

# Hamulus Stress Fracture in a Batsman: An Unusual Injury in Cricket - A Case report and Review of Literature

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## What to Learn from this Article

Hamulus stress fracture is an uncommon sports injury and hasn't been reported in a cricketer till date; if the clinician is not aware of this entity, then it is very easy to miss the diagnosis or to misdiagnose it!

## Abstract

**Introduction:** Hamulus fractures are uncommon injuries constituting 2-4% of carpal fractures and are usually reported in athletes. Stress fractures of hamulus are even rarer and very few cases have been reported till date. In this case report, we present the first documented case of stress fracture of hamulus in a cricket batsman and review the existing literature on hamulus fractures, both acute and stress fractures, in sportspersons in general.

**Case Report:** A 23-year-old, right-handed, cricket batsman presented with pain in the hypothenar region of his left hand of 7 weeks duration. The pain typically worsened during batting, and he had difficulty in gripping the bat. Plain radiographs were largely inconclusive; magnetic resonance images, however, demonstrated a stress fracture of the hamate hook. The patient was put on conservative management, and his bat grip was modified. He recovered completely within 12 weeks and went back to playing professional cricket.

**Conclusions:** Hamulus stress fractures should be considered in cricketers presenting with chronic, non-traumatic, and ulnar-sided hand pain. The nonleading hand is more likely to be involved in a batter, as seen in other sports with a double handed grip. Nonoperative treatment, change of grip and adequate rehabilitation give good outcomes in most cases.

**Keywords:** Hamulus, stress fracture, cricket, batsman.

## Introduction

Stress fracture of the hamulus (hook of hamate) is extremely rare with only a few cases having been reported in literature [1, 2, 3, 4]. We present a rare case of stress fracture of the hamulus in a right-handed, club cricket batsman. To the best of our knowledge, this is the first case report of a stress fracture of hamulus in cricketer players till date.

## Case Report

A 23-year-old club team cricketer, who was a right-handed batsman, presented to us with pain in the ulnar side of the left wrist and in the hypothenar area (nondominant hand) since 7 weeks; this was insidious in onset and gradually progressive in intensity. He had no definite history of any acute trauma to this region. Pain typically worsened during batting,

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## Author's Photo Gallery



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and he had difficulty in gripping the bat, and could not execute powerful strokes. On clinical examination, he had deep point tenderness over the hook of the hamate region (Fig. 1). There was no swelling in the region; but grip strength was reduced compared to the opposite side. No symptoms of ulnar nerve compression were elicited.

Plain radiographs revealed a sclerotic area in the hamate but were largely inconclusive (Fig. 2). We asked the patient to bring the cricket bats he used to the clinic and his batting stance and handle grip was examined. We noted that the player used a cricket bat with an extra long handle, and the butt of the handle impinged against the ulnar side of the left wrist and the hypothenar area during batting, reproducing his symptoms (Fig. 3).

Magnetic resonance imaging demonstrated a stress fracture of the hook of the hamate; however, the fracture was not complete, and there was no evidence of any avascular necrosis of the hamate (Fig. 4). He was immobilized in a wrist brace for 4 weeks and put on a rehabilitation protocol; his bat handle and bat grip were modified to minimize pressure over the hamate region. He went back to playing the game within 12 weeks after the initiation of treatment and at 2 years follow-up, he is playing cricket at a club level without any symptoms.

### Discussion

Hamulus (hook of hamate) fractures comprise 2-4% of carpal fractures [5, 6, 7]. These fractures are usually seen in sports persons.

First described by Milch [8] in 1934, many subsequent articles in literature detail the incidence, diagnosis, management, and complications of this fracture in different sports (Table 1) [9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25]. Hamulus fractures are usually seen in sports such as baseball, golf, and tennis where a bat or racquet is used by the athlete [7]. The nondominant hand is reportedly injured by swinging a baseball bat or golf club, whereas the dominant hand tends to be more at risk in tennis and other racquet sports [26].

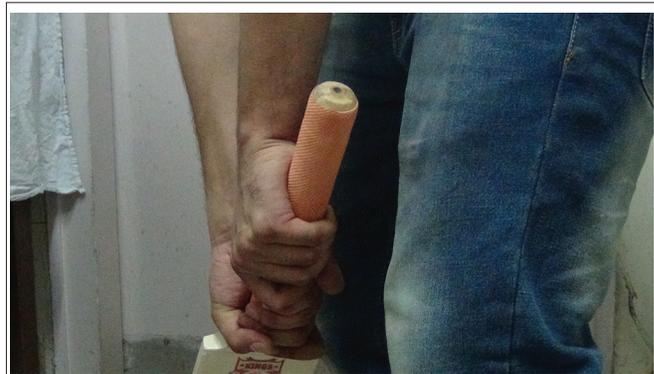
In the sport of cricket, only 1 article has reported hamulus fractures so far [11]. Belliappa and Barton [11] reported 2 hamulus fractures in a case series of 64 hand injuries in 55 cricketers; however, these hamulus fractures were secondary to acute trauma (i.e., the impact of the upper end of the bat handle on the hand) and were not stress injuries.

The mechanism of injury leading to an acute hamulus fracture continues to be controversial. Most hamulus fractures are secondary to impact injuries either due to direct trauma (caused by abutment of the hook of hamate on an object or a fall on outstretched hands) or due to an indirect trauma (due to a shearing force applied by the flexor tendon of the small and ring fingers) [9, 10, 13, 16, 17, 18].

Stress fractures, on the other hand, are caused by repetitive microtrauma, most often due to the caused by racquet/bat/club and not due to a



**Figure 1:** Clinical photograph demonstrating the area of tenderness in the hypothenar area of the left hand.



**Figure 3:** Bat grip of the player showing how the long handle of the bat constantly caused pressure concentration in the area of hamulus.



**Figure 2:** Radiograph appeared largely normal with some doubtful sclerosis in the region of the hook of hamate.



**Figure 4:** A T2 magnetic resonance image is showing signal alterations, signifying a stress reaction, in the hamulus region.

**Table 1: Summary of selected studies reporting hamulus fractures in athletes secondary to impact injuries (due to direct/indirect trauma)**

Authors (year)	Publication	Sport	Number of athletes	Mechanism of injury	Side (leading/nonleading hand)	Management	Remarks
Stark <i>et al.</i> [10], 1977	Fracture of the hook of the hamate in athletes	Tennis (4) Golf (7) Baseball (9)	20	Traumatic	-	Excision	100% return to sport
Belliappa and Barton [11], 1991	Hand injuries in cricketers	Cricket	2 out of 64 cricketers	Traumatic (impact injuries)	Non leading hand	Excision	Responded well to excision
Foucher <i>et al.</i> [12], 1985	Fractures of the hook of the hamate	Tennis	6	Traumatic	Leading hand	Excision	Most cases are diagnosed when painful nonunion, fraying tendinitis of the flexor tendons to the ulnar fingers, ulnar or median nerve deficits appear
Parker <i>et al.</i> [13], 1986	Hook of hamate fractures in athletes	Baseball (4) Softball (1)	5 patients (6 fractures)	Traumatic	Leading hand (2) Non leading hand (4)	Excision in all	100% return to sport Entire hook should be excised to its base as the primary form of treatment.
Gupta <i>et al.</i> [14], 1989	Fractures of the hook of the hamate	Golf (2) Squash (1)	3	Traumatic	Leading hand (1) Non leading hand (2)	Excision	Painless return to sport in 4-6 weeks
Whalen <i>et al.</i> [15], 1992	Nonoperative treatment of acute hamate hook fractures	Golf	8	Traumatic 6 acute 2 subacute	Non leading hand	Nonoperative in all (Union in 7/8 cases)	Hamulus fractures, if diagnosed early, may heal with nonoperative management. Fractures that fail to heal with immobilization or those with chronic nonunion should be treated with excision.
Futami <i>et al.</i> [16], 1993	Fractures of the hook of the hamate in athletes - 8 cases followed for 6 years	Golf (3) Tennis (4) Motocross (1)	8	Traumatic	Leading hand (5) Non leading hand (3)	Excision in all 3 cases additional tendon suture	Associated conditions included rupture of flexor tendons in 3 cases and ulnar nerve paresthesia in 2 cases
Aldridge <i>et al.</i> [17], 2003	Hook of the hamate fractures in competitive golfers: Results of treatment by excision of the fractured hook of the hamate	Golf	7	Overuse	Non leading hand	Excision in all patients	100% return to sport
David <i>et al.</i> [18], 2003	Symptomatic partial union of the hook of hamate in athletes	Golf (5) Baseball (3)	8	Traumatic	Non leading hand	Excision in all athletes	Partial union should be managed no different than a nonunion of hamulus 100% return to sport noted

(Contd...)

Table 1: (Continued)

Authors (year)	Publication	Sport	Number of athletes	Mechanism of injury	Side (leading/nonleading hand)	Management	Remarks
Evans Jr [19], 2006	Case report of right hamate hook fracture in a patient with previous fracture history of left hamate hook: Is it hamate bipartite?	Golf	1	Traumatic	Non leading hand	Excision	-
Scheufler <i>et al.</i> [20], 2006	Current treatment of hamulus-ossis-hamati fracture	Golf (2) Tennis (1) Others (11)	14	Traumatic	-	Operative (8) (excision in 5 and ORIF in 3) Nonoperative (6)	Primary surgical treatment reliably yields a good clinical outcome compared to nonoperative treatment of acute non-displaced hamate hook fractures. Results after fragment excision and ORIF are comparable
Gill and Rendeiro [21], 2010	Hook of the hamate fracture	Golf	1	Traumatic	Not clear	Excision	Returned to sport in 12 weeks
O'Grady and Hazle [22], 2012	Persistent wrist pain in a mature golfer	Golf	1	Overuse	Non leading	Excision	-
Bachoura <i>et al.</i> [23], 2013	Hook of hamate fractures in competitive baseball players	Baseball	7 athletes (8 fractures)	Both (overuse in 6 and traumatic in 2)	Non leading hand in 6 athletes Bilateral in one (switch-hitter)	Excision and ulnar tunnel decompression in all athletes	100% return to sport Excision with tunnel decompression gives good results with minimal complications and early return to sport
Devers <i>et al.</i> [24], 2013	Outcomes of hook of the hamate fractures excision in high-level athletes	Baseball (10) Golf (1) Football (1)	11 athletes (12 fractures)	Traumatic	Leading hand (9) Non leading hand (3)	Excision in all athletes	100% return to sport within 6 weeks of surgery Surgical excision is safe and effective treatment in high level athletes
Scheufler <i>et al.</i> [25], 2013	High incidence of hamate hook fractures in underwater rugby players: Diagnostic and therapeutic implications	Underwater rugby	17	Both Traumatic (10) Overuse (4)	Leading hand	Operative (15) Excision (10) ORIF (5) Nonoperative (2)	All patients treated surgically returned to active sports High incidence in underwater rugby due to high, repeated forces applied to leading hand. Surgical treatment recommended over conservative treatment

ORIF: Open reduction and internal fixation

single traumatic impact injury [1]. Guha and Marynissen [1] and Van Demark *et al.* [4] reported stress fractures in 2 tennis players secondary to repetitive stress injury caused by the leading edge of the tennis racquet in the dominant hand which were treated conservatively; both athletes responded well to nonoperative treatment and eventually returned to tennis. Scheufler *et al.* [2] reported 3 stress fractures in 2 golfers and 1 tennis player (both in the leading hand) in a series of 14 hamulus fractures. Bayer and Schweizer [3] reported a case in a rock climber who repeatedly attempted dynamic swing moves in high-intensity rock bouldering (Table 2).

In the case presented above, there was no definite history of any traumatic event, and the pain was insidious in onset, gradually progressed in intensity and typically was aggravated during batting sessions. Furthermore, the fact that the pain responded to rest and alterations in bat grip are retrospectively supportive of a stress injury secondary to repetitive microtrauma due to the free edge of the long bat handle impinging on the hypothenar area while executing batting strokes. Stress fractures if picked up early and treated by immobilization usually heal well allowing early return to sport [1]. If the diagnosis is delayed, the results of nonoperative treatment deteriorate, and the patient is more likely to need surgical treatment (either excision or open reduction and internal fixation [ORIF]) [2].

### Management of hamulus fractures

Hamulus fractures can be treated nonoperatively with cast immobilization or operatively by ORIF (with Kirschner wires or screws) or fragment excision [6].

### Nonoperative management

A high, unidentified number of hamulus fractures remain asymptomatic and either do not require or seek treatment. However, nonoperative management may lead to secondary complications such as painful nonunion, flexor digitorum profundus or superficialis tenosynovitis, and tendon rupture and is also associated with a long period of immobilization. Milek *et al.* reported a 15% incidence of tendon ruptures (18/257 cases) in hamulus fracture cases treated nonoperatively [27].

### Operative management

Excision of the hamulus is currently the preferred surgery of choice for most hand surgeons as evidenced by our literature review (Table 1); however, it leads to a reported 11% decrease in the flexor tendon excursion due to geometric factors [28]. There are also chances of residual pain, impaired sensation, and weakening of grip strength [2]. Scheufler *et al.* reported no significant difference in the grip strength between patients who received ORIF and those who received hamulus excision, although the grip strength values are slightly higher in the ORIF group.

**Table 2: Summary of studies reporting hamulus stress fractures (arranged in chronological order)**

Authors (year)	Publication	Sport	Number of athletes	Side (leading/non leading hand)	Management	Remarks
Guha and Marynissen [1], 2002	Stress fracture of the hook of the hamate	Tennis	1	Dominant hand	Nonoperative	Patient made complete recovery and returned to tennis. Diagnosis confirmed by high-density CT scan
Scheufler <i>et al.</i> [2], 2005	Hook of hamate fractures: Critical evaluation of different therapeutic procedures	Golf (2) Tennis (1)	Three stress fractures in a series of 14 fractures	Nondominant hand in golfers Dominant hand in tennis athlete	Excision (2) Nonoperative (1)	Authors recommend primary surgical treatment as conservative treatment results were found to be "disappointing." Diagnosis confirmed by MRI/CT scans
Bayer and Schweizer [4], 2009	Stress fracture of the hook of the hamate as a result of intensive climbing	Rock climbing	1	Not clear	Nonoperative	Fracture healed after immobilization in a forearm cast; full recovery within 3 months. Diagnosis confirmed by MRI/CT scans
Van Demark Jr <i>et al.</i> [4], 2015	Stress fracture of the hook of the hamate: A case report	Tennis	1	Dominant hand	Nonoperative	Fracture healed with casting in spite of being diagnosed 2 months late. Authors observed that nonoperative treatment is successful if fracture is treated early
This study Dhillon <i>et al.</i> 2016	-	Cricket	1	Nondominant hand	Nonoperative	Full recovery with nonoperative treatment with successful return to sport in 12 weeks

MRI: Magnetic resonance imaging, CT: Computed tomography

They hypothesized that in the young, active population who work under strenuous conditions, ORIF with screws should be preferred over hamulus excision and also over ORIF with K-wires; the reasons being better grasp, anatomic restoration of the pulley mechanism for the 4<sup>th</sup> and 5<sup>th</sup> longflexor tendons and shorter immobilization time (around 2 weeks) in ORIF with screws group [2].

### Conclusions

Ulnar-sided pain and tenderness in players of racquet sports or those using clubs/bats have to be carefully evaluated. The dominant hand in tennis or sports involving single hand grip, and the nondominant hand in double grip sports may be the site of ulnar-sided stress concentration, leading to a stress fracture. MRI should be used to evaluate the wrist in all such cases.

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### Clinical Message

Hamulus stress fractures can occur in the non-leading hand of a cricket batsman as in other sports with a double-hand grip. The stress fracture is usually secondary to a long bat handle which leads to repeated impingement on the hook of the hamate. Plain radiographs are usually inconclusive; MRI or bone scan is necessary to clinch the diagnosis. Non-operative treatment along with a change in the bat grip usually leads to fracture union and a good functional outcome with return to active sport. Excision of the hamulus or ORIF may be needed in chronic/recalcitrant cases.

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