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Finger Injuries in Football and Rugby

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SYNOPSIS

Football and rugby athletes are at increased risk of finger injuries given the full contact nature of these sports. Depending on the injury and the position played, some players may return to play early with protective taping, splinting, and casting. Other injuries, particularly in players requiring the full use of their hand for their position, require a longer rehabilitation period and prolonged time away from the field.

The treating hand surgeon must carefully weigh the benefits of early return to play for the athlete's current season and future playing career against the risks of re-injury and long-term morbidity, including post-traumatic arthritis and decreased range of motion and strength. Each player must be comprehensively assessed and managed with an individualized treatment plan.

Keywords

Rugby finger injuries; Football finger injuries; Jersey finger; Mallet finger; Return to play

Introduction

In the United States, football is the most played sport and rugby is the fastest growing sport.¹ Football and rugby athletes are at increased risk of upper extremity injury because of the full contact nature of these sports. A recent prospective cohort study found that collegiate rugby players sustained wrist and hand injuries 9.6 times more often than collegiate football players.¹ Hand injuries in rugby players occur most commonly during the tackle, the maul, and when handling the ball.² In football, injuries occur most commonly during tackling and in games rather than in practice.³ Hand and finger injuries represent 12% of all football injuries.⁴

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The authors have nothing to disclose.

For the safety of a player's teammates and opponents, the only protective equipment that can be used in rugby is taping. Plastics and metals are prohibited. In football, padded playing splints and casts can be worn, facilitating an earlier return to play as the injured player's position permits.

For high school athletes, fracture rates are highest in football compared to other sports (4.37 per 10,000 athlete exposures ie. one athlete participating in 1 practice or game).⁵ Football players are the most likely to return to play immediately compared to other sports, in part because playing casts are permitted.⁶ Fractures occur most commonly in the hand and fingers in football (36%).⁵ Injuries result most commonly from contact with another player (63% of fractures).⁶ Fractures are most commonly sustained during running plays while being tackled (27%), tackling (22%), or blocking (14%).⁶

A study by Goldfarb et al. of hand, thumb, and finger injuries in National Football League (NFL) players over a 10 year period found that 48% of injuries involved the fingers, 30% involved the thumb, and 22% involved the hand.³ Hand injuries were most common in lineman whereas wide receivers and defensive secondary players (safeties and cornerbacks) sustained the most finger injuries.³ The fewest injuries were seen in tight ends for hand, thumb, and finger injuries, followed by quarterbacks.³ Metacarpal fractures (80% of hand injuries) and proximal interphalangeal (PIP) joint dislocations were the most common injuries.³ The most days missed from play resulted from hand bursitis (41 days), PIP subluxations (41 days), thumb sprains (35 days), tendon lacerations (30 days), and Bennett fractures (30 days).³

For physicians caring for athletes, one of the most challenging treatment decisions is when to permit the athlete to return to play. The risks and benefits should be discussed with the player and his/her family, coach, athletic therapist, trainer, and agent. The risks of reinjury and long-term morbidity with early return to play must be weighed against the professional and financial consequences incurred if return to play is delayed. Factors to consider are the player's hand dominance, stage of career, future playing career, position, and ability to play with a protective splint. The amount of time left in the season, the level of play, and the timing of contract negotiations are also important factors. A young player's potential college and professional careers must be considered as their injury could greatly impact their livelihood. A study surveying 37 consultant hand surgeons for teams in the National Football League, National Basketball Association, and Major League Baseball demonstrated consideration variability for the initial management and return to protected and unprotected play for professional athletes, highlighting the need for individualized management for each injured athlete.⁷

In football, injuries to the dominant hand are most limiting for quarterbacks and centers.⁸ Skilled position players tend to have a delayed return to play compared to nonskilled position players. Skilled players include quarterbacks, running backs, wide receivers, and tight ends. Nonskilled players include offensive and defensive linemen and linebackers who do not require ball-handling skills.

Athletes tend to recover more quickly and more completely than the general population. Their superior baseline health, absence of comorbidities, motivation, and access to physicians and therapists improve their outcomes. Twice daily hand therapy with skilled hand or athletic therapists helps accelerate recovery compared to the general public.

A thorough history and physical exam is important for every injured athlete. Although rare, it is important not to miss a second injury that may be masked by the first due to pain, swelling, or a physical exam that is overly focused. For example, Bhargava and Jennings describe a UCL tear that occurred simultaneously with a CMC dislocation of the thumb in a football player.⁹ The consequences of continued play with a missed injury can have serious long term effects on rugby and football players. Comparison to the contralateral uninjured hand is particularly important for assessment of ligamentous laxity and tears as well as rotational deformity of the digits secondary to fractures. Digit or wrist block anesthesia can facilitate a throughout examination.¹⁰

Soft tissue injuries

Mallet finger

The most common closed tendon injury in athletes is a mallet injury of the finger.¹¹ Forced flexion during active extension of the distal interphalangeal (DIP) joint or direct strikes of the football or rugby ball to the tip of the finger can result in this injury. The extensor tendon is torn at its insertion on the dorsal base of the distal phalanx. In rugby, back row forwards, full backs, and wingers most frequently sustain a mallet finger injury.²

An untreated mallet finger can progress to a swan-neck deformity of the finger with hyperextension of the PIP joint due to tendon imbalances. Early recognition and treatment are important for optimal recovery of DIP joint extension and finger strength.

Isolated tendinous injuries can be treated with extension splinting of the DIP joint or with buried, percutaneously placed K wires for 6 weeks (Fig. 1A-B). The effectiveness of splinting can be confirmed with high resolution US, but this technology is seldom needed.¹² To be successful, the extension splint must permit the ruptured end of the extensor tendon to be in contact with the bone for secondary healing. If there is gap between the bone insertion and the terminal tendon despite DIP joint extension, open surgical repair is necessary.¹³

When there is an associated fracture, treatment may require splinting, K wires, or open reduction and internal fixation depending on the fracture pattern and the degree of articular surface involvement. Restoration and maintenance of a concentric DIP joint is important for range of motion, prevention of a painful joint, and mitigating the risk of post-traumatic arthritis.

K wires are preferred to lessen the risk of splint dislodgement during sport, which would require the period of immobilization to be restarted. Burying the K wires lessens the risk of pin site infection, osteomyelitis, pin migration, and skin breakdown. Two K wires should be used to prevent rotation of the distal phalanx relative to the middle phalanx and to increase stability of the DIP joint.

Typically the athlete can continue training and game play with the appropriate splint or fixation with K wires. If tolerated by the athlete's position requirements, a splint is worn for play with K wires in place for further protection. The skin is monitored for maceration and breakdown daily. However, some authors believe that athletes should wait 6 weeks for K wire removal prior to return to play given the risk of pin breakage, migration, and infection.¹⁴ After 6 weeks, the K wires are removed. All athletes, whether treated nonsurgically or surgically, are advised to continue splinting for an additional 6 weeks at night and during sports.¹⁵

Jersey finger

Rupture of the flexor digitorum profundus (FDP) occurs more commonly during contact sports than during noncontact sports.¹¹ The FDP is avulsed from its insertion on the volar base of the distal phalanx and retracts a variable distance depending on the presence of an avulsion fracture and the integrity of the vincula system. This is known as a jersey or rugby finger. Closed FDP ruptures are uncommon in young healthy athletes.¹⁶ Football and rugby players are at risk of this injury when the DIP joint is forced into extension while actively flexed. This occurs most commonly while pulling on a loose jersey. Jersey finger can affect all fingers, but injuries to the ring finger account for 75% of cases.¹⁵

FDP injuries require surgery to restore active flexion of the DIP joint. They cannot be adequately treated with splinting alone. Controlled, guided physiotherapy is required postoperatively for 3-6 months to maximize range of motion and strength outcomes. A dorsal blocking splint is worn for 6 weeks after surgical repair. Strengthening exercises begin at 8 weeks postoperatively if full range of motion is present. For athletes who require the full use of their affected hand for their position, return to play may take 4-6 months.¹⁵

The timing of surgical repair varies based on the level of tendon retraction and the presence of a fracture. Based on the Leddy and Packer classification and Smith's modification, type I (retraction of the FDP tendon to the palm) and IV (associated volar avulsion fracture of the distal phalanx with simultaneous avulsion of the FDP from the fracture fragment, retraction of the FDP tendon to the palm) injuries requires early surgical repair within 10 days of the injury to prevent tendon retraction.¹⁷ If the athlete chooses not to be treated during the season, his/her overall outcome will be compromised and the player must be properly counseled on their options. A tenodesis or arthrodesis of the DIP joint can be performed at the end of the season. Or two stage tendon reconstruction can be performed in a delayed fashion; however, the athlete must be counseled that this technique requires two surgeries and extensive physiotherapy both preoperatively and postoperatively to maximize range of motion outcomes. Full return of range of motion is unusual.

Early surgical repair can be done using a variety of techniques including a transverse intraosseous suture, Z-lengthening of the retracted tendon stump, or a pull-through suture over button repair (Fig. 2A-C).¹⁸ Bone anchor techniques or lag screw fixation are also commonly employed.¹⁹

With a type II (retraction of the FDP tendon to the PIP joint) or III (associated volar avulsion fracture of the distal phalanx that limits retraction of the FDP tendon to the DIP joint) jersey

finger, repair can generally be delayed 6 weeks if the tendon gap is less than 1 centimeter.²⁰ However, there have been reports of marked tendon retraction following a type II injury which have required tendon lengthening to facilitate repair.²¹ Athletes must be counseled that there may be additional risk with delayed repair compared to early surgical treatment. Some authors recommend timely surgical repair for all types of jersey finger.¹⁵

MRI or US of a tendon can quantify the amount of tendon retraction to guide treatment, particularly for type II jersey fingers. The integrity of the tendon sheath and pulleys can also be assessed using these non-invasive imaging modalities. Some authors believe that physical exam is inaccurate and that imaging is more helpful in determining the level of tendon retraction compared to palpating for the point of maximal tenderness.¹⁸

Collateral ligament tears

Football, rugby, and other tackling sports result in repetitive radial and ulnar directed stresses to the metacarpophalangeal (MCP) and interphalangeal (IP) joints of the hand. As a result, radial and ulnar collateral ligament injuries are common. Coaches and athletes often refer to collateral ligament injuries as a jammed finger. Centers, wingbacks, and back row forwards sustain the most collateral ligament injuries in rugby.²

On lateral stress testing, incomplete collateral ligament tears maintain a firm endpoint and have less than 20 degrees of joint opening compared to the contralateral uninjured finger. These injuries can be treated with buddy taping to the adjacent finger. Alternatively, the injured digit alone may be taped to permit for flexion and extension while maximizing radial and ulnar support (Fig. 3).²² Early hand therapy is important to minimize adhesions and to maximize range of motion.²²

Complete tears lack a firm endpoint and demonstrate over 20 degrees of joint opening on lateral stress testing. These injuries can be treated closed with buddy taping or open using suture anchors.²³ Following suture anchor repair, active motion can be started 2 weeks postoperatively and return to play is permitted 6 weeks postoperatively.²⁴

Ulnar collateral ligament injuries of the thumb metacarpophalangeal joint—

Thumb ulnar collateral ligament (UCL) injuries occur in rugby and football from falls on an outstretched hand or with forced abduction on the thumb MCP joint. These injuries can lead to joint instability, an abduction deformity of the MCP, chronic pain, decreased pinch strength, joint incongruity, and post-traumatic arthritis. When a complete tear is present, stress testing of the thumb MCP joint with a distal radially directed force reveals over 30 degrees of joint space opening, over 15 degrees of increased UCL laxity compared to the contralateral, uninjured thumb, and the loss of a firm endpoint. Stress radiographs, US, or MRI can help establish the diagnosis when the clinical findings are equivocal.

Partial UCL tears of the thumb MCP joint are treated with joint immobilization. A thumb spica splint or cast is worn to prevent further damage, particularly with repeated abduction forces to the thumb. A partial tear with no ligamentous laxity can be splinted until pain and tenderness resolve.¹⁵ Pain can persist for months, often noted with gripping activities;

prolonged immobilization may be required with splinting or taping techniques.²⁵ Partial tears with ligamentous laxity on abduction stress testing require splinting for 4-6 weeks.¹⁵

Football players who are able to play with a cast may do so early. They must be aware of the risk of progression to a complete tear with a repeat injury that could lead to the need for surgery, MCP joint instability, and post-traumatic arthritis.²⁵ Skilled players with dominant hand injuries may require 12 weeks away from play until the ligament is healed and the MCP joint is stable.

Complete UCL tears typically mandate surgical repair. In uncertain cases, US or MRI can be used to look for a Stener lesion, confirming the need for surgical intervention. Some authors believe that casting alone for 6 weeks may lead to favorable outcomes, eliminating the need for surgical intervention.¹⁵ However, if the MCP joint remains unstable after 6 weeks of immobilization, surgery is required. Depending when the injury occurs, ball handling players may prefer early acute surgical repair to avoid the possibility of surgery later in the season. The opposite may apply to nonskilled players who are able to complete their season in a playing cast and can consider surgery in the off season if joint instability persists.

If surgery is performed, the player can consider return to play with a protective cast at 2 weeks postoperatively once the soft tissues are healed.²⁵ The MCP joint is immobilized for 6-8 weeks. Abduction and adduction stresses are avoided. Strengthening exercises are started 6 weeks postoperatively. Once the player is back playing, protective taping can be used for the rest of the season.²⁵

Common surgical options include direct ligament repair with a nonabsorbable suture for intraligamentous ruptures and suture anchors when the ligament is avulsed from its insertion on the base of the proximal phalanx (Fig. 4). Pull out buttons can also be used to reinsert the ligament into bone. Cadaveric studies suggest that pull out buttons have greater resistance to force compared to suture anchor techniques.²⁶ Chhabra et al. reported quick return to play and excellent long-term results in their study of 18 college football players following UCL repair with a suture anchor.²⁷ The average time to surgery was 12 days for skilled players and 43 days for nonskilled players.²⁷ Skilled players returned to play 7 weeks postoperatively whereas nonskilled players returned at 4 weeks; all athletes returned to the same level of play and there was no difference in clinical outcomes between the skilled and nonskilled player groups over a two year follow-up period.²⁷ 64% of consultant hand surgeons surveyed by Carlson et al. recommended waiting 12 weeks prior to return to unprotected play for NFL players.⁷

Finger interphalangeal joint dislocations—IP joint dislocations are common in contact sports. PIP joint dislocations are the most common finger injury sustained by football players.³ The ulnar two digits are injured in 66% of cases.³ Preventive taping or bracing can be considered for the PIP joints of the ring and small fingers of wide receivers, safeties, cornerbacks, and linemen who are most prone to injury.³ Taping techniques can also be used to help prevent IP joint dislocations of the thumb.²²

Many IP joint dislocations are treated with closed reduction on the field. It is important for the player to be evaluated as soon as possible following the injury. If the player remains in the game, he/she should be evaluated at half time or immediately after the game. X-rays are performed to ensure the joint is congruent and to assess for associated fractures. The volar plate, ulnar and radial collateral ligaments, and extensor tendon (central slip for PIP dislocations, terminal tendon for DIP dislocations) are examined. The range of motion of the reduced joint is tested actively and passively and joint stability is assessed.

Stable IP joints may be immobilized for 2-3 days for comfort then range of motion exercises are begun.¹⁵ Others believe that athletes may return immediately to play if the joint is stable following reduction.⁷ Buddy taping or protective splinting, as permitted by league rules, is used to protect the digit when the athlete returns to play. Buddy taping decreases the incidence of recurrent hyperextension and lateral displacement.²⁸ Zinc oxide, self-adhesive tape, and commercially available straps can be used for buddy taping.²⁹

Bowers reported that virtually all pure hyperextension injuries of the PIP joint result in rupture of the distal insertion of the volar plate from the base of the middle phalanx.³⁰ These injuries can be treated with buddy taping. PIP joint fracture-dislocations occur based on the angle of the PIP joint at the time of injury. Axial stress on the middle phalanx can result in volar, dorsal, or a combination of fractures, depending on the angle of the PIP joint.³¹

Stable dorsal fracture-dislocations of the IP joints are treated with dorsal blocking splinting and early range of motion exercises. The joint is flexed and blocked at the angle in which joint stability and congruency are maintained. The splint prevents further extension beyond this angle and reduces the chance of repeat dislocation or subluxation. Often 20-30 degrees of flexion is used for 3 weeks and the angle is decreased by 10 degrees every week thereafter. Joint stability must be assured at all times with repeat clinical exam and x-ray imaging. Protective static splinting can enable early return to play for football athletes; dorsal block splinting is used when not playing.

Unstable dislocations and fracture-dislocations require operative intervention. Instability often results from PIP fracture-dislocations involving over 40% of the volar base of the middle phalanx. Dynamic traction, open reduction and fixation with K wires or screws, hemihamate or volar plate arthroplasty, and cerclage and tension band wiring techniques can be used to treat these injuries. Players should be counseled about the increased severity of these injuries compared to purely ligamentous PIP injuries and the increased likelihood of residual stiffness, decreased flexion, and post-traumatic arthritis.

Boutonniere deformity

Volar PIP joint dislocations are far less common than dorsal dislocations. Following closed reduction, the integrity of the central slip must be assessed. If closed reduction fails, open reduction is required. Following either a volar PIP joint dislocation or an isolated central slip injury, the player is examined using an Elson test to evaluate the integrity of the central slip. The player's PIP joint is flexed over the end of an examination table with the palm and proximal phalanx on the table. The player is asked to extend his/her middle phalanx joint against resistance. If the central slip is injured, PIP extension is absent or weak; instead, DIP

extension occurs as the extension force is transmitted through the lateral bands to the distal phalanx. If the athlete is unable to maintain extension of his/her PIP joint, he/she should be treated as an acute Boutonniere injury with 6 weeks of full time extension splinting of the PIP joint with the DIP joint free.^{32,33} An additional 6 weeks of nighttime splinting is often recommended, particularly if a mild, residual PIP hypertension deformity persists. Range of motion of the DIP joint is encouraged to maintain the dorsal location of the lateral bands.

Football players can return to sport if they are able to play their position while wearing a splint. Buddy taping is also performed to further protect the injured digit.¹⁴ Players requiring the use of their digit for their position are unable to return to play for a minimum of 6 weeks until the tendon has healed.

If a skilled football player or rugby player is unable to take time off from their sport, secondary Boutonniere reconstruction can be performed after the season. Often an extensor tenotomy is required to correct the PIP hyperextension deformity.¹⁴

An open central slip injury requires open tendon repair. If there is an associated fracture requiring fixation, K wires or screws can be used. If K wires are used, these players may be unable return to play until the K wires are removed in 6 weeks unless they can be adequately protected in a playing cast. If stable screw fixation is achieved, players can often return to play in 2 weeks with a playing cast once the skin and soft tissues are healed.

Bone injuries

Fractures

Hand fractures account for up to a third of all fractures sustained by athletes.³⁴ Most are low energy and result in minimally displaced, extra-articular fractures with limited soft tissue injury.³⁵ Football has the highest rate of hand fractures accounting for 50% of all hand fractures sustained playing sport.²² In rugby, the centers, back row forwards, and scrum halves sustain hand fractures most frequently.² Anatomic, stable fracture restoration and early range of motion are critical to maximizing outcomes following a fracture.^{35,36} Percutaneous techniques can reduce soft tissue dissection, edema, and fibrosis while ensuring stable fracture fixation and limiting fragment devascularization.³⁶

Nondisplaced, stable fractures of the hand can be treated with a playing cast for 4-6 weeks.³⁷ Displaced fractures are treated with closed reduction to convert an unstable fracture to a stable pattern. Displaced fractures that are stable following closed reduction can be treated non-operatively.³⁸ If a displaced fracture cannot be converted to a stable fracture, operative intervention is indicated. Unstable fractures are treated surgically and then protected with a cast. Range of motion exercises with protective splinting are started 7-10 days postoperatively.³⁷

Timing of return to play depends on the position of the player. Since playing casts are permitted in football, but not in rugby, earlier return is possible for football athletes. Return to play in football with a playing cast occurs at 1-2 weeks for a lineman, linebacker, or kicker with a nonsurgical fracture. 2-4 weeks away from contact play may be required for

these positions if open reduction internal fixation is performed, depending on the fixation stability. Once the soft tissues are healed, play may be resumed in a protective playing cast. 6-10 weeks may be required for a running back, receiver, or quarterback in football and for all rugby players prior to return to contact practices and games. These players can return to play once normal (85% of contralateral) strength has been reestablished in the injured hand and splinting has been weaned.³⁷ Fractures in the throwing hand and in those requiring a strong power grip for tackling typically have the most delayed return to play.

Metacarpal fractures—An axial force (for example, a fall on a clenched fist), a direct blow to the hand (from another player or the ball), a fall, getting the hand twisted in a jersey, and being stepped on are mechanisms that result in metacarpal fractures in football or rugby.³⁹ Fractures occur most commonly in the mid-diaphysis of the metacarpal; the long finger is most commonly injured.³⁹ 80% of metacarpal fractures in athletes are minimally or nondisplaced, 5% remain stable after reduction and can be maintained with functional bracing, and the remaining 15% require surgical treatment.⁴⁰

38% of consultant hand surgeons let professional football, baseball, and basketball players return to protected play with a nondisplaced metacarpal fracture immediately; 57% waited 3-4 weeks after injury.⁷ 73% permitted unprotected play 4-8 weeks after injury.⁷ For collegiate and high school football athletes, protective splints were used for an average of 21 days.³⁹ Glove casts can be used to immobilize a stable metacarpal fracture will permitting continued range of motion and use of the wrist.¹⁰

Surgical intervention is recommended for metacarpal shaft fractures with over 5mm of shortening, over 30 degrees of dorsal angulation, displacement, or rotational malignment.¹⁰ Articular incongruity is another indication for operative fixation. Minimal rotation deformity is accepted in athletes who require their hands to grasp and throw to maintain maximal grip strength.⁴¹ If surgical intervention is required to restore alignment or stability following a fracture, techniques that provide the greatest strength with the least amount of tissue dissection are preferred.^{38,40}

If surgical intervention is needed, plate fixation or lag screws are often used. Geissler and McCraney recommend using a 2.0mm cage plate and subsequent return to protected play in 2 weeks.⁴² Fufa and Goldfarb also recommend time for wound healing and suture removal with return to play at 2 weeks followed by 6 weeks of protective play.⁴¹ Others report return to play in less than 10 days following surgery for a metacarpal fracture for high school athletes and in less than 3 days for college football players with no additional incidence of postoperative hardware failure or wound complications.³⁹

Unstable metacarpal fracture patterns, such as undisplaced intra-articular head and base fractures, are often treated prophylactically with internal fixation in athletes to prevent later displacement.⁴³ Plate and screw fixation are preferred, facilitating return to play in 14 days compared to 36 days with K wires.⁴⁴ Lag screws provide excellent fixation for long spiral metacarpal fractures. Geissler recommends considering the use of plate fixation for border digit metacarpal fractures in contact athletes.³⁶

Phalangeal fractures—Phalangeal fractures are the most common fracture of the hand in athletes as well as the general population.³⁸ The metacarpals are more protected and less prone to injury. In the hand, the distal phalanx is the least well protected. Consequently, distal phalanx fractures constitute almost half of all hand fractures.⁴⁵

Some hand surgeons authorize players with stable phalangeal fractures in good anatomic position to participate in sports immediately after injury in a protective cast. Others prefer to wait until there is evidence of radiographic healing around 3 weeks after injury.⁴³ Unstable fractures include those with displaced articular fragments, rotational deformity, over 15 degrees of angulation, and over 6mm of shortening.³⁸ For these unstable fractures, play can be resumed in 1-2 weeks after surgery with a playing cast. 6-8 weeks is required prior to unprotected play.⁸

Open reduction with internal fixation with plates is most commonly used for unstable phalangeal shaft fractures.³⁸ Rigid fixation permits immediate range of motion exercises and earlier return to play.³⁸ A dorsal or midaxial surgical approach is used. Plates are placed on the dorsal or lateral surface of the phalanx. Lateral placement is ⁴²prefer by Geissler to decrease extensor tendon adhesions.³⁶ Alternatively, percutaneous techniques can be used. Geissler described the use of headless cannulated mini screws for intraarticular unicondylar and bicondylar fractures.⁴⁶

Stable proximal and middle phalanx fractures are treated with buddy taping and protective splinting for 4-6 weeks.³⁸ Unstable proximal and middle phalangeal shaft fractures are stabilized with K wires, screws, or plates.³⁸ Plates and screws are preferred over K wires in athletes to increase biomechanical strength, minimize soft tissue irritation, minimize the incidence of pin site infection, minimize the risk of hardware breakage or migration, and to facilitate earlier range of motion.

Long oblique fractures, with a fracture length over twice the diameter of the bone shaft, can be fixed percutaneously or open with 3 lag screws to achieve the same biomechanical torsion strength as plate fixation.³⁸ Intraarticular unicondylar fractures are most commonly treated operatively in athletes owing to their high propensity for displacement.⁴³ Even if these fractures appear undisplaced initially, there is a tendency for later loss of reduction due to the unstable nature of this fracture pattern. Percutaneously placed headless compression screws are often used (Fig. 5A-B).^{36,38} Bicondylar fractures may require a plate in addition to lag screws across the condyles for adequate stability.³⁸ Unstable intraarticular phalangeal base fractures are treated with headless compression screws via a percutaneous or open approach.³⁸ If screw placement is not possible, K wires can be used.

Stable distal phalanx fractures are treated with protective splinting for 2-3 weeks with the PIP free.³⁸ Unstable fractures are treated with K wires or single screw fixation.³⁸

PIP joint fractures—Outcomes after a PIP joint fracture tend to be better with primary intervention rather than delayed reconstruction.²⁸ Stable dorsal fractures (for example, a reducible volar lip fracture-dislocation) can be treated with buddy taping and early return to play.²⁸ Splints can be worn outside of sports. Close follow up and range of motion exercises

are required to aid in the return of full motion. Stable lateral fracture-dislocations, both ulnar and radial, can be treated with buddy taping and protective splinting if the avulsion fracture is displaced less than 2mm.³⁸

Unstable dorsal fracture-dislocations with a tendency towards recurrent dorsal subluxation require dorsal block splinting to maintain joint congruency while permitting early range of motion to prevent joint stiffness and permanent limitations in range of motion. PIP flexion is maintained at all times; dorsal block splinting is used when the player is not playing and protective casting is used when participating in practices and games. Close observation with repeat clinical exams and x-rays is required, predominantly during the first 3 weeks after injury.²⁸

Unstable volar fracture-dislocations with dorsal lip fractures are typically treated with extension splinting. If a football player's position permits, they may return to play early in a protective cast. For a rugby player or skilled football player, return to play is delayed. Alternatively, the fracture can be treated surgically. Nonomura et al. reported good results with open reduction and internal fixation of a bony central slip dorsal middle phalanx fracture using a mini hook plate.⁴⁷

Unstable volar fractures (for example, a volar lip fracture involving over 50% of the articular surface) should be treated acutely to optimize the player's long term result.²⁸ An open shotgun approach to the PIP enables placement of screws if the fracture fragment is of adequate size.³⁸ Return to play following surgical intervention can occur 1 week postoperatively for football players able to play in a cast and 4-6 weeks postoperatively for players requiring their hand to tackle. In the latter, buddy taping and thermoplastic splint reinforcement are advised when play is resumed.²⁸

Hand therapy

In general, hand therapy is started 2-3 days after injury with range of motion exercises. Non-involved joints of the hands should be mobilized immediately. Early range of motion exercises are important in achieving optimal outcomes.³⁵

Edema control is imperative for all finger injuries. Elevation, compression gloves, sleeves, taping, retrograde massage, anti-inflammatory medications, and icing can be used. Fingers should be monitored daily and therapy exercises should be adjusted if causing worsening edema. Controlled, noncontact athletic training can be resumed with the hand properly protected once the initial injury edema has subsided.⁸

Protective equipment

In rugby, no plastic and metal can be worn, even if covered by padding or tape. Only soft braces or neoprene sleeves are permitted. Full finger gloves are not permitted, only rugby-specific unpadded gloves with open fingers can be worn.⁴⁸ Gloves can be used in football at all levels, including compression gloves for edema management. Taping is permitted in both rugby and football and can be used to prevent injuries or to stabilize digits after injury when play is resumed.⁴⁹

In football, playing casts are permitted to facilitate early return to game play (Fig. 6).³⁶ Playing casts must be padded to protect the player, his/her teammates, and his/her opponents. High density, slow-recovery, closed-cell polyurethane foam is commonly used. Padded gloves, a bivalved padded cast, a padded club cast, and a padded splint may also be worn.³⁹ Skilled position players often use padded gloves when they return to protected play. Nonskilled position players can return sooner with greater protective offered by padded casts.

High school athletes have been able to wear playing casts since 1994.⁵⁰ The National Federation of State High School Associations states in 1.5.3b1:

ILLEGAL: Hard substance in its final form such as leather, rubber, plastic, plaster or fiberglass when worn on the hand, wrist, forearm or elbow unless covered on all exterior surfaces with no less than 1/2 inch thick, high-density, closed-cell polyurethane, or an alternate material of the same minimum thickness and similar physical properties to protect an injury.⁵¹

For football, National Collegiate Athletic Association (NCAA) athletes must also wear 0.5 inch closed-cell polyurethane padding. For NFL athletes, 0.25 inch padding is required.²² Protective splinting for fractures should include the joint above and below the fracture site.³⁸

To prevent injuries, shorts with pockets should not be worn while playing rugby.¹⁹ When pockets are worn, catching a finger in the pocket of an opponent's shorts is the most common mechanism of jersey finger injuries.⁵²

Off the field, continuous splitting can be stopped 4-6 weeks after injury if the player demonstrates radiographic evidence of fracture healing and the fracture site is no longer tender with palpation or with use.⁴⁰

Return to play

Early return to controlled conditioning exercises is safe for most athletes. Stationary bikes, incline treadmill walking, trunk and abdominal exercises, and lower body strengthening can be performed.

In general, return to contact drills and games after an open surgical procedure should be no sooner than 1-2 weeks postoperatively for skin and soft tissue healing and suture removal.^{14,53} In a study by Kodama et al, two rugby players were not compliant with their postoperative instructions and suffered a wound dehiscence when they returned to play the day after their open reduction and internal fixation of their hand fractures.⁵³

Players are most prone to injury during tackling, blocking, and other contact.³ The act of tackling or blocking results in more injuries than being tackled or blocked.³ Protective splinting is very important when these activities are resumed. Return to unprotected play can be permitted when the player no longer has pain with impact.⁴⁰ For players with injuries to their nondominant hand or who play nonskilled positions, the protective splint may be continued for the rest of the season during play.⁴⁰

Summary/Discussion

Physicians may feel pressure to permit athletes, particularly high-level players with professional aspirations, an early return to play by the athlete as well as by his/her coach, family, agent, and trainer. The risks and benefits should be discussed and documented and an informed decision should be reached. The risk of re-injury and long term morbidity must be carefully considered by all involved parties.

It is important to set aside adequate time for a comprehensive consultation with an athlete. There are many factors to consider when treating football and rugby players including the decision for nonoperative vs. operative intervention, the use of casts, splints, and taping both off and on the field, the timing of return to protected and unprotected play, and the creation of weekly hand therapy goals. Typed instructions can be helpful in guiding a player's treatment. Athletes are goal-oriented individuals and having weekly recovery milestones can help them stay on-track and engaged in their treatment plan.

An athlete's aspirations for their playing career and for their life after sport must be thoroughly discussed. A player's long-term life ambitions should not be compromised for their short-term playing career. Obtaining a second and even a third opinion from other hand surgeons can be helpful for an athlete as they consider their treatment options following a finger injury.

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KEY POINTS

- Football and rugby athletes are at increased risk of finger injuries owing to the full contact nature of these sports.
- The timing of return to play is critically important for football and rugby athletes. The physical, emotional, and financial implications of time away from the field must be weighted against the risk of reinjury and the effects on long term outcomes with an early return.
- Football players are permitted to wear playing casts. For nonskilled players, such as linemen who do not handle the ball, this can facilitate an early return to play. Skilled players such as wide receivers typically miss more games while recovering from a finger injury.
- Rugby players are not permitted to wear playing casts for the safety of their teammates and their opponents. Only taping can be used. This often leads to a delayed return to sport following a finger injury.

Fig. 1. (A) PA and (B) lateral radiographs showing two buried, percutaneously placed K wires used to treat a mallet finger. The DIP joint is held in extension for 6 weeks. If the player returns to play with the K wires in place, a DIP extension splint is recommended for additional protection.

Fig. 2.

A jersey finger can be repaired using a pull-through suture button technique. (A) The distally avulsed FDP tendon is reattached to its insertion on the volar base of the distal phalanx using a non-absorbable suture. Two Keith needles are drilled through the distal phalanx obliquely to pass the suture tails from the volar distal phalanx base to the dorsal distal phalanx, through the nail distal to the germinal matrix. (B) The pulleys are maintained. (C) The suture is tied over a button dorsally and remains in place for 6 weeks following repair of a jersey finger. Early hand therapy, with the button in place, is critical to allow tendon gliding to optimize the range of motion of the injured finger.

Fig. 3. Individual finger taping can be used to allow early return to play for collateral ligament injuries.

From Singletary S, Geissler WB. Bracing and Rehabilitation for Wrist and Hand Injuries in Collegiate Athletes. Hand Clin 2009;25(3): 447; with permission.

Fig. 4.

Suture anchor repair can be used to treat complete tears of the thumb MCP UCL. The ligament is more commonly avulsed from its distal insertion on the base of the proximal phalanx than from its origin on the metacarpal head.

Fig. 5.

A percutaneously placed headless compression screw can be used for fixation of unicondylar phalangeal fractures. This minimally invasive technique minimizes tissue trauma and is preferred for athletes. (A) Preoperative and (B) postoperative radiographs are shown for an ulnar unicondylar fracture of the proximal phalanx of a thumb.

Fig. 6.

A closed-cell polyurethane padded club cast can be worn to protect a hand injury during football practices and games.

From Geissler WB. Operative fixation of metacarpal and phalangeal fractures in athletes. Hand Clin 2009;25(3):417; with permission.