(i) Assessment of the acutely injured hand

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Abstract

An acutely injured hand presents a diagnostic challenge to the treating clinician. A comprehensive history with a detailed understanding of the mechanism of injury and a thorough knowledge of underlying patho-anatomy forms a keystone to the systematic assessment of the injured hand. This is followed by a logical sequence of physical examination which includes 'look', 'feel', 'move' and special tests.

This article aims to present a system for assessment of an acutely injured hand to help the treating doctor plan further management.

Keywords assessment; clinical examination; hand; injury

Introduction

Injuries of the hand are commonly encountered problems. The spectrum of hand injuries can be widespread, ranging from simple fractures to severe crushing/degloving injuries affecting viability of the hand; thus assessment of an acutely injured hand can be challenging. The majority of these injuries affect young active males and if not managed well can potentially lead to adverse long-term outcomes.[1] Hence it is important to assess and diagnose these injuries accurately.

History

A thorough history is important in assessing any hand injury. This not only helps the clinician determine a differential diagnosis, but it also aids in establishing the likely prognosis. Table 1 summarises the key points to enquire during the initial assessment of an acutely injured hand.

Mechanism of injury

An understanding of the mechanism of injury is of vital importance. The deforming forces transmitted through the bone and soft tissues predict the nature and severity of the injury. For example, sudden eccentric hyperflexion of the distal interphalangeal joint (DIPJ) could cause bony or soft tissue mallet injuries.[2] A forceful contraction of the flexor digitorum profundus (FDP) tendon could lead to avulsion of the FDP tendon from its distal insertion, called the "Jersey finger" (with the ring finger being affected in up to 75% of cases).[3] A history of high velocity trauma should alert the clinician to the possibility of multiple fractures and/or open wounds.[1] While assessing open wounds, lacerations and amputations, one should enquire about the mechanism and the instrument that caused the injury; for example a knife, lawn mower or other penetrating instruments, as these could predict the extent of the underlying damage.

Key points to enquire during the initial assessment of an acutely injured hand

History

- Mechanism of injury
- Left or right-handedness
- Occupation
- Duration between the injury and initial presentation
- Current symptoms
- Previous level of function
- Injury while at work, at home or while playing sport

Table 1

High-pressure injection injuries

High-pressure injection injuries are a special subset of injuries to the hand sustained secondary to high-pressure injection devices such as a paint gun or a grease gun.[4] These usually appear benign, with small puncture wounds, but they can actually be associated with significant contamination of the underlying soft tissues due to the injected material. These injuries should be carefully assessed, as their severity is frequently underestimated and can thus cause delayed referrals and poor outcomes.

Sports related injuries

Some injuries are commonly associated with certain sports, like acute rupture of the ulnar collateral ligament of the thumb that is common in skiers ("skier's thumb").[5] Jersey finger and dislocation of the proximal interphalangeal joint (PIPJ) and/or DIPJ is

Salient features to "look" for when examining patients with hand injuries

- Bruising
- Haematoma
- Swelling
- Erythema (infection)

(Signs of blunt trauma)

- Lacerations/wounds (examine underlying tissues including bones, ligaments, tendons and skin)
- Cascade of the hand (symmetry and position)
- Tissue loss (examine and document)
  - Skin loss
  - Bone loss
  - Amputation
  - Fingertip/Nailbed injuries
- Colour of the fingers
- Tenodesis effect
- Rotational alignment of the fingers
- Deformity
- Arches of the hand

Table 2

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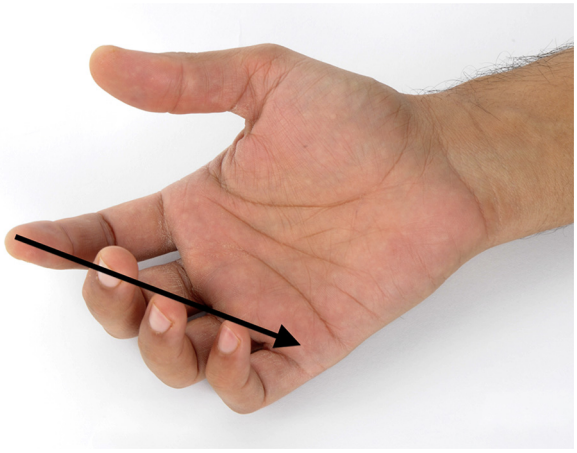

Figure 1 Cascade of the hand. With the palm facing upwards the hand assumes a posture of increasing flexion at the MCPJ and PIPJ from index to little finger called as Cascade of the hand as shown by the line.

common in rugby players. Mallet finger, also known as "baseball finger", is common in ball sports such as baseball, tennis and cricket. Fracture of the neck of little/ring finger metacarpal is also known as a "boxer's fracture", and fracture dislocation of the 4th and 5th carpometacarpal joints (CMCJ) is also common in boxers.

Open wounds sustained secondary to human bites should be treated as potentially serious, as they can lead to septic arthritis and osteomyelitis.[6]

The duration between the initial injury and time of presentation is important, as the management and subsequent outcome is different for acute versus chronic conditions. Knowledge about the patient's vocational history is also important, as certain injuries could potentially affect a patient's working ability.

Clinical examination of the hand

The senior author follows the standard "look, feel, move" sequence as suggested by Sir Graham Apley.[8] Prior to examination, the patient should be adequately exposed and all jewellery removed. Simultaneous examination of both hands allows examination and comparison of the non-affected side with the injured side.

Look

After obtaining a thorough history, the assessment of the hand starts with a good "look" at the affected side. Table 2 enumerates salient features to look for.

Bruising, swelling and haematoma are the signs of acute injury. Look carefully for wounds and lacerations on the palmar and dorsal sides, borders of the hand and the web spaces, and if possible take a clinical photograph for further reference. Note and document the site, size and depth of the wounds, and the amount of skin, bone or digital loss. A pictorial representation/diagram of the hand injuries is a very useful adjunct. It is not advisable to explore open wounds of the hand in the Emergency Department, and instead this should be undertaken under regional or general anaesthesia in the operating theatre.[1]

Cascade of the hand: in the normal hand with the palm facing upwards there is increasing flexion of the metacarpophalangeal joints (MCPJs) and PIPJs from index to little fingers, which is commonly referred to as the cascade of the hand (Figure 1). This is due to the intrinsic tension of the flexor tendons (FDP, FDP).

Look for symmetry of hand posture and compare it with the other side; this can provide valuable information about the dynamic balance between the intrinsic and long extrinsic muscles of the hand.

Fingertip and nail bed injuries are associated with lacerations, avulsions and subungual haematomas. These should be carefully assessed, as they tend to have a prolonged recovery and have an adverse cosmetic effect.[11] These injuries should always be investigated radiographically, as up to half of these patients have associated bony injury.[11] Patients with amputations and significant tissue loss should be assessed and managed timely, as the finger can be salvaged by re-implantation/revascularization.[9]

Kanavel's signs: these are signs of infective flexor tenosynovitis, and include 'intense pain on stretching the finger', 'flexion posture of the digits', 'sausage-shaped fingers' and 'percussion tenderness along the flexor tendons'.[10]

Tenodesis effect: the tenodesis effect is seen as passive flexion of the fingers when the wrist is extended and vice versa, and this is due to residual muscle tension producing the passive movement.[11] One should carefully look for the tenodesis effect of the

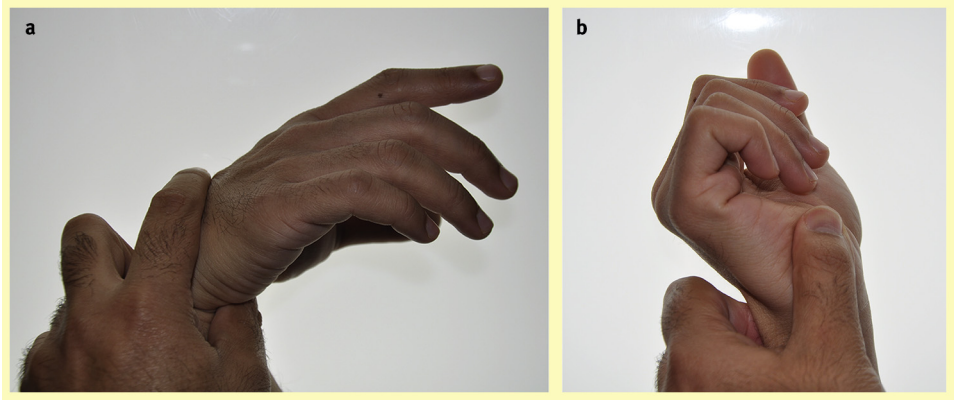

Figure 2 a) Tenodesis effect with wrist in flexion. When the wrist is passively flexed the fingers extend at the MCPJ, PIPJ and DIPJ, (**b**) Tenodesis effect with wrist in extension. When the wrist is passively extended the fingers flex at the MCPJ, PIPJ and DIPJ. This is produced due to the attachment of the flexor tendons to the digits.