Common Fractures and Dislocations of the Hand

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Learning Objectives: After reading this article, the participant should be able to: 1. Describe the concept of early protected movement with Kirschner-wired finger fractures to the hand therapist. 2. Choose the most appropriate method of fracture fixation to achieve the goal of a full range of motion. 3. Describe the methods of treatment available for the most common fractures and dislocations of the hand.

Background: The main goal of treatment of hand and finger fractures and dislocations is to attain a full range of wrist and nonscissoring finger motion after the treatment is accomplished. This CME article consists of literature review, illustrations, movies, and an online CME examination to bring the participant recent available information on the topic.

Methods: The authors reviewed literature regarding the most current treatment strategies for common hand and finger fractures and dislocations. Films were created to illustrate operative and rehabilitation methods used to treat these problems. A series of multiple-choice questions, answers, discussions, and references were written and are provided online so that the participant can receive the full benefit of this review.

Results: Many treatment options are available, from buddy and Coban taping to closed reduction with immobilization; percutaneous pins or screws; and open reduction with pins, screws, or plates. Knowledge of all available options is important because all can be used to achieve the goal of treatment in the shortest time possible. The commonly used methods of treatment are reviewed and illustrated.

Conclusions: Management of common hand and finger fractures and dislocations includes the need to focus on achieving a full range of motion after treatment. A balance of fracture reduction with minimal dissection and early protected movement will achieve the goal. (Plast. Reconstr. Surg. 130: 722e, 2012.)

The majority of metacarpal and phalangeal fractures can be treated nonoperatively.1,2 Optimal treatment will depend on whether the fracture can be reduced (reducible or irreducible) and whether the reduction can be maintained (stable or unstable). Closed reduction and percutaneous fixation or open reduction and internal fixation of metacarpal and phalangeal fractures is indicated for irreducible fractures, open fractures, associated soft-tissue injury, segmental bone loss, and multiple fractures, and relatively indicated for intra-articular fractures and malrotated fractures that cannot be corrected by closed reduction.3

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Related Video content is available for this article. The videos can be found under the “Related Videos” section of the full-text article, or, for Ovid users, using the URL citations published in the article.
INTRA-ARTICULAR FRACTURES OF THE BASE OF THE THUMB METACARPAL

Bennett fracture is a two part fracture-dislocation in which the entire thumb metacarpal is subluxated dorsally, radially, and proximally by the pull of the abductor pollicis longus. If the metacarpal base can be reduced and Kirschner wired closed, or if the fragment is less than 20 percent of the articular surface, closed reduction and percutaneous fixation are preferred (Fig. 1, center). Longitudinal traction, adduction, and pronation are applied to the base of the thumb metacarpal under fluoroscopy, and the base of the metacarpal is Kirschner wired to the index metacarpal or trapezium. The pins are removed after 4 weeks. If there is an articular stepoff greater than 2 mm after attempted closed reduction and percutaneous fixation, open reduction and internal fixation is performed through a Wagner incision with 2.4- or 2.0-mm lag screws or Kirschner wires (Fig. 1, right). Long-term follow-up has confirmed superior results in terms of pain, mobility, strength, and radiographic signs of arthritis in patients who underwent closed reduction and percutaneous Kirschner wiring or open reduction and internal fixation if there was less than 1 mm of articular stepoff after reduction. Conversely, patients with articular incongruity after reduction had a higher incidence of symptomatic arthritis in long-term follow-up. One study contradicts the principle of anatomical reduction of intra-articular fractures, finding little evidence of symptomatic post-traumatic arthritis 10 years after nonoperative treatment of Bennett fractures.

ULNAR METACARPAL BASE FRACTURE DISLOCATIONS

In reverse (baby) Bennett fractures, approximately 25 to 30 percent of the radial base of the small finger metacarpal remains articulating with the hamate, but the entire small finger metacarpal is subluxated proximally and dorsally because of the pull of the extensor carpi ulnaris tendon. One study showed that the majority of patients treated by immediate range of motion were asymptomatic 4½ years later. Another study showed that 38 percent of patients are symptomatic 4 years later regardless of the treatment. Most agree that restoration of articular congruity should be attempted either by closed reduction and percutaneous fixation or open reduction and internal fixation.

Longitudinal traction is applied to the small finger and pressure is applied to the dorsal aspect of the base of the small finger metacarpal followed by passive wrist extension and closed Kirschner wire fixation under fluoroscopy. If treatment has been delayed, closed reduction and percutaneous fixation is not successful, multiple carpometacarpal joint fracture dislocations are present, or there is an associated dorsal shear fracture of the hamate, open reduction and internal fixation is indicated.
through a dorsal longitudinal incision. Fixation is achieved with oblique and transverse Kirschner wires or by longitudinal intramedullary Kirschner wires first passed antegradely down the metacarpal shaft and then passed retrogradely back into the hamate.

**METACARPAL SHAFT FRACTURES**

The geometry of metacarpal shaft fractures may be transverse, oblique, spiral, or comminuted. Transverse metacarpal shaft fractures exhibit apex dorsal angulation caused by the deforming force of the interosseous muscles (Fig. 2). Closed reduction is indicated for 10 degrees of apex dorsal angulation in the index and middle fingers, greater than 20 degrees in the ring finger, and greater than 30 degrees in the small finger. Most metacarpal shaft fractures are inherently stable and do not require fixation after closed reduction. Immobilization should not be continued longer than 3 weeks; otherwise, stiffness may result.18,19 Closed reduction and percutaneous fixation is indicated if the fracture is unstable. Under fluoroscopic control, a single 0.062-inch Kirschner wire can be inserted retrogradely into the metacarpal head to the radial or ulnar side of the extensor tendon and then across the fracture site into the proximal metacarpal or even into the carpus.20,21 Metacarpal shaft fractures of the border digits, the index and small finger metacarpals, can be Kirschner wired transversely to noninjured metacarpals.

An alternate method of percutaneous pinning of a metacarpal shaft fracture is to use the “bouquet arrangement” of multiple intramedullary Kirschner wires inserted antegradely from the base of the metacarpal.22–24

Open reduction and internal fixation of metacarpal shaft fractures is indicated for unsuccessful closed reduction and percutaneous fixation, or for (1) significantly displaced transverse fractures or fractures that have residual angulation of greater than 10 degrees in the index and middle fingers, 20 degrees in the ring finger, and 30 degrees in the small finger; (2) spiral or oblique fractures with residual malrotation and scissoring; (3) multiple metacarpal shaft fractures when multiple Kirschner wires may not allow early movement after surgery; (4) open metacarpal shaft fractures; or (5) segmental metacarpal bone loss.

Metacarpal shaft fractures are exposed through a longitudinal incision to one side of the extensor tendon. The most simple fixation technique is to insert a Kirschner wire longitudinally down the medullary cavity of the metacarpal. The Kirschner wire is introduced antegradely at the fracture site into the distal fragment and drilled out through the radial or ulnar aspect of the metacarpal head and then drilled back retrogradely after the fracture has been reduced into the proximal fragment and even into the carpus. Longitudinal intramedullary Kirschner wire fixation is an excellent solution for multiple open transverse metacarpal shaft fractures. The crossed Kirschner wire configuration is more stable, but it is more difficult to achieve except for metacarpal shaft fractures of the border index and small finger metacarpals.25,26

Dorsal plate-and-screw fixation may be considered for fixation of a single unstable metacarpal shaft fracture (Fig. 3) but is more usually indicated for multiple metacarpal fractures, open metacarpal fractures, and fractures where there is segmental bone loss or an associated dorsal soft-tissue injury. Low-profile 2.7- or 2.4-mm plates are usually applied dorsally, with fixation of at least four cortices both proximal and distal to the fracture site.27–29 The newer low-profile plates do not usually need to be removed unless a secondary tenolysis of the extensor tendons or capsulotomy of the metacarpophalangeal joint is necessary or if the patient feels that the plate is annoyingly palpable or causes cold intolerance. Spiral and long oblique metacarpal shaft fractures that are unstable or have persistent malrotation and scissoring after closed reduction are best treated with open reduction and interfragmentary screw fixation.30 Fractures that are amenable to screw fixation should be two to
three times longer than the diameter of the metacarpal. The proximal and distal apices of the fracture are manipulated into anatomical position and temporarily held with a reduction clamp or temporary Kirschner wire. Two 2.7-mm screws or three 2.4- or 2.0-mm screws should ideally be inserted midway between a plane at 90 degrees to the long axis of the metacarpal and the plane of the fracture itself (Fig. 4). It is important to avoid fragmentation of the apex of each fracture by placing the screw a minimum of two screw diameters away from the apex of the fracture.

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Fig. 3. (Left) Transverse fracture of the shaft of the index finger metacarpal. (Right) Open reduction and internal fixation with a 2.0-mm dorsal plate.

Fig. 4. (Left) Spiral fracture of the index and middle finger metacarpals. (Right) Open reduction and internal fixation of each spiral fracture with three 2.4- and 2.0-mm lag screws.
Comminuted open fracture of the metacarpal shaft with segmental bone loss or associated with loss of the overlying dorsal soft tissues is best treated by débridement and provisional bony stabilization to maintain metacarpal length, using either transverse Kirschner wires into an adjacent noninjured metacarpal, spacer wires, locked intramedullary nailing, or the newer generation of miniature external fixators. Serial débride-
ments are performed until the wound is clean enough to allow delayed primary wound coverage and bone reconstruction.

**METACARPAL NECK FRACTURES**

These fractures usually involve the ring and/or small finger metacarpals and assume an apex dorsal angulation because of bony comminution along the palmar cortex of the metacarpal neck and because the interosseous muscles flex the metacarpal head. Controversy remains as to how much apex dorsal angulation can be accepted (Fig. 5). Some surgeons believe that 40, 60, or even 70 degrees of apex dorsal angulation of the small finger metacarpal neck fracture is acceptable, but other surgeons believe that persistent angulation of greater than 30 degrees is unacceptable.

A simple test to determine whether apex dorsal angulation of the ring and small finger metacarpals is significant is to see whether the finger adopts a posture of pseudoclawing. When the patient attempts to extend the ring or small finger, the metacarpophalangeal joint will hyperextend and the proximal interphalangeal joint will flex. A prospective series comparing two groups of patients with small finger metacarpal neck fractures treated nonoperatively and operatively showed no difference in functional outcome despite residual apex dorsal angulation in the nonoperated group. However, patients will occasionally complain of decreased flexion of the finger, tenderness over a palpable metacarpal head in the palm, or loss of prominence of the ring or small finger metacarpal head. Although it used to be felt that all metacarpal fractures needed to be immobilized with metacarpophalangeal joint flexion, there is now a level I evidence study that Boxer (fifth metacarpal neck) fractures can now be immobilized with the metacarpophalangeal joints in extension.

**PHALANX SHAFT FRACTURES**

Nondisplaced stable fractures do not require reduction and can be treated by buddy-taping the fractured finger to an adjacent finger. If there is minimal pain associated with a nondisplaced sta-
ble fracture, immediate gentle active range of motion exercises can be started with buddy-taping. If there is pain or instability, the digit should be immobilized in a splint in the position of safety, with the metacarpophalangeal joint flexed 70 degrees and the proximal and dorsal interphalangeal joints in full extension to prevent contracture of the collateral ligaments.\(^4^7\) Splint immobilization should not be continued for longer than 3 weeks; otherwise, 60 percent of patients will develop stiffness.\(^1^9, 4^8, 4^9\)

Closed reduction of displaced proximal phalanx fractures causing dysfunction begins with longitudinal traction to disimpact the fracture. Flexion of the metacarpophalangeal joint stabilizes the proximal fracture fragment. Flexion of the distal fragment to correct angulation and malrotation is performed. Reduction is maintained by immobilization in an extension block splint for 3 weeks with the metacarpophalangeal joints flexed 90 degrees and the interphalangeal joints straight. Active flexion of the fingers and extension back to the limit of the splint can be initiated within a few days for stable transverse fractures, but inherently unstable spiral or oblique fractures should be immobilized for the entire time.

If fluoroscopy or radiography reveals loss of reduction, closed reduction and percutaneous fixation or open reduction and internal fixation may be required.\(^5^0\) Under fluoroscopy, two or three 0.035- or 0.045-inch Kirschner wires are inserted at right angles either to the fracture line or to the longitudinal axis of the phalanx and should engage both cortices (Fig. 6). If local anesthesia is used, rotational alignment can be checked by asking the patient to actively flex and extend their finger. If malalignment persists clinically or is observed radiographically, conversion to open reduction and internal fixation is indicated.

Closed reduction of middle phalangeal fractures can be achieved by flexing the proximal and dorsal interphalangeal joints to 90 degrees. Two crossed 0.035- or 0.045-inch Kirschner wires are then inserted in the midcoronal plane, antegradely from the base of the phalanx to the subchondral bone at the head of the phalanx, or they are introduced retrogradely from the retrocondylar fossa at the head of the phalanx to the subchondral bone at the lateral bases of the phalanx. It is preferable to avoid Kirschner wiring across the proximal interphalangeal joint if possible.

If closed reduction and percutaneous fixation of a proximal or middle phalangeal shaft fracture is unsuccessful, open reduction and internal fixation is necessary. (See Video, Supplemental Digital Content 2, which illustrates the operative reduction of a 4-week-old middle phalanx fracture that was healing in a malunited position, available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at [http://links.lww.com/PRS/A578](http://links.lww.com/PRS/A578). The fracture was opened and Kirschner wired, and early protected movement was initiated at 3 days postoperatively.) Fractures of the proximal phalanx are approached through a Pratt extensor tendon-splitting incision or by excising one of the lateral bands\(^5^1\) (Fig. 7).

Fractures of the middle phalanx can be approached by elevating the conjoined lateral bands. Open reduction of long oblique and spiral phalangeal fractures allows anatomical reduction by keying the apex of the fracture into the corresponding fragments, and provisional fixation with a reduction clamp\(^5^2\) or two or three transverse Kirschner wires. For more rigid fixation, two or three 2.0- or 1.5-mm lag screws (Fig. 8) are used for proximal phalangeal fractures and 1.5- or 1.3-mm screws are used for middle phalangeal fractures. Ideally, screws should be inserted in the plane that bisects the fracture line and the long axis of the phalanx and should be positioned at least two screw diameters away from the apex of any fracture line.\(^5^3–5^8\)

Finally, some transverse phalangeal shaft fractures are amenable to rigid fixation with a low-profile miniplate or mini–condylar plate.\(^2^7, 5^8, 5^9\) Positioning the plate laterally rather than dorsally prevents interference with gliding of the overlying
extensor tendon. Closed reduction with Kirschner wires is preferred by many over plate fixation because closed Kirschner wired finger tissues do not need to recover from extensive dissection, and because there is concern about tissues gliding over plates and the scar they induce in fingers. However, several reports imply that there is no significant difference in outcome when comparing phalangeal fractures treated by plate fixation and Kirschner wire fixation.60–62 There is no difference in the incidence of infection between buried and protruding Kirschner wires.63

CONDYLAR FRACTURES OF THE PROXIMAL AND MIDDLE PHALANGES

Condylar fractures are inherently unstable. If nonoperative splint immobilization is chosen for treatment of nondisplaced unicondylar fractures, weekly radiographic follow-up is mandatory to detect any proximal or palmar displacement. For displaced unicondylar fractures, closed reduction and percutaneous fixation should be attempted. If articular congruity can be confirmed under fluoroscopy, the fracture is fixed percutaneously with two Kirschner wires or miniscrews 1.3 or 1.5 mm in diameter.64 An alternative technique is to drill

Fig. 6. (Left) Displaced long oblique fracture of the proximal phalanx of the index finger. (Center) Closed reduction and percutaneous Kirschner wire fixation of the long oblique fracture of the proximal phalanx with three transverse Kirschner wires. (Right) Rotatory malalignment of the finger.

Video 2. Supplemental Digital Content 2 illustrates the operative reduction of a 4-week-old middle phalanx fracture that was healing in a malunited position. The fracture was opened and Kirschner wired, and early protected movement was initiated at 3 days postoperatively. Video 2 is available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at http://links.lww.com/PRS/A578.
Fig. 7. Operative exposure of a long oblique fracture of the proximal phalanx by retracting one of the lateral bands.

Fig. 8. Open reduction and lag screw fixation of the long oblique fracture of the proximal phalanx.
a Kirschner wire into the condylar fragment and use this as a joystick to manipulate the fragment into anatomical position. Care must be taken in closed reduction of these small delicate bone fragments, as large forces can cause irreparable damage.

If closed reduction and percutaneous fixation fails, open reduction and internal fixation is required through a dorsal longitudinal incision on the side of the condylar fragment. The fracture is exposed by incising the extensor tendon between the lateral band and central slip (Fig. 9, left). The central slip should not be detached from its insertion on the base of the middle phalanx and, similarly, the collateral ligaments should not be detached from the condylar fragment. The fracture is anatomically reduced under direct vision at the articular surface and so that the condylar apex keys into the defect on the phalangeal shaft. Reduction is maintained provisionally with a small towel clip, cannulated clamp, or Kirschner wire. The fracture is then fixed with two parallel transverse 0.028- or 0.035-inch Kirschner wires or two 1.3- or 1.5-mm lag screws if the fracture fragment is three times the diameter of the screw (Fig. 9, right, and Fig. 10). Early range of motion can be started carefully, but the proximal interphalangeal joint is splinted in extension to prevent the common complication of extensor lag.

Anatomical reduction of bicondylar or comminuted fractures is not usually possible by closed reduction. Articular congruency is initially achieved by fixing the two condylar fragments together with a miniscrew or Kirschner wire, and then the larger condylar fragment is fixed to the shaft with a screw or Kirschner wire. Dynamic traction devices may be indicated for comminuted fractures.

**DORSAL PROXIMAL INTERPHALANGEAL JOINT DISLOCATIONS**

Most dorsal dislocations and stable fracture-dislocations of the proximal interphalangeal joint can be treated nonoperatively, but it is vitally important to avoid prolonged immobilization, which results in either permanent stiffness or a flexion contracture of the proximal interphalangeal joint. It can be very helpful to view active proximal interphalangeal joint motion under live fluoroscopy in a lateral view to fully evaluate the stability of the joint after reduction of a dislocation. The finger can be elevated and wrapped with self-adherent tape to reduce swelling and then the finger can be buddy-taped to an adjacent finger and active range of motion exercises started. It should be emphasized to patients that stiffness and swelling of the finger can persist even up to 1 year after injury but that prevention of swelling and rapid restoration of full range of motion are important for achieving a good result. Chronic hyperextension deformities of the proximal interphalangeal joint can be successfully treated by tenodesis of the proximal interphalangeal joint using one slip of the flexor digitorum sublimis tendon.

Stable fracture-dislocations in which the avulsion fracture is less than 40 percent of the articular surface and the much rarer unstable pure dorsal dislocations without an avulsion fracture can be treated with 3 weeks of dorsal block splinting. After a true lateral radiograph has confirmed concentric reduction of the proximal interphalangeal joint, a dorsal splint is applied to the finger with the proximal interphalangeal joint in 30 degrees of flexion. Patients are able to actively flex the proximal interphalangeal joint, but the splint blocks extension before the point of potential redisplacement. The splint is extended progressively 10 to 15 degrees per week to allow increasing extension, but it is important to obtain true lateral radiographs every week to document that the joint remains reduced and has not redislocated or subluxated.

For unstable fracture-dislocations of the proximal interphalangeal joint where the volar fragment is greater than 40 percent of the articular surface, there is no consensus as to the optimal treatment. Occasionally, an extension block pin may be used, in which a 0.035-inch Kirschner wire is drilled into the head of the proximal phalanx between the central slip and lateral bands at an angle of approximately 30 degrees, to block dorsal subluxation of the middle phalanx but al-
low gentle flexion of the proximal interphalangeal joint and extension up to the point where the middle phalanx is prevented from further extension by the extension block pin (Fig. 11). (See Video, Supplemental Digital Content 3, which illustrates the closed operative reduction of a dorsal subluxation of the base of the middle phalanx with a dorsal blocking Kirschner wire to restore joint congruency and allow early protective movement without generating the scarring induced by open reduction, available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at http://links.lww.com/PRS/A579.)

Various dynamic skeletal traction devices have been described to apply both longitudinal traction to the finger and a palmar directed force to pre-
vent recurrent dorsal subluxation of the middle phalanx, yet still allow early active range of motion. These devices rely on the principle of ligamentotaxis and are especially suited to the treatment of comminuted fractures and pilon fractures of the base of the middle phalanx. The Schenck dynamic skeletal traction splint is effective but cumbersome.

The Agee force couple is difficult to fabricate, but the newer devices such as the Stockport Serpentine Spring System and the Agee Joint Jack are much simpler to apply. Unstable fracture-dislocations where there is a single large volar fragment greater than 40 percent of the articular surface are potentially amenable to open reduction and internal fixation with one or two small Kirschner wires or a small lag screw followed by early range-of-motion exercises.

Many unstable proximal interphalangeal joint fracture-dislocations are not amenable to open reduction and internal fixation because the volar fragment is comminuted. In these circumstances, the base of the middle phalanx can be resurfaced by advancement of the volar plate, which also prevents dorsal resubluxation. This technique of volar plate arthroplasty is performed through a volar Bruner incision, with retraction of the flexor tendons between the A2 and A4 pulleys and excision of the true collateral ligaments to allow shotgun exposure of the proximal interphalangeal joint. A transverse groove is made in the volar base of the middle phalanx, and the volar plate is advanced into this trough and fixed either with a pullout wire or miniature bone anchors. After confirming congruous reduction of the middle phalanx with respect to the head of the proximal phalanx, a 0.035-inch Kirschner wire is used to transfix the proximal interphalangeal joint in 30 degrees of flexion to maintain reduction for 3 weeks. The Kirschner wire is removed at 3 weeks and active flexion exercises are begun using a dorsal extension block splint for a further 1 to 2 weeks. Eaton and Malerich reported a 10-year follow-up of patients with both acute and chronic proximal interphalangeal joint fracture-dislocations treated by volar plate arthroplasty, with an average range of motion of 6/95 degrees for patients treated within 6 weeks of injury and 12/78 degrees for patients treated beyond 6 weeks after injury. More recently, Hastings has advocated treating unstable fracture-dislocations of the proximal interphalangeal joint by restoring the volar buttress of the base of the middle phalanx with a hemihamate autograft.

### Ulnar Collateral Ligament Injuries of the Metacarpophalangeal Joint of the Thumb

Ulnar collateral ligament injuries occur more frequently than radial collateral ligament injuries,
with an incidence of 65 to 90 percent of metacarpophalangeal joint injuries. The ulnar collateral ligament is injured by an abduction force at the metacarpophalangeal joint and has been termed skier’s thumb. The ligament is torn five times more frequently at its distal insertion from the base of the proximal phalanx than it is torn or avulsed from its proximal origin from the metacarpal head, although midsubstance tears are frequently seen. The collateral ligament may remain intact but avulse a small fracture from the ulnar base of the proximal phalanx or less commonly from the metacarpal head.

Stener described the proximal portion of the ulnar collateral ligament being flipped proximally and superficial to the adductor aponeurosis in two-thirds of complete ulnar collateral ligament injuries. Therefore, the adductor aponeurosis is interposed between the proximal and distal ends of the ulnar collateral ligament and the ligament cannot heal regardless of cast immobilization. If there is a Stener lesion, surgery is indicated. If a Stener lesion can be ruled out by physical examination, magnetic resonance imaging, or ultrasound, the ligament can be expected to heal with nonoperative immobilization for 4 to 6 weeks.

Because a Stener lesion cannot occur in a partial rupture of the ulnar collateral ligament, it is important to distinguish between partial and complete ruptures of the ligament, because partial ruptures can be treated by cast immobilization but complete ruptures with a high likelihood of a Stener lesion provide an indication for open reduction and repair. Distinction between partial and complete tears is usually made clinically based on the following criteria: (1) a complete tear has greater than 35 to 45 degrees of laxity on radial stress; (2) a complete tear has greater than 15 degrees of laxity compared with the opposite thumb; (3) a partial tear usually has a discrete endpoint to radial stress, whereas a complete tear has no endpoint to radial stress under local anesthetic block (Fig. 12); and (4) ultrasound or magnetic resonance imaging can be helpful.

If the posteroanterior radiograph shows a small undisplaced or minimally displaced avulsion fracture from the ulnar base of the proximal phalanx, this implies that the ulnar collateral ligament is at least partially intact. These patients can be treated by immobilization in a thumb spica cast with the interphalangeal joint left free for 4 weeks followed by 2 weeks of controlled mobilization in a short opponens splint.

If the posteroanterior radiograph shows an avulsion fracture with more than 2 mm of displacement or a large avulsion fracture, open reduction and internal fixation is indicated. The ulnar collateral ligament is approached through an S-shaped incision centered over the ulnar aspect of the metacarpophalangeal joint. The Stener lesion, if present, presents as an edematous mass proximal and superficial to the adductor aponeurosis. The aponeurosis is incised parallel to its insertion on the extensor pollicis longus tendon and reflected volarly. If a tear is found within the substance of the ulnar collateral ligament, this is repaired with figure-of-eight or mattress sutures. A suture should also be placed from the volar and distal aspect of the repaired ulnar collateral ligament to the volar plate, and any significant tear in the dorsal...
ulnar capsule should be repaired to prevent volar subluxation of the proximal phalanx. The strength of the repair is then tested by gently stressing the thumb into radial deviation, and only if there is a suggestion of some remaining laxity should the metacarpophalangeal joint be pinned with a 0.045-inch Kirschner wire in slight flexion and ulnar deviation. After repair of the adductor aponeurosis, the thumb is immobilized in a thumb spica splint with the interphalangeal joint free for 4 weeks.

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