Mallet Finger: A Review

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Citation

C Mauffrey. *Mallet Finger: A Review*. The Internet Journal of Orthopedic Surgery. 2005 Volume 3 Number 1.

Abstract

Mallet finger also called drop or baseball finger is a deformity of the finger caused by detachment of the extensor mechanism from the base of the distal phalanx, either directly or in association with a fracture. The commonest cause of this injury is a violent flexion or laceration of the dorsum of the finger at the level of the distal inter-phalangeal joint. It is most commonly seen when the finger is struck on the tip resulting in rupture of the extensor tendon or avulsion of the tendon with or without a small fragment of bone from the insertion. If left untreated this lesion causes the distal phalanx to droop and leaves a mallet finger deformity.

ANATOMY

The terminal extensor tendon is a thin flat structure measuring approximately 1 mm thick and 4-5 mm wide. It inserts onto the dorsal lip of the distal phalanx. The tendon attaches to the dorsal part of the capsule and inserts into a ridge distal to the articular cartilage from one collateral ligament to the other [1] . Powered by the lumbrical and interosseous muscles, the dorsal mechanism flexes the metacarpo-phalangeal joints and extends both the proximal and distal inter-phalangeal joints (PIP and DIP).Warren et al, in their study noted an area of deficient blood supply in the distal digital extensor tendon area and suggested that this zone of avascularity might have implications in the cause and treatment of mallet finger [2] .

PATHOPHYSIOLOGY

With a disruption of the dorsal mechanism at the DIPJ, the entire power of extension is directed to the PIPJ. Over time, and especially if the volar plate is lax, this concentrated extension force results in PIPJ hyperextension and a swan-neck deformity (the DIPJ rests in an abnormally flexed position and the PIPJ rests in a hyper-extended position). This deformity frequently causes a functional deficit. Therefore, even if a mallet finger is not particularly symptomatic from a functional or cosmetic perspective, treatment of the mallet injury may preclude development of this swan-neck deformity.

CLASSIFICATION

- Type 1: closed or blunt trauma with loss of tendon continuity with or without a small avulsion fracture.
- Type 2: Laceration at or proximal to the DIP joint with loss of tendon continuity.
- Type 3: Deep abrasion with loss of skin, subcutaneous cover and tendon substance.
- Type 4:
    - A- Transepiphyseal plate fracture in children.
    - B- Hyperflexion injury with fracture of the articular surface of 20 to 50%.
    - C- Hyperextension injury with fracture of the articular surface usually greater then 50% and with early or late volar subluxation of the distal phalanx.

DIAGNOSIS AND MANAGEMENT

Mallet finger remains a clinical diagnosis that requires a detailed history taking associated to a thorough physical examination of the hand. Imaging studies need to be integrated within the diagnosis, as it is important to exclude any associated bony injuries as well as deformity from osteoarthritis or rheumatoid arthritis. An AP and lateral view x-rays centred at the DIPJ of the affected finger are required these x-rays are used to differentiate between a bony injury and a tendinous mallet injury. Lateral radiographs reveal the presence of volar subluxation of the distal phalanx.

Conservative: The primary goal in all methods of treatment is restoration of the continuity of injured tendon with

maximum recovery of function. Although various treatment protocols have been proposed, splinting of the distal inter-phalangeal joint in extension for 6 to 8 weeks has been the gold standard with minimal morbidity in the majority of patients with closed mallet injury. This can be achieved by thermoplastic stack (mallet) splints or plaster cast splints. With this duration of immobilisation patient compliance remains an important outcome factor. It has recently been shown that delay in initiating treatment did not affect significantly the DIP joint movement or extension lag [3] .

Surgical: It is advocated for acute and chronic mallet lesions in patients who have failed non-surgical treatment, are unable to work with the splints in position, have a fracture involving more then one third of the joint surface or have an open mallet injury.

Fresh lacerations of the extensor mechanism of the DIP joint with mallet deformity are repaired by a running suture 4.0 or 5.0 synthetic material, which re-approximates skin and tendon simultaneously. This finger is immobilized in a stack splint with DIP in extension.

K wire fixation across the DIP joint in extension with PIP joint in extension is also an option.

COMPLICATIONS

Complications during conservative treatment are infrequent and benign and in most cases are related to the skin. A persistent extension deficit of approximately 10 degrees has been reported after conservative treatment in 40% to 70% of patients [4] and transient skin problems like dorsal maceration and dorsal ulceration. Surgical complications include infection, stiffness, permanent nail deformities, joint incongruities and deviation of DIP joint.

CONCLUSION

Kalainov et al [5] recently demonstrated that closed and displaced mallet finger fractures with greater then one third articular surface damage could be treated non operatively with negligible pain, patient satisfaction and good function at 2 years follow up. However patients with palmar subluxation of distal phalanx may develop swan neck deformity and extensor lag and degenerative joint changes.

Wehbe and Schneider [6] concluded that most mallet injuries can be treated non operatively ignoring joint subluxation and the size or displacement of the bony fragment. Pulvertaft [7] noted that 60% of mallet fingers had satisfactory results after splintage and that a further 20% would improve in due course.

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