

Bennett's Fracture Rehabilitation: A Case Report

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Abstract: Fractures and dislocations of the hand are commonest orthopaedic injuries and constitute about 10% of skeletal fractures. Bennett's fracture dislocation is an intra-articular basal fracture of the first metacarpal accounting for one-third of first metacarpal injuries. It predominantly occurs in males commonly affecting the dominant hand. The mechanism involves impact against partially flexed thumb or by fall onto a thumb. Management includes closed reduction and stabilization, open reduction with internal fixation or osteosynthesis. Bennett's fracture is associated with complications such as malunion, weak grip and osteoarthritis of first carpometacarpal joint. Following initial management, physical therapy is required to achieve a successful functional outcome. In our case a 24 year old male suffered a Bennett's fracture in right dominant hand and was managed with closed reduction and K-wire fixation. Initial rehabilitation after K-wire removal included passive mobilisation, tendon gliding exercises and grip strengthening.

Keywords: Bennett's fracture, rehabilitation, first metacarpal

1. Introduction

Isolated fractures and dislocations of metacarpals are common injuries of hand encountered every day. Intraarticular basal fractures of first metacarpal are estimated to be 1.4% of all fractures occurring in hand [1]. Bennett's fracture was described by Edward Hallaran Bennett in 1882 as an intraarticular fracture of the base of first metacarpal with dislocation of first carpometacarpal (CMC) joint [2, 3]. Bennett's fracture occurs as a result of axial overloading on a partially flexed and adducted thumb like a fist or fall onto a thumb [2, 4]. These fractures can be treated conservatively with closed reduction and cast fixation, but maintaining adequate reduction to allow sufficient healing is a major issue [5]. Surgical management includes closed reduction and K-wire fixation or open reduction with internal fixation [6]. Inadequate or delayed management may result in pain, stiffness, decreased grip strength, malunion and osteoarthritis of first CMC joint [2, 5]. Early rehabilitation allows the patient an earlier return to work or sports. We report a case of a young male with Bennett's fracture managed with K-wire fixation undergoing hand rehabilitation.

2. Case Report

A 24 year old male injured his dominant right hand during fall from a bicycle. The patient developed severe pain immediately and was unable to move his right thumb. He reported to the hospital with complaints of pain, deformed thumb and loss of thumb movements. During initial examination, dorsoradial aspect of the thumb was tender on palpation but neurovascular status was intact. The anteroposterior [Figure 1] and oblique radiographs [Figure 2] of the hand revealed a Bennett's fracture. The patient was managed with closed reduction and K-wire fixation under regional anaesthesia and a Bennett's plaster cast was applied. After 3 weeks, K-wires were removed and patient was prescribed to wear a splint and referred for physical therapy.



Figure 1: Preoperative X-ray (AP view)



Figure 2: Preoperative X-ray (Oblique view)

On physical examination finger and thumb movements were limited along with decreased grip strength. The main goals of physical therapy program were to reduce impairments and restore functional performance. The rehabilitation aimed at reducing pain, restore mobility at wrist and hand, improve grip strength and normalize hand function facilitating an earlier return to work. Initial rehabilitation focused on isolated joint movements. Gentle mobilization of CMC joint

was performed by the therapist. Active-assisted range of motion (AAROM) exercises was initiated for wrist, metacarpophalangeal (MCP) and interphalangeal (IP) joints of the fingers.

After 4 weeks, brace was continued and removed for exercises. The therapist continued to perform passive mobilization of the CMC joint. Passive thumb abduction and extension were started. Tendon gliding exercises were added to improve mobility of the fingers.

At 6 weeks patient was instructed to perform active-assisted thumb abduction and extension. He was encouraged to move the thumb in an arc from palmar abduction to radial extension. However, lateral pinch position for thumb was avoided. By the end of 8 weeks, thumb exercises were progressed to active opposition and circumduction. Light isotonic strengthening for wrist and forearm along with gentle grip strengthening with putty was begun. After 10 weeks postoperatively, full ROM was achieved and brace was discontinued. Strengthening for wrist and forearm was progressed gradually. Grip strengthening was performed using gentle ball squeezing. Functional exercises using power web were initiated. Patient was instructed to avoid forceful grasp or pinch. A home program was prescribed comprising of resistance exercises for wrist and hand, opposition and pinching activities of thumb and grip strengthening.

3. Discussion

The thumb is an important part of the hand accounting for 40% of the hand function^[7]. The first CMC joint is a unique articulation between base of first metacarpal and trapezium forming saddle shaped joint thereby, allowing greater mobility and functional significance^[8]. The first metacarpal is the second most commonly injured metacarpal accounting for 25% of all metacarpal fractures with 80% occurring at the base^[9]. Bennett's fracture dislocation is defined as an intra-articular fracture of the first metacarpal base with dislocation of CMC joint^[3, 9]. Dial et al have reported higher incidence in males commonly occurring in dominant hand^[6].

The mechanism of injury involves axial loading of a flexed and adducted thumb such as making a fist^[2, 4, 9]. Pain and decreased thumb mobility supplemented with radiological investigations helps in making an early diagnosis.

The basic aim of treating Bennett's fracture is to obtain adequate reduction of the fracture and restoration of the articular surface^[10]. Conservative management includes closed reduction and plaster fixation^[11]. Good outcome depends on maintaining adequate reduction and allowing healing in a proper pattern^[10]. A variety of methods have been suggested for achieving proper anatomic reduction. These include closed reduction with K-wire fixation, open reduction and internal fixation or external fixation^[6, 12]. However inadequate fixation of the fracture may result in malunion leading to pain, weak grip and rotational deformity^[10]. Long term consequences may result in CMC joint arthritis^[2]. Stiffness can occur depending on duration and position of immobilization^[7].

Rehabilitation of the hand is the key whether managed conservatively or surgically. Mobilization of the hand is initiated after 4 weeks^[13]. Studies suggest that splintage with early mobilization gives better functional results. In our report, a young male managed with closed reduction and K-wire fixation for Bennett's fracture underwent rehabilitation. Mobilization was initiated following K-wire removal focusing on isolated thumb movements^[14]. Tendon gliding exercises were performed to restore ROM of the fingers^[15]. Grip strengthening exercises along with wrist strengthening were included. On achieving full ROM functional exercises were begun promoting early return to work.

4. Conclusion

Bennett's fracture is a functionally important injury and should not be considered or managed as trivial. Adequate reduction and maintenance allows proper healing limiting complications and permits early rehabilitation. The rehabilitation program should focus on maintaining balance between mobility and stability. Isolated movements of digits must be initiated followed by combined movements in later part of rehabilitation. Exercises aiming to improve mobility and grip strengthening must be incorporated for better performance of functional activities.

5. Conflict of Interest

There is no conflict of interest to declare.

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