Metacarpal and phalangeal injuries

Introduction

Injuries to the hand are common, phalangeal and metacarpal fractures account for 10% of all fractures. The resulting morbidity from delayed treatment to hand injuries is particularly high in the dominant hand. A brief overview of the salient conditions is presented here.

Anatomy

The small joints of the hand are hinged joints. The metacarpophalangeal (MCP) joints have a 'cam' configuration, whereas the proximal interphalangeal (PIP) and distal interphalangeal (DIP) joints have a spherical shape. Stability depends not only on the articular contour but on the collateral ligaments and volar plate. The volar plate is a thick fibrocartilaginous portion of the volar capsule that connects the neck of the bone proximal to the joint to the base of the bone distal to the joint. The volar plate has strong lateral attachments but a weak distal attachment.

Owing to the eccentricity of the metacarpal head the collateral ligaments are more taught in flexion than in extension, and therefore the MCP joint needs to be immobilized in flexion.

Small joint injuries

A partial or complete tear of the collateral ligaments, volar plate, or extensor tendon results in subluxation or dislocation of the finger joint. Intra-articular fractures, including avulsion fractures and fracture dislocations, may be associated with these injuries.

Evaluation of swelling, tenderness or bruising of a finger should raise concerns that a joint injury has occurred. Ligamentous injury often causes instability which can be assessed by stress testing – ensure the comparative non-injured opposite side is tested where possible to help distinguish injury from ligament laxity.

Limited motion may arise from joint subluxation or displaced articular fractures. It is therefore imperative that good quality radiographs are obtained and these should include anteroposterior (AP), direct lateral and possibly an oblique view.

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Common DIP joint injuries

Mallet finger

This results from sudden forced flexion to the DIP, causing extensor tendon rupture from the distal phalanx (with or without bony fragment). Large fracture fragments (>30%) of the articular surface are at risk of volar subluxation of the distal phalanx. Treatment is either closed (splinting or casting for mallet fingers with <30% fracture fragments or displaced less than 2mm), or surgical (for >30% fragment size, >2mm displacement or associated with volar subluxation of the distal phalanx).

Dorsal DIP joint dislocation

Hyperextension to the tip of the finger may disrupt the volar plate and collateral ligaments. Frequently associated with volar laceration (owing to the adherence of the volar skin to the underlying bone). Treatment is either closed reduction or surgery for irreducible dislocations.

Common PIP joint injuries

Collateral ligament sprain

Either abduction or adduction forces applied to an extended finger can cause tearing of the collateral ligaments. The radial collateral ligament is injured more frequently than the ulnar. Tenderness over the site of injury is seen and stress testing should be performed in 20° of flexion; lack of firm end-point is diagnostic of a complete tear. Radiographs can demonstrate small chip fractures, and record the degree of angulation under stress testing.

Partial and most complete tears can be treated with static splinting (for 1–2 weeks) and then neighbour strapping (for a further 3 weeks). Surgical intervention is indicated when radiographic evidence of soft tissue interposition is noted, when there is a displaced condylar fracture of middle phalanx, or when closed treatment fails.

Volar plate injury

A hyperextension force to the PIP may cause the volar plate to tear from the middle phalanx (with or without bony fragment). Closed management is indicated in stable injuries with dorsal splinting (in 20° of flexion) for 1 week.

Dorsal PIP dislocation

One of the most frequently seen articular injuries to the hand. Hyperextension at the PIP joint results in dislocation of the middle phalanx dorsally. Closed treatment with reduction and neighbour strapping for 3–6 weeks is usual, although the presence of a volar fragment >15% of articular surface may require operative intervention.

Common MCP joint injuries

Thumb MCP ulnar collateral ligament injury

This is also known as 'gamekeeper's thumb' or 'ski-pole thumb'. Competency of the ulnar collateral ligament is essential for effective lateral key pinch. Stress testing should be performed comparing with the uninjured thumb, and stress radiographs indicating >35° of opening suggest a complete tear. Closed treatment is indicated in partial tears with good end-points and not opening more than 35°. Cast immobilization for 4–6 weeks is used. Surgical treatment is for the unstable, complete tear or those with a displaced fracture fragment.

Metacarpal fractures

Metacarpal fractures account for a third of all fractures in the hand.

Classification

These are described by location; including metacarpal head, neck, shaft and base. Typically subclassified into non-displaced or displaced, closed or open, and associated with angulation, rotation or shortening deformity.

Management

Physical examination

Remove all jewellery. Check for:

1. Obvious deformity?
2. Bruising and/or swelling?
3. Pain and tenderness to palpation?
4. Restricted range of motion?
5. Malrotation or angulation of digits?
6. Vascular and/or nerve involvement?

Radiographic evaluation

AP and lateral views of the metacarpal bones are used to define fracture alignment. A tangential (Brewerton's) view is useful for evaluating metacarpal head fractures.

Metacarpal head fractures

Non-displaced head fractures can be treated with either neighbour strapping or cast protection. Displaced oblique fractures require open reduction and internal fixation (ORIF) with either Kirschner wires or small screws. There is a possibility that avascular necrosis may still occur in the metacarpal head even after a non-displaced transverse fracture.

Metacarpal neck fractures

Also known as 'boxer's' fractures. As a result of a direct blow on the metacarpal head (usually of the ring or little finger) the metacarpal neck may fracture with associated angulation. If the angulation is less than 15° the fracture can be treated conservatively (neighbour strapping/ulnar gutter cast). For angulation between 15 and 40° the fracture requires reduction with subsequent ulnar gutter splintage. Above 40° of angulation closed reduction and percutaneous wiring is indicated. Residual angulation of more than 15° is unacceptable in the index and long fingers, as there is a lack of compensatory carpometacarpal motion for these fingers. However, a total of 40° dorsal angulation can be accepted in the little finger.

Metacarpal shaft fractures

Transverse shaft fractures often result from a direct blow to the hand, these fractures can be treated conservatively with reduction and cast application. Spiral and long oblique fractures of the shaft are unstable with shortening and rotation. ORIF is indicated for shaft fractures that have malrotation, dorsal angulation >10° for index and middle fingers, dorsal angulation >20° for ring and little fingers and any shortening greater than 3 mm. In multiple metacarpal shaft fractures it is recommended that internal fixation is performed.

Metacarpal base fractures

Stable base fractures can be treated in just a cast; however, displaced fractures require closed reduction and percutaneous fixation.

Thumb metacarpal base fractures

Fractures in this region can affect lateral key pinch and opposition of the thumb to other digits. This group of fractures (*Figure 1*) are classified separately into:

1. Bennett's fracture dislocation
2. Rolando's Y or T condylar fracture
3. Epibasal fracture
4. Comminuted fracture.

There is notable swelling and pain at the base of the thumb, commonly associated with bruising in the thenar region.

Treatment depends upon whether the fracture is displaced or not. Non-displaced fractures that are in good alignment can be treated with a cast for 4 weeks. Displaced fractures require either percutaneous wiring or ORIF, as only 1–3 mm of carpometacarpal incongruity can be accepted.

Phalangeal fractures

In combination phalangeal and metacarpal fractures account for nearly 10% of all fractures.

Classification

Extra-articular phalangeal fractures are classified the same as metacarpal fractures, but include a tuft fracture for the distal phalanx.

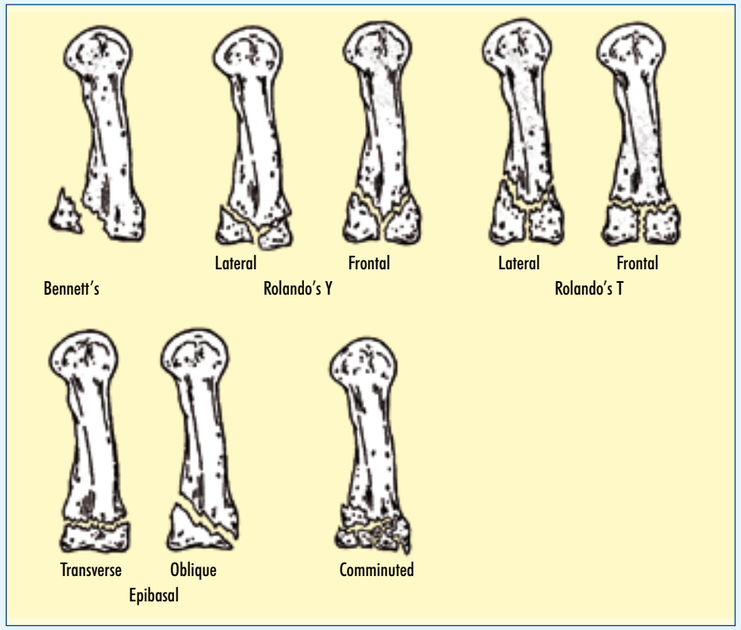
Examination

Remove all jewellery. Radiographic evaluation should be prompted by swelling, pain, limited motion and deformity. Up to 30% of phalangeal fractures are open injuries. Obtain AP and lateral radiographs (fingers need to be splayed and in varying degrees of flexion to obtain good lateral views).

Management

As with all fractures accurate reduction is vital to allow normal function. Fingers need to be mobilized as soon as fracture stability allows to prevent debilitating stiffness. Those fingers not involved in the injury should be mobilized as soon as possible for the same reason. The PIP joint is the most important joint for motion and function of the digit.

Figure 1. Classification of thumb metacarpal base fractures.



Stable fractures

If well aligned these can be treated with neighbour strapping, splint or cast.

Displaced fractures

If reduction is possible and stability can be maintained then treatment with a cast or splint is advocated. However, it may be necessary to use percutaneous wiring to prevent the fracture from displacing again.

Unstable fractures

If, despite attempted closed reduction, position and stability cannot be maintained then ORIF is indicated. Options include Kirschner wires, interfragmentary screws or plate and screw fixation. If there is segmental bone loss then external fixation may be required.

Conclusions

It is imperative that injuries to the hand and fingers are diagnosed promptly and correctly, enabling the correct treatment to be instigated. If an injury is missed the resulting impact on the function of the hand can be devastating, particularly if the injury occurred in the dominant hand.

Careful evaluation of the injured region and radiographs is required as often the diagnosis is not straightforward – especially in respect to ligamentous injuries. BJHM

Conflict of interest: none.

Further reading

Brinker MR, Miller MD (1999) *Fundamentals of Orthopaedics.* WB Saunders, Philadelphia

Schenck RR (1994) Classification of fractures and dislocations of the proximal interphalangeal joint. *Hand Clin* **10(2):** 179–85

KEY POINTS

- Phalangeal and metacarpal fractures account for 10% of all fractures.
- Ligamentous injuries are relatively easy to overlook in the acutely injured hand.
- Careful radiograph evaluation is required when dealing with intra-articular injuries.
- Early mobilization is required to allow any chance of return to normal functioning of an injured digit.
- Rotational malalignment is a common problem with hand fractures and must not be overlooked.

Timing of antibiotic administration for community-acquired pneumonia

Abstract

Objective

There is evidence to suggest that delayed administration of antibiotics for community-acquired pneumonia (CAP) is detrimental to the outcome of patients. We assessed the timing of antibiotic administration in patients admitted to a large teaching hospital.

Method

Only cases with CAP as their primary diagnosis were included. The time from presentation to hospital to signature on drug prescription was recorded for each patient, together with the reason for delay if present and length of stay.

Results

A total of 83 patients met inclusion criteria over a one year period. Of these 36% of patients received antibiotics after 8 hours with less than 10% being commenced in the accident and emergency (A&E) department. Length of stay was demonstrated to be longer if antibiotics were delayed.

Discussion

Guidelines indicate all patients with CAP should receive antibiotics within 8 hours. It was clear that A&E doctors were reluctant to prescribe antibiotics despite positive diagnosis. Marked delays were also seen when stat doses were not prescribed by the medical doctor. Simple measures to modify prescribing behaviour would dramatically reduce delays and improve patients' outcomes. BJHM

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