

# THE ASSESSMENT AND INITIAL MANAGEMENT OF THE ACUTE HAND INJURY

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The acute hand injury constitutes 15% of the patient load of the average Accident and Emergency Department. Approximately one third of all accidents at work are hand injuries and they account for 30% of compensation cases. Most of them are of minor significance from a clinical point of view but are of major significance emotionally and economically and therefore a high standard of care is to be encouraged. The consequences of allowing an unnecessary complication such as infection to arise or of missing serious underlying structural damage are therefore significant, and the outcome rests upon correct assessment and early

management.

## **Initial assessment**

This is helped by using an aide-memoire such as the hand injury chart approved by the British Associations of Accident and Emergency Medicine, Plastic and Orthopaedic Surgeons (Fig 1 overleaf). It compels an adequate history and examination and thereby minimises the risk of overlooking a significant injury.

## **History**

Personal details are essential to note, such as dominance, age, sex and occupation. All of these may in different ways affect both the defin-

itive management and likely outcome.

Understanding the mechanism of injury is vital. The presence of a crushing element or the possibility of retained foreign material must be noted and the history of a skiing injury or of a rotatory element to a digital injury will alert the examiner to the possibility of instability. Injury with glass needs particularly careful assessment as shards of glass may cause widespread damage at a distance from what often appears to be a minor surface wound.

It is important to understand the significance of the site of injury. For example a laceration over one of the knuckles of the dominant hand is

due to human teeth unless proved otherwise and needs appropriate treatment. A laceration on the volar aspect of a joint may be due to hyper-extension of that joint with a spontaneously reduced compound dislocation.

## Examination

Adequate examination may well be aided by the use of local anaesthetic for nerve blocks at the wrist or in the fingers. It is always important to compare the wounded hand with the normal hand.

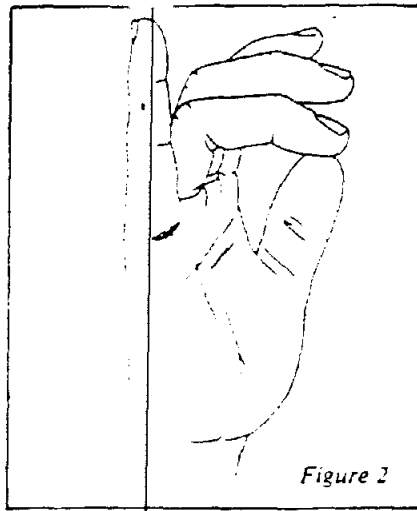
### 1 Look

Observation reveals an alteration in the posture of the hand whether due to a tendon injury or nerve injury or an unstable or displaced fracture or dislocation. Local swelling and digital perfusion should also be noted.

Typical examples are the laceration of the ulnar nerve which produces a characteristic clawing and a flexor tendon injury which is betrayed by the asymmetry of the normal resting flexion of the fingers (Fig 2).

### 2 Feel

The next step of examination is to feel for sweating, for temperature change, for local tenderness and in order to test for sensation. A denervated area of skin becomes dry very quickly and a plastic surface will slide over such skin within a few minutes of the injury. This is useful when sensory testing is impossible such as in small children. Evaluation of sensation in an injured hand is always difficult and a particular trap is the undoubted presence of some sensibility in many cases where subsequently it has been shown that the sensory nerve has been completely divided. The reason for this is that the cut ends of the nerve lie together bathed in physiological fluid continuing to conduct impulses across the gap for probably some hours and although careful examination shows that the level of sensation is altered the presence of any sensation at all may well suggest to the examiner that the nerve is in fact intact. By the following day, however, it is perfectly clear that the lesion has been complete.



### 3 Move

It is important to get the patient to move actively rather than move the various joints passively. It is also useful to compare the two hands and observe the movement of the normal hand before the abnormal one.

It is easy to diagnose extensor tendon injuries as the droop of the finger is characteristic. However, the siting of a laceration on the back of the proximal interphalangeal joint of the fingers should alert one to the possibility of a concealed extensor tendon injury even when movement at the first visit is normal. The laceration of the central slip of the extensor mechanism is notorious for producing delayed Boutonniere deformity and this is always much easier to treat if diagnosed at the first visit. All the lacerations over the extensor tendons anywhere in the hand should be explored under local anaesthetic to ensure that no concealed tendon injury has occurred.

As far as flexor tendon injuries are concerned, it is surprising the number of patients who do not attend hospital directly after either a closed or open wound involving flexor tendon rupture. The rugby player who sustains a closed avulsion of the flexor digitorum profundus to the left ring finger frequently attends the Accident Department several days after the injury thinking at first that the finger has merely been strained. He therefore presents with an inability to flex the terminal joint of the digit and the diagnosis is obvious. There is only one flexor tendon to the thumb and diag-

nosis of flexor tendon injury is therefore straightforward. As far as the fingers are concerned however, it is important to be able to examine the hand in such a way that the function of the two flexor tendons to each finger can be separated. If the uninjured fingers are held straight, then any flexion in the injured finger taking place must be carried out by the flexor digitorum superficialis as the profundus has been splinted. Stabilisation of the proximal interphalangeal joint in extension allows one to test the integrity of the flexor digitorum profundus and thus the action of the two tendons can be easily distinguished even in the presence of a painful injury. If the discomfort from testing is such that an adequate examination cannot be carried out, then it will be important to deliver local anaesthetic blocks to allow this to be done. It should be remembered that the metacarpo-phalangeal joints can be flexed by the lumbrical muscles alone.

It is very important to make records of the results of examination of tendon function at the first visit. It is a well known fact that a tendon that has almost completely been severed can still function adequately and rupture completely subsequently. This will then appear as if the initial examination has been inadequate and the tendon injury has been missed, whereas in fact this might not be the case. However, if the examination of the tendons has not been recorded accurately then the assumption is naturally made that the tendon injury has been missed.

Another aspect of the passive movement of the injured hand is to test for instability of joints. The rupture of the ulnar collateral ligament of the metacarpo-phalangeal joint of the thumb is a common injury of skiers but can of course occur in other ways. A dislocated proximal interphalangeal joint can relocate spontaneously, and fracture dislocations through joints, such as is seen at the base of the thumb metacarpal (Bennett) needs specifically to be tested for instability. This may require some form of analgesia or anaesthesia to confirm.

#### 4 X-ray

The basic rules applying to X-ray views of the hand are that two views of the relevant part should be taken at right angles and that if possible the joint above and below the fracture should be demonstrated. If a lateral view of the finger is required then it usually has to be specifically requested as an X-ray of the hand will routinely provide an oblique view of a finger only. The scaphoid bone requires special views and it is becoming increasingly important for Accident and Emergency Departments to have an arrangement whereby all radiographs are reviewed by the senior in the department or a radiologist. Any missed fractures or dislocations can then be recalled for review.

The significance of the X-ray appearance of particular fractures has to be taught. The main distinction between stable and unstable fractures needs to be understood and communicated to all the staff. In particular the fracture-dislocation around the proximal interphalangeal joint and at the base of the metacarpals are injuries that require particular care. What appears on the initial X-ray to be a stable position can displace later if the mechanism is not understood. All potentially unstable fractures and fracture dislocations need to be reviewed in a hand clinic where expert opinion is available as to management.

#### Management

When the patient arrives his or her pain and anxiety need to be dealt with. The early use of nerve blocks is a great help not only in relieving pain but allowing adequate inspection and cleansing of any wound. This of course has to be delayed until after examination if any nerve injury is suspected. Children in particular need immediate attention with pain control and reassurance for the parents. For fingertip injuries a handout such as from 3M Health Care is indispensable. Protection against tetanus needs to be assured.

#### Management of the wound

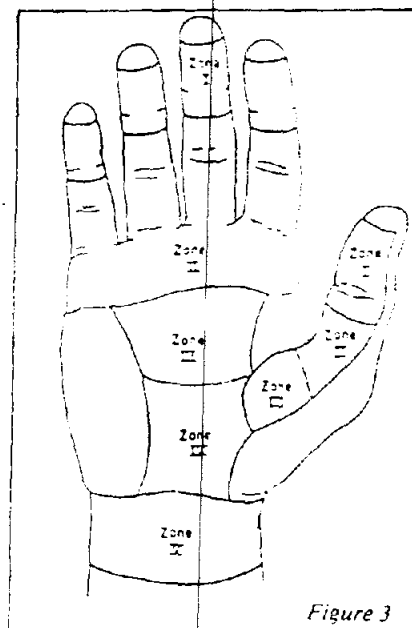
If contamination is present visibly then the wound needs to be carefully

excised. If contamination is suspected such as with a human or animal bite, then again the wound needs to be carefully excised before closure and an appropriate antibiotic given. If the wound is more than 12 hours old it is probably unwise to close it.

If skin loss is present then skin grafting is required as all wounds in the hand need to be closed, with the exception of the fingertip injury which can usually be treated conservatively unless the volar aspect of the finger pulp is affected. A variety of procedures of varying degrees of sophistication have been described for the management of fingertip injuries but if any such surgery is contemplated this needs to be done by an expert.

Where wounds have been complicated by injuries to deeper vital structures this should have been discovered during examination. The pulsatile spurting of an artery should alert one to the likelihood of a nerve injury also and bleeding should never be controlled in the hand by application of artery forceps, without clearly identifying the adjacent structures. Bleeding can easily be controlled by local pressure, bandaging and elevation.

If tendon or nerve injury is suspected or fractures are present that require open reduction and internal fixation then the case needs to be referred to someone with adequate expertise.



Tendon injuries need to be dealt with immediately if possible as do compound fractures. Clearly revascularisation of digits must be done immediately but nerve injury repair can be delayed. If there is to be any delay in exploration then the wound needs to be excised under local anaesthetic and carefully sutured. If the wound is thoroughly cleaned and excised and sutured then tendon repair can be delayed for several hours, even days without prejudicing the final result. The principle needs to be understood that all tendon injuries should be repaired, although there has been contention in the past about repair of tendons within Zone 2 (Fig 3), the general view among hand surgeons is that both tendons within the fibrous flexor sheath should be repaired if possible.

#### Outcome

The outcome of any hand injury is therefore dependant upon a number of factors in addition to the type of injury itself. An accurate diagnosis is important together with appropriate management carried out by someone of adequate expertise. There needs to be the support of in-patient facilities for hand elevation and of physiotherapy and occupational therapy for post operative splintage and exercise.

An important factor in the outcome, however, is the attitude of the patient. The identical injury in two different persons can produce quite different outcomes. Clearly there are considerable psychological aspects to hand injuries which must never be underestimated.

The staff receiving hand injuries need to be clear about the various protocols involved and where appropriate expertise is available for definitive repair. For example, the protocol for reimplantation of severed parts needs to be understood so that inappropriate referral is avoided.

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