radiograph revealed a fracture of the base of the PP of the left thumb. MRI was done to look for any ligament injury and found to have a UCL ligament complete tear with entrapment of aponeurosis of adductor pollicis muscle between the MCP joint and torn ligament confirming a stener’s lesion (Figure 4 A-C).

Treatment

Treatment for Stener's lesion is surgery, which should be done as soon as possible to avoid complications. Therefore, all the above four patients underwent surgery. Under brachial block with appropriate pressure and a tourniquet was inflated and operative parts were painted

and draped. The dorso-ulnar approach was taken with a longitudinal incision over adductor aponeurosis around 1-2 cm, and an avulsed ligament was identified. After that, bone was prepared for reattachment of the avulsed ligament with the help of 3.0 Ethibon and a 1.5 mm suture anchor used for reattachment for UCL. The dorsal capsule and adductor aponeurosis were repaired with 3.0 Vicryl, and closure was performed layer by layer; and for three weeks, a thumb spica was applied. Post-surgical rehabilitation included an active range of motion after three weeks, and patients were advised to resume work after 10 to 12 weeks. In complete, distal, first UCL tear, the aponeurosis of the adductor pollicis muscle can be interposed between the MCP of the joint and torn ligament. In case of acute Stener's lesion the treatment was repair of the UCL through direct suture, pull-out suture or suture anchor techniques. Ruptured ligament repair will be the aim of surgery and bony avulsion or chip fracture should be kept immobilized in cast, brace or splint to block thumb abduction for at least 4-6 weeks.



Figure 4 (A-C): A 22-year-old female presented with left-hand pain and swelling with a history of falling over outstretched hand while driving a scooter and inability to use her left thumb. Plain radiograph reveals a fracture of base of PP of left thumb (black arrow). On MRI, PDFS sequence in coronal plane shows ligament injury i.e., an avulsion of UCL ligament (white arrow) which signifies Stener's lesion.

DISCUSSION

The MCP joint is a diarthrodial joint that is mainly proficient in flexion and extension, but it can also rotate, adduct, and abduct. The amount of varus or valgus laxity and different positions of flexion is changeable in the thumb.⁴ The first MCP joint has few static and dynamic stabilizers. The static structures of the MCP joint are the ulnar and radial collateral ligaments, the volar plate, and the dorsal capsule. Dynamic stabilizers include extrinsic muscles of the thumb are the adductor muscles (extensor pollicis longus, extensor pollicis longus, adduction longus) and (extensor pollicis longus, extensor pollicis longus, extensor pollicis longus). These static and dynamic stabilizers in the thumb with proper and accessory ligaments productively work in different movements of this MCP joint, e.g., in flexion position, the dorsal capsule, and the proper collateral ligament are stretched while in extension, the accessory collateral ligament and the palmar

plate are tight. The adductor pollicis lies in the joint capsule as it gets inserted into extensor expansion through its aponeurosis. This aponeurosis is an important structure to look for UCL tears as it gets entrapped with the ligaments and requires different categories of treatment.⁵⁻⁷ Drawings show pathogenesis of Stener lesion. UCL is normally located deep to adductor aponeurosis (AA). After an acute abductive force to thumb, UCL is torn in consecutive figures, when thumb returns to neutral position, ligament may relocate superficial to AA, resulting in a Stener lesion (Figure 5 A-C).

These UCL injuries also occur in sports like rugby and other collision sports with a twisted thumb. Acute excessive stretching stress on the MCP joint of the thumb causes three types of injuries i.e., rupture of the ulnar collateral ligament, avulsion fracture (displaced or not) of the base of the PP, or both. The incidence of a Stener's lesion associated with rupture of the ulnar collateral ligament has been reported to be as high as 52% based on intraoperative findings. Despite advances in imaging and high clinical suspicion, Stener's lesions have been overlooked.

Due to the difference in treatment, there is a classification of this game keeper's thumb injury given. Type I is a non-displaced flexion stability fracture, usually treated with a cast or splint. Type II is a displaced fracture that requires surgical intervention. Type III, flexion-stable non-fractures require a splint or cast. Type IV is a non-fracture type that is unstable in flexion and requires surgery, unstable type IV requires a splint or cast while displacement fractures (including the volar plate). Type V is a displacement fracture type that includes a palm plate. It has flexion stability and comes with a splint or plaster.

Normal PA (posterior-anterior), oblique and lateral radiographs are suitable to evaluate metacarpal and phalangeal injuries. Half-supination and half-supination diagonal are also supportive views to assess metacarpal fractures. Phalanx fractures require special PA, oblique and lateral views of the injured digit. A thumb stress view can be performed when there is a surmise of UCL injury that can explain subluxation. A CT scan helps identify associated fractures (with or without displacement) at the base of the metacarpal bone. It is also important to identify the intra-articular extension, gap, and associated carpal fracture of the metacarpal base. Ultrasound has been successfully used to distinguish Stener's lesions from simple ulnar collateral ligament detachment but can be misleading and operator-dependent.⁷ Performing high resolution ultrasound in the long axis with dynamic imaging allows good visualization of the UCL and adductor pollicis aponeurosis. With use of appropriate technique and probe, ultrasound is highly accurate in diagnosing Stener's lesions.⁸

MRI is the modality of choice for evaluating the anatomical structure of small and complex soft tissues in the hand due to its high spatial resolution capability and

good contrast between soft tissues and bone components. In the case of partial tears, MR can show high signal intensity within UCL. If it ruptures completely, we will see disruption of UCL. MR may also show common relevant findings such as soft tissue edema, hemorrhage, avulsed bone fragments, and subluxation of the MCP joint. Spaeth discovered that MR was useful in detecting UCL displacement and described the mien of the "yo-yo on a string" sign which is substantial for Stener's lesions.⁹ Although the overall MR sensitivity of the Stener's lesions is 95% and the specificity is 94%.⁸ The coronal T1-weighted and proton density-weighted images (PDFS) were most useful for assessing the anatomic details and the integrity of the ligaments. The T2-weighted images are best for joint effusion and edema. Axial images were less useful for determining the extent of ligamentous injury. MR imaging can accurately show the anatomy of the first MCP joint, and MR findings can be used after acute rupture of the ulnar collateral ligament to distinguish a Stener's lesion from a non displaced or minimally retracted tear.¹⁰

CONCLUSION

In this case series of four patients with complete clinical, radiological-surgical details, we would like to emphasize that early diagnosis and surgical treatment are essential for these displaced ulnar collateral ligament ruptures. The presence of this Stener's lesion in the ulnar collateral ligament of the first MCP emphasizes the importance of post-traumatic MRI of the hand to ensure that similar patients are properly treated as early as possible to avoid long-term complications such as chronic pain, joint degeneration, and instability.

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