Management of acute hand injuries in athletes

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Abstract

Athletic hand injuries present a unique challenge for the treating surgeon. Apart from a detailed understanding of the pathoanatomy of each injury, the surgeon also needs to appreciate the specific demands placed on the injured athlete in their sport in order to ensure an optimal outcome with a timely return to competition. In this article, the most commonly encountered acute hand injuries in athletes are reviewed, focussing on the assessment, principles of treatment and consideration of rehabilitation as pertinent to athletes.

Keywords athlete; hand injuries; rehabilitation; sports injury

Introduction

Athletic injuries present a unique challenge for the treating surgeon. Apart from a detailed understanding of the pathoanatomy of each injury, the surgeon also needs to appreciate the specific demands placed on the injured athlete to ensure an optimal outcome with a timely return to competition. In addition, the care of the injured athlete necessitates a team approach involving close communication between the surgeon, therapist, coaches and trainers.

Injuries involving the hand occur frequently and their distribution is sport-specific. Their management demands an understanding of the sport and the position played by the athlete, the level of competition participated in, future athletic aspirations and the role of rehabilitation. The timing of injury may influence management decisions, both in terms of time remaining in the current season but also in terms of the career of the athlete, for example when nearing retirement. In this article, commonly seen athletic hand injuries, namely ulnar collateral ligament (UCL) injury of the thumb, avulsion injury of the flexor digitorum profundus (FDP) tendon, proximal interphalangeal joint (PIPJ) injuries, and phalangeal and metacarpal fractures, are reviewed focussing on the assessment, principles of treatment and consideration of rehabilitation as pertinent to athletes.

Ulnar collateral ligament injury of the thumb metacarpophalangeal joint (skier's thumb)

Injury to the UCL of the thumb metacarpophalangeal joint (MCPJ) is commonly encountered in contact sports and classically described in skiers following a fall, as the thumb is caught by the static pole. It occurs as a result of radial deviation and hyperabduction stress to the thumb. In addition, it may be associated with damage to the dorsal capsule and the ulnar aspect of the volar plate.

Assessment

The patient presents with localized swelling, ecchymosis and tenderness over the ulnar border of the MCPJ. Occasionally a lump is palpable, which may represent a Stener lesion.[1] This occurs when the UCL is avulsed from the proximal phalanx and is flipped over the dorsum of adductor aponeurosis as the joint is reduced. Recognition of this lesion is important, as the interposed aponeurosis prevents healing of the avulsed ligament onto the proximal phalanx and surgical intervention is thus indicated.

In suspected injury, radiographs should be performed before stress testing to exclude the presence of a fracture and to prevent displacement of an undisplaced fracture. Stress testing should be performed in full extension and 30° of MCPJ flexion. Greater than 30° of laxity, or more than 15° of difference compared to the uninjured thumb, in both extension and flexion, are likely to indicate a complete UCL tear. Laxity in flexion only (but stable in extension) suggests an intact accessory ligament.

If pain precludes an accurate assessment, infiltration of local anaesthetic can aid diagnosis.[2] Apart from static radiographic views, some surgeons employ stress views to demonstrate the opening and subluxation of the joint.[3] Rarely, two-level injury may occur and a high level of vigilance is required for identifying the telltale flecks of bone on radiographs.[4] Modern magnetic resonance imaging (MRI) can provide accurate identification of ligamentous injury[5] and increasingly ultrasound is also being utilized to evaluate UCL injuries.

Management

Management of an UCL injury is largely based on the clinical findings, aided by radiographs. Undisplaced fractures and clinically stable ligamentous injuries are generally amenable to closed treatment with immobilization in a thumb spica for 4 weeks. A displaced or rotated fragment, with an unstable joint, is treated by open reduction and internal fixation (ORIF) using a bone anchor, a screw or tension-band wiring. Clinically unstable injuries or those with a Stener lesion warrant exploration and reattachment of the avulsed ligament. If there are small bony fragments that cannot be fixed, these may be excised and the ligament is reattached directly to the proximal phalanx with an anchor.

Rehabilitation and return to play

Classic teaching suggests that following surgical repair the thumb should be in full time immobilization for 4 weeks. The senior author has employed an accelerated rehabilitation programme for elite athletes, allowing active flexion/extension exercises under supervision of the therapist. However, excluding therapy sessions the thumb should be protected in a radial blocking splint for about 6 weeks (Figures 1 and 2). An early return to training wearing the splint is permissible in situations where dexterity of the hand is not required, such as stationary cycling to maintain cardiovascular fitness. Beyond that, an additional 6 weeks of splint wear during play is advisable.

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Figure 1 Radial blocking splint for ulnar collateral ligament injury of the thumb.

Avulsion injury of flexor digitorum profundus (jersey finger)

Avulsion injury of the FDP tendon results from forced hyperextension of the distal interphalangeal joint (DIPJ) while the finger is actively flexing. The classic scenario is when a player grabs the jersey of an opponent with the terminal aspect of the finger and the excessive pull forces the distal interphalangeal joint into extension against a contracting deep flexor tendon, avulsing the tendon from its insertion on the distal phalanx.[6] The most commonly involved finger is the ring finger.[6]

Classification is based on the extent of proximal retraction of the tendon as well as the presence or absence of an associated bony avulsion fragment.[6] In type I injuries, the FDP tendon retracts into the palm, where it is tethered by the lumbrical origin. At this level, both the vinculum longus profundus (VLP) and vinculum brevis profundus (VBP) are ruptured, resulting in a significant loss of both the intrinsic and extrinsic vascular supply to the tendon. In type II injuries, the tendon retracts to the level of the PIPJ and there may be a small cortical avulsion. In this situation, the VBP is disrupted but the VLP remains preserved. In type III injuries, retraction occurs up to the level of the A4 pulley and more proximal retraction is prevented by an associated, large bony fragment. Both vinculae are usually intact in type III injuries.

Figure 2 Radial blocking splint for ulnar collateral ligament injury of the thumb.

These three types form the original Leddy and Packer classification,[6] which has since been extended to include other, rarer patterns. A type IV injury is a two-level injury involving an avulsion fragment entrapped at the A4 pulley and rupture of the FDP tendon insertion off this bony fragment, with secondary retraction into the finger or palm.[7] Type V injuries are characterized by the presence of an osseous avulsion of the FDP tendon in association with a comminuted distal phalanx fracture.[8]

Assessment

Following a typical injury, as discussed earlier, patients present with inability to actively flex the DIPJ. The involved finger rests in an extended or hyperextended position and the cascade of the fingers is disrupted. The course of the flexor tendon should be palpated from distal to proximal, looking and feeling for a specific area of swelling and tenderness, which may correspond to the level of retraction of the proximal stump.

Radiographs of the involved finger are obtained to assess for underlying fractures or bony avulsion fragments. When the physical findings are equivocal, ultrasound may be employed to confirm the disruption and to localize the level of retraction.

Management

Management options are based on the time elapsed since injury, the extent of proximal tendon retraction, vincular system disruption and bony fragment size. Prompt intervention is recommended in all cases because the tendon may retract more proximally than the associated fracture pattern suggests.[9] In acute cases that are treated expeditiously a direct repair is generally achievable when the pulley system can be dilated and the FDP tendon brought to its insertion site without tightening the cascade more than 1 cm of tip-to-palm distance compared with the adjacent digits.[10] Techniques of tendon-to-bone fixation include dorsal button fixation, direct tie around bone or suture anchor.[10]

If the repair results in undue shortening, or a direct repair is not achievable, perhaps due to a delay in diagnosis, treatment options include wound closure, observation and DIPJ tenodesis or arthrodesis if the joint later becomes unstable; tendon lengthening by tenotomy in the forearm[11]; primary tendon graft or two-stage tendon reconstruction.[10] (The relative merits of the options are beyond the scope of this review.) The different treatment options commit the athlete to significantly different rehabilitation protocols, with attendant implications for the dexterity and the ability of the athlete to return to early competition. Therefore it is imperative to have a thorough preoperative discussion with the athlete regarding potential intraoperative concerns and the approach to treatment.

Rehabilitation and return to play

Following a successful primary repair, a dorsal blocking plaster splint is made intra-operatively so that the end of the splint extends beyond the fingertips. The wrist is positioned in a neutral position, the MCPJ at about 60° of flexion and the IPJ in neutral.