CLOSED TENDON injuries of the hand and wrist are very common among athletes. Because such injuries are often considered minor, many go untreated during the competitive season. A good result is usually obtained when treatment is initiated early, but permanent disability may result if treatment is delayed until the season is over.

Mallet finger, which is the most common closed tendon injury in the athletic population, is a disruption of the terminal extensor tendon at its insertion on the distal phalanx. A mallet-type injury to the thumb is quite rare, but it can occur during participation in a contact sport. According to Doyle, mallet-type injuries of the thumb account for 2%–3% of all mallet finger injuries.

The mechanism of thumb extensor tendon injury is similar to that which occurs in the other fingers. A direct blow to the tip of an extended finger forces the distal phalanx into flexion. A direct blow to the dorsum of the distal interphalangeal (DIP) joint, or a hyperextension force at this joint can also be the cause of these injuries. Mallet thumb involves disruption of the extensor pollicis longus tendon, which makes the athlete incapable of actively extending the interphalangeal (IP) joint of the thumb.

When an athlete presents with a swollen finger following trauma, the possible existence of a fracture should be considered. A mallet injury may involve disruption of the terminal extensor mechanism through its substance or it may be associated with an avulsion of bone. Bone injury may involve any of the following: (a) avulsion of a small bone fragment from the base of the distal phalanx, (b) avulsion of a large bone fragment that comprises one-third or more of the IP joint articular surface, or (c) avulsion of a large bone fragment that is associated with palmar subluxation of the remaining portion of the distal phalanx.

The purpose of this report is to present the case of a collegiate football player who jammed his thumb into the opponent’s shoulder pad breastplate with such force that a mallet injury of the thumb occurred.

**Case History**

A 22-year-old collegiate football player sustained a thumb injury during the second quarter of a game while blocking an opponent. As the opponent was forced to the ground, the athlete jammed his thumb into the breastplate of the opponent’s shoulder pads. The injured athlete informed the athletic trainer of sharp pain and the inability to
move his thumb. An obvious deformity was evident, and an inability to actively extend the distal phalanx was confirmed (Figure 1). The team physician performed a second evaluation, which localized tenderness to palpation on the dorsal aspect of the IP joint. There was no pain in response to palpation of the MCP joint, the proximal phalanx, or the first metacarpal, and no crepitus was apparent. Because the existence of a significant fracture was deemed unlikely, a Stax splint (Hartmann-Conco, Inc., Rock Hill, SC) was applied to maintain the thumb IP joint in full extension (Figure 2). A layer of protective foam padding was applied to the splint, which was secured with a thumb-spica taping procedure. The athlete was permitted to return to play, and he participated in the second half of the game without incident.

Following the game, cryotherapy was administered to minimize pain and swelling. The athlete was informed that the thumb IP joint should be maintained in an extended position and was instructed not to remove the splint. Radiographs obtained on the following day were negative. The injury was further evaluated by the team orthopedist, who applied a thumb spica cast. The athlete was permitted to participate in football practice sessions and games as tolerated. Closed-cell protective foam was applied over the cast for competition, as required by NCAA football regulations. The cast was worn for 10 days, which was followed with utilization of the Stax splint with padding and tape fixation to the extremity for the next 18 days of football participation. At four weeks postinjury, the athlete wore padded gloves over the Stax splint during football activities, which was continued for the next 12 days. When not participating in football activities, the athlete continuously wore the Stax splint to maintain the IP joint in full extension.

At the conclusion of the season, the athlete was found to have full thumb IP extension, with no drop into flexion (Figure 3). He was able to perform active flexion and extension and had the ability to extend the distal phalanx against resistance. He was permitted to engage in unrestricted activity, with instructions to wear the Stax splint at night for the next two weeks and to report any symptoms. At two months postinjury, a follow-up examination demonstrated full extension and flexion of the thumb IP joint and no pain was reported.

**Discussion**

Few cases of mallet thumb have been reported in the literature. Because the extensor tendon insertion on the thumb is broader than those of the other digits, a greater force is required to create a mallet injury of the thumb than that which will create the injury in digits with two interphalangeal joints. Although there is a limited amount of literature that specifically relates to treatment options for a mallet thumb injury, there is general agreement that surgical fixation is appropriate for an avulsion fracture involving more than 30% of the joint surface or palmar subluxation of the distal phalanx.

Conservative treatment of a mallet finger injury of the second through fifth digits involves splinting the DIP joint in extension for 6–8 weeks, followed...
with night-only splinting for an additional 2–4 weeks. Immobilization of the proximal interphalangeal (PIP) joint is not required, which helps to minimize stiffness and promotes function of the hand. Because the thumb has a single interphalangeal joint, splinting for mallet thumb includes immobilization of the IP joint but leaves the metacarpophalangeal (MCP) joint free. Aronowitz and Leddy and Hong advocate conservative treatment of mallet thumb in the same manner as a mallet finger injury when no fracture is associated with the tendon injury.

Miura et al. reported the largest case series of mallet thumb injuries. Among 25 patients who were treated with coil-splint immobilization that continuously maintained extension of the IP joint for 4–6 weeks, followed with use of the splint for 8–12 hours each day for 3–6 months, 21 attained full IP joint extension. The majority of the cases involved either a laceration or direct trauma as the cause of extensor tendon disruption. Primiano reported two cases of mallet thumb injury sustained during participation in sports (hockey goalie and skier), both of which were treated conservatively with good outcomes. A padded aluminum splint applied to either the dorsal or palmar surface of the DIP joint, or a commercial polyethylene molded splint, can be used to maintain thumb IP joint extension. The area between the thumb surface and the splint should be kept dry to avoid skin maceration. A Cochrane review failed to yield sufficient evidence to support a recommendation for a specific splinting procedure but did support the importance of patient compliance for realization of the best possible outcome.

Good results have been reported for late treatment of mallet finger injuries, even when treatment has been delayed for 2–3 months after injury. Surgical intervention is warranted when conservative treatment fails. Surgical repair may involve Kirshner wire (K-wire) fixation across the DIP and PIP joints, intramedullary K-wire fixation of the DIP joint, or oblique placement of a pin across the DIP joint.

Sport participation is permissible with a mallet finger injury, assuming that the injured finger is protected and the DIP is maintained in extension. No literature could be found that addressed return to sport participation with a mallet thumb injury. The decision to use cast immobilization for two weeks might be considered somewhat conservative, but it provided maximum protection during participation in football activities in the early phase of tissue healing.

Conclusion

Injuries of the fingers and thumb are sometimes neglected. Mallet injury of the finger or thumb will typically be associated with swelling and an inability to actively extend the distal phalanx. Continuous immobilization in extension 8–12 weeks has a high rate of success. A commercial polyethylene molded splint was found to provide effective protection, while allowing full participation in football activities.

References