

A Repair of Sagittal Band for Subluxation of the Extensor Tendons at the Metacarpophalangeal Joint

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ABSTRACT

Introduction and Importance: Sagittal band (SB) injuries, often termed Boxer's Knuckle, are a significant cause of extensor tendon instability at the metacarpophalangeal (MCP) joint. These injuries are typically the result of trauma, leading to pain, swelling, and difficulty in finger extension. The radial sagittal band is more susceptible to rupture due to its thinner structure and greater exposure to radially directed forces. This report presents a case of a chronic SB injury following a boxing match, managed surgically.

Case Presentation: A 37-year-old male presented with a two-month history of a catching sensation and deformity in his third finger, following a boxing injury. He also experienced tingling in the left hand's ring and little fingers. Examination revealed an angulation deformity and limited range of motion in the hand and wrist. Previous imaging suggested a neglected fracture and dislocation. The patient underwent open direct repair of the extensor hood using a tendon graft, under regional anesthesia. Postoperative care included immobilization followed by dynamic splinting.

Clinical Discussion: SB injuries range from mild tenderness to complete tendon

dislocation. In this case, the severity and chronicity required surgical intervention. The use of a tendon graft was necessary to restore stability and function. Postoperative management focused on preventing recurrence and restoring mobility.

Conclusion: This case highlights the need for timely diagnosis and tailored surgical treatment in SB injuries. Early intervention and structured rehabilitation are crucial for optimal recovery, particularly in athletes, to prevent long-term functional deficits.

Keywords: Sagittal band injury, Boxer's Knuckle, extensor tendon instability, hand trauma, chronic injury, Sagittal band rupture, extensor hood repair, MCP joint subluxation, hand surgery, sports injury, extensor tendon dislocation, case report

INTRODUCTION AND IMPORTANCE

Sagittal bands are ligaments in the hand that arise from the volar plate and deep transverse metacarpal ligaments. This ligament stabilized extensor tendon that are part of the extensor tendon and help straighten the thumb and the other fingers. They are attached to near the metacarpal phalangeal (MCP) joints, of each finger. Sagittal bands are part of the extensor retinaculum system, which also the part of

the triangular ligament, transverse and oblique retinacular ligaments, and transverse aponeurotic fibers. Injury to the SB causes inflammation that leads to a persistent swelling, pain sensation, tenderness, and instability of extensor tendon. All of the symptom resulting in limitations to full active metacarpophalangeal (MCP) joint extension.¹

Injuries to the SB can occur from posttraumatic due to a direct blow or fall, such as a torn superficial layer or a rupture. A ruptured sagittal band can cause a catching sensation lead to the stiffness of the finger at the MCP joint when it straightened. This injury is also known as "Boxer's Knuckle". Instability of Ulnar-sided of tendon and dislocation are more common. The radial sagittal band are more often to be ruptured compared to the ulnar sagittal band because of a combination of thinner and longer radial sagittal band and more substantial ulnar-sided juncturae tendinum causing increased radially directed forces.²

The third metacarpal head had a prominence surface and looser attachment of the transverse fibers which have a higher possibility to injured compared with the other digits. Rayan and Murray classified sagittal band injuries into 3 types. Injuries of type I resulted in tenderness, but not instabilities of the tendon. A tendon subluxation is defined as lateral displacement of the tendon but maintaining contact with the metacarpal condyle in type II.³ Tendon dislocation in type III causes the tendon to be displaced within the groove between two metacarpal heads.⁴

Injuries to the sagittal band can be treated conservatively or surgically. A full-time neighbor strapping program can adequately treat a grade 1 sagittal band injury for up to a month. Splinting is required for grades 2 and 3. A variety of hand splints are described whose function is to hold the affected MCPJ in a neutral to extended position.⁵ Conservative treatment used for

acute, closed injuries with minimal pain or loss of function, and when trauma is not the cause, you can try conservative treatment. This involves immobilizing the injured finger in an extension splint for 1 month, and taking over-the-counter medications and ice to manage pain and swelling. You should also try to keep the proximal interphalangeal joint (PIPJ) free to move to prevent stiffness. Surgical treatment used repair the band and help straighten the injured finger or thumb.⁶

CASE PRESENTATION

We report the case of a 37-year-old male, a right-hand dominant individual, presented with a chief complaint of a catching sensation when he bends or straighten his third finger, which had persisted for two months following a boxing match at gym in July 2024. This incident resulted in the deformity, leading to a noticeable deformity. The patient also experienced a tingling sensation in the fingers of the left hand, particularly affecting the ring and little fingers. Initial evaluation at peripheral general hospital by an orthopedic specialist led to a diagnosis of a neglected old fracture of the lateral condyle of the left humerus, along with osteolytic lesions in the left humerus, radius, and ulna, and a dislocation of the left radial head.

The patient's history of trauma included, with the left fist striking his opponent while the boxing match. Despite this, the patient did not seek treatment from a bonesetter nor massage therapy. There was no history of systemic illnesses, medical medication, or prior surgeries. The patient's family history revealed no similar signs or symptoms. Upon physical examination of the left hand, there was an observable angulation deformity without swelling or bruising. The radial artery was palpable, and the capillary refill time was less than 2 seconds. Active range of motion was notably limited, with significant restrictions observed in the hand and wrist



Figure 1. The pre-operative clinical picture. (Source: internal documentation)

Surgical Procedure

Surgical management for acute injuries involves direct repair of the extensor hood, whereas chronic injuries may require reconstruction using tendon grafts. Many techniques can be used to centralize the extensor tendon by creating a check rein. The surgeries with dorsal incision over the metacarpal joint were performed on the radial or ulnar side under regional anesthesia with brachial plexus block. The sagittal band was exposed and examined and the degree of dislocation and subluxation of the EDC tendon was inspected while passively flexing the MP joint of the affected finger.

The direct method was the basis for treatment, which varied depending on the kind of sagittal band injuries. The EDC tendon remained intact in the deep layer underneath the MP joint extension, and the SSB injury was extremely thin in relation to the thickness of the wounded area. At the appropriate level of the sagittal band, a little opening made in the remaining extensor

tendon is used to pass the tendon segment. This stops the extensor tendon's separation from further unwinding and migrating distally. The para-tendon was sutured to the PSB by continuous technique fixation while the MP joint flexion immobilized the EDC tendon. By approaching both rupture edges and combining multiple figure-of-eight and continuous procedures, the PSB injury was healed. The tendon slip method was employed to reconstruct it if approximation was not possible because of extensive damage of the margin or if tendon instability remained even after direct repair. All patients underwent passive flexion of the MP joint up to 90° immediately following surgery to ensure stability and no subluxation of the EDC tendon. The surgical site was irrigated and closed in layers. The patient was placed in a protective splint to maintain the MCP joint in extension, and instructions were given to limit hand use for the initial postoperative period.

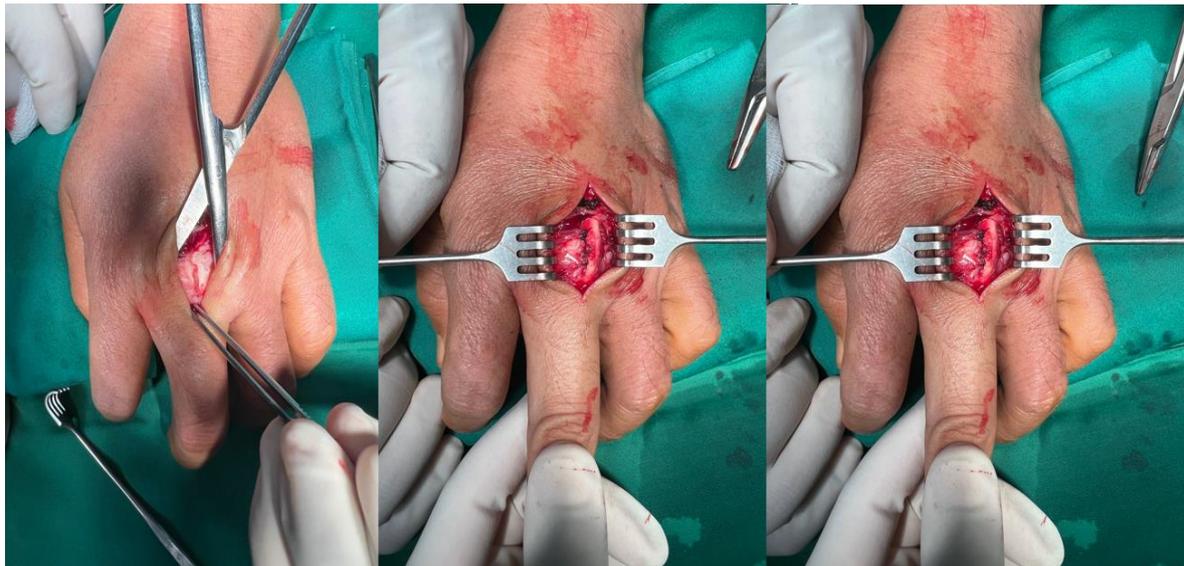


Figure 2. The intraoperative documentation showed the sagittal band was exposed were examined and the degree of dislocation and subluxation of the EDC tendon was inspected while passively flexing the MP joint of the affected finger. (Source: internal documentation)

Post-operative

Postoperative management is essential for a successful outcome following sagittal band repair. The patient initially wore a dorsal splint for 4 weeks to immobilize the MCP joint in slight extension while allowing movement in the interphalangeal joints. At 2 weeks, sutures were removed, and passive range of motion exercises began, avoiding MCP joint flexion to protect the repair. By

week 4, the patient transitioned to a removable orthosis, and controlled active motion exercises were introduced. Strengthening exercises started between weeks 6 and 8, focusing on restoring grip strength and dexterity. By 12 weeks, the patient had full active extension of the middle finger without pain or complications. Full activity, including sports, resumed after 4 months.



Figure 3. The post-operative clinical evaluation. (Source: internal documentation)

CLINICAL DISCUSSION

The hand is a complex and highly specialized structure that enables a wide

range of fine motor functions. A key component of its function is the extensor mechanism, which allows for the extension

of the fingers and enables activities such as grasping, gripping, and releasing objects. The integrity of this system is crucial for hand dexterity, and any disruption can lead to significant functional impairment. One of the less commonly encountered but functionally disabling conditions affecting the extensor mechanism is subluxation of the extensor tendons at the metacarpophalangeal (MCP) joint, often resulting from injury to the sagittal band.⁷

Understanding the anatomy of the extensor mechanism is fundamental to appreciating the functional impact of sagittal band injury. The extensor tendons of the fingers are part of a complex system that includes the extensor digitorum communis (EDC) tendons, the lumbrical muscles, and the interosseous muscles, which together facilitate coordinated extension of the fingers at the MCP joints. The sagittal band, a fibrous structure that spans from the volar plate of the MCP joint to the extensor hood, is responsible for maintaining the central alignment of the EDC tendons.³

The sagittal band's role is to ensure that the extensor tendons remain securely within the dorsal aspect of the MCP joint, preventing their displacement during flexion and extension of the fingers. Injury to this band can result in tendon instability, with the extensor tendon slipping off the MCP joint either radially or ulnarly, depending on the location of the rupture. This condition is known as extensor tendon subluxation, which can cause painful snapping during finger movement, a loss of full extension, and difficulty with tasks requiring finger coordination.^{8,9}

Disruption of the sagittal band can lead to subluxation or dislocation of the extensor tendons, causing painful snapping and dysfunction during finger movement. This condition is more common in the middle and ring fingers due to the unique biomechanics of these digits, and it can occur as a result of trauma, repetitive strain, or underlying inflammatory conditions such as rheumatoid arthritis. Patients with a sagittal band injury often present with acute

or chronic pain localized to the MCP joint, accompanied by swelling and tenderness.^{1,10}

Sagittal band injuries are relatively rare and can be categorized into two broad types: traumatic and atraumatic. Traumatic injuries typically occur following a direct blow to the dorsum of the hand, as seen in contact sports or accidents. The force of impact can rupture the sagittal band, resulting in an immediate and painful displacement of the extensor tendon. Atraumatic injuries are more commonly associated with chronic inflammatory conditions such as rheumatoid arthritis, where long-standing inflammation leads to weakening and eventual rupture of the sagittal band. In these cases, subluxation of the extensor tendon develops gradually and may initially be misdiagnosed as tendonitis or other soft tissue disorders.¹¹

We presented a 37-year-old male, a right-hand dominant individual, with a chief complaint of an inability to bend or straighten the third finger, which had persisted for two months following boxing training at the gym. This clinical picture is matched with the chronic sagittal band injury. Clinically, the hallmark of this injury is the visible or palpable snapping of the extensor tendon over the joint during active finger flexion and extension. In acute cases, this may be accompanied by a sense of instability or weakness when attempting to extend the finger, with the tendon visibly subluxation to the ulnar or radial side of the joint. Chronic injuries may present with more subtle symptoms, including persistent pain, swelling, and a tendency for the tendon to "catch" or "snap" during movement, which may lead to compensatory changes in hand function.⁹

The repair of the sagittal band for subluxation of the extensor tendons at the metacarpophalangeal (MCP) joint is a critical surgical intervention, particularly in cases of traumatic rupture.¹² Recent studies indicate that surgical repair of the sagittal band has a high success rate, particularly when performed early after injury. Most patients achieve near-normal function and can return to their previous level of activity.

Chronic injuries, however, may be associated with a higher risk of complications such as joint stiffness, recurrent subluxation, or tendon adhesions.⁴ Various techniques have been developed, each demonstrating effective outcomes.¹³ This incident resulted in the deformity, leading to a noticeable deformity. The patient also experienced a tingling sensation in the fingers of the left hand, particularly affecting the ring and little fingers. Emerging trends in the management of sagittal band injuries include minimally invasive surgical techniques, the use of biologic adjuncts such as platelet-rich plasma, and enhanced imaging modalities for better diagnosis and treatment planning.¹⁴ Additionally, ongoing research into the biomechanics of the extensor mechanism may lead to further refinements in both surgical and conservative management strategies.

CONCLUSION

This case illustrates the importance of early diagnosis and appropriate surgical management in sagittal band injuries, particularly in cases involving athletes or individuals with repetitive hand trauma. The use of tendon grafts for reconstruction, combined with a structured postoperative rehabilitation program, can result in favorable outcomes, with restoration of tendon stability and improved range of motion. Early intervention is critical to prevent long-term functional deficits and to ensure optimal recovery. This case reinforces the need for individualized treatment plans based on the severity and chronicity of the injury.

Patient Consent

The patient provided written consent for the publication of this case report and accompanying images. A copy of the written consent can be made available for review by the Editor-in-Chief of this journal upon request.

Patient Prespective

I had nearly given up on being able to carry out my daily tasks because of the pain and stiffness in my hand. Fortunately, the surgeon's surgical approach and the rehabilitation process enabled me to resume my daily activities.

Declaration by Authors

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