5. Trauma

Brain Injury

All head injury risks damage to the brain. Blows to the head, severe acceleration and deceleration (whiplash) or penetrating injuries can all cause damage to the brain. This damage includes:

Concussion - Where the brain is subjected to violent ‘shaking’ usually as a result of a blow or a sudden stop in a violent movement of the casualty’s head. As a result little gaps open up between the nerve cells that make up the brain and this interferes with the functioning of the brain.

Concussion may result in long-term brain damage if it occurs more than once.

Contusion - Bruising and tearing of the brain caused by the brain hitting the skull or having parts of the skull or foreign bodies driven onto it.

Compression - Is caused by bleeding from a blood vessel inside the skull and a subsequent build up of pressure. Compression may not be noticed until after the casualty begins to suffer permanent brain damage.

A doctor must examine all casualties who have been knocked out.

Identifying Brain Injury

History

- Story of a blow or force applied to head or face

Signs

- Altered state of consciousness
- Dislike of bright light
- Bleeding or spinal fluid in ears and/or nose
- Blood under the white area of the eye
- Bruising around eyes
- Obvious head injury
- Speech disturbance
- Loss of balance
- Loss of movement on one side of the body
- Loss of power on one side of the body

Symptoms

- Headache
- Nausea
- Confusion
- Visual disturbance

Because of the danger of a slowly developing compression a close watch is kept for the development of a cluster of the above signs and symptoms.

Treatment

- If unconscious place casualty on their side using an appropriate position
- Call an ambulance as soon as possible
- Keep casualty calm and comfortable
- Remain with casualty if possible
Treat all severe head and Facial injuries as cervical spinal injury.

Spinal Injuries

Fig. 5.1: Skeleton of the head and neck

Although spinal injury can occur without trauma to the head and face, this is uncommon. In most cases spinal injury is associated with injury to the face, head or helmets worn by the casualty.

Fractures of the spinal vertebrae can be either stable or unstable. Stable fractures present little danger to the spinal cord. Unstable fractures risk causing catastrophic damage if they are not properly handled.

Because of the close association between spinal injury and head and facial injury all unconscious casualties with severe head injury have a spinal injury till proven otherwise in hospital.

Identifying Spinal Injury

**History**
- Injury to head or face
- Story of violent movement and a sudden stop

**Signs**
- Obvious head injury
- Poor perfusion
- No movement following the accident
- Inability to differentiate between the sharp and blunt end of a pin

**Symptoms**
- Pain in the region of the spine
- Loss of sensation/numbness/tingling in body, arms or legs
- Patient, if conscious, often reports hearing a snapping noise
- Loss of movement
- Loss of power
Treatment

- DRSABC
- Keep casualty’s head and neck straight and aligned with torso
- Do not move casualty unless necessary
- Do not allow flexion or twisting of neck
- Control bleeding and dress wounds
- Cover casualty, keep warm
- Control movement around or close to the casualty

Injuries to the Face and Jaw

Severe Facial Injuries

Injuries to the face are common and dramatic but rarely life threatening. Most facial injuries consist of lacerations that are treated like any other bleeding using direct pressure, elevation and rest. However, severe facial injuries pose a very real threat to the casualty’s life through airway blockage and brain and spinal injury.

Severe head and neck injuries usually accompany severe facial injuries as well. In one US study 55% of severe facial fractures were found to have an associated closed head injury and 10% were found to have associated cervical spinal injuries.

Treatment of Severe Facial Injury

- Sit casualty down and reassure them
- Do not manipulate areas of the face that are obviously damaged
- Maintain casualty’s airway
- If casualty is conscious sit forward if possible and allow saliva and blood to drain
- Do not use firm direct pressure on bleeding wounds associated with obvious facial fractures.
- Cover all wounds with dressings and gently hold in place

In cases of catastrophic facial damage the airway must be located and cleared. Remember the lips of the mouth are generally in line with the lobes of the ears. Use the lobes as a landmark to find the area of the mouth and attempt to clear.

If necessary lay the casualty face down and allow all fluids including blood, to drain from the oral and nasal cavities.

Fractured Jaw

There are two basic types of jaw fracture; stable and unstable. With both types of fracture the major concern is with the casualty’s airway. If the casualty is unconscious, simply place them on their side. If the casualty is conscious then treat as follows:

Treatment of Fractured Jaw

- Sit casualty down and lean forward
- Allow saliva and blood to drain from mouth
- Have casualty support their jaw with their own hand
Injuries to the Special Sense Organs

Eyes

Serious Eye Injuries

These may result from trauma such as being thrown through a window, being exposed to an explosion or being struck by an object. Usually, the area will be covered in blood and damaged tissue may be seen.

It is vital that if you think the eyes are damaged, DO NOT EXAMINE THE EYES!

Treatment of Serious Eye Injuries

- Do not attempt to examine eyes
- Get ambulance immediately
- Dressings applied gently across both eyes to stop casualty moving eyes not control bleeding
- Bandage lightly in place
- Rest and reassure casualty - never leave them alone
- Prevent casualty vomiting, coughing or sneezing

Foreign Bodies in Eye

The first indication of an eye injury is often the sensation that there is something in the eye.

Treatment of Foreign Body in Eye

- Sit casualty down and reassure them
- Wash your hands
- Open casualty's eye and lift eye lids out and look under each eye lid
- Have casualty pull upper eyelid over the lower eyelid and vigorously blow their nose
- Recheck eye for object
- If object still on white of eye, carefully remove with cotton bud, cloth or tissue
- If unsuccessful flush eye with clean water or saline
- If all fails send casualty to medical practitioner
Ear Injury

Bleeding from Ears

Bleeding from ears is usually associated with picking at skin, a ruptured ear drum or a fractured base of skull in head injury.

Treatment of Bleeding from the Ear or Ears

• Place pad over ear that is bleeding to absorb blood but not to stop it
• If possible, lay casualty on affected side, so blood can drain away
• If both ears bleeding sit casualty slightly up and allow blood to drain
• If serious incident - explosion or accident call ambulance immediately

Foreign Object in Ear

For foreign objects in ear leave them for the medical practitioner. If it is an insect it can be drowned using warm olive or vegetable oil. Insects, such as moths, can be removed from ears at night by holding a light a few feet away from the affected ear. The moth will, hopefully, then fly out from the ear.

Treatment of Foreign Body in Ear

• Sit casualty down with affected ear upward
• Wash your hands
• Attempt to remove with fingers or use warm olive or vegetable oil for insect
• If object or insect stuck send to medical practitioner
Nose

Fractured Nose

Fractures of the nose are painful and disfiguring but not life threatening unless there is associated uncontrolled bleeding.

Foreign Body in Nose

If it cannot be blown out or swallowed send to medical practitioner.

Nose Bleed

Most nosebleeds are dramatic but not life threatening unless there is an associated severe facial injury, head injury with fractured base of the skull or the casualty is unconscious or elderly. In elderly men severe nosebleed can be associated with very high blood pressure.

In the elderly patient check whether they suffer from high blood pressure as some individuals suffer nosebleeds due to severe episodes of very high blood. The best indicator will be very strong pulses and severe headaches.

Treatment of Nose Bleed

• Rest casualty and sit them forward
• Pinch nose below bone for 10 minutes
• Get casualty to breathe through mouth
• Loosen all tight clothing
• Have casualty Spit blood from throat into bowl
• Apply ice packs to throat, neck and forehead
• If bleeding lasts longer than 20 minutes take casualty to medical practitioner
TRAUMA TO AIRWAY

Hanging
Hanging is a common method of suicide with 1,151 deaths in 2008 (ABS figure). Hanging does not just simply strangle the casualty but also damages to the spinal column, muscles of the neck and the structures inside the neck such as the carotid sinuses. The casualty will have multiple problems.

Treatment of Hanging

- Check casualties abdomen for warmth
- If casualty still warm get help immediately
- When help arrives, lift casualty as follows
  - first support casualties head and neck
  - lift casualty and cut noose (watch your back!!)
  - allow casualty to slip to ground while supporting head and neck
- Check and clear airway - ensure cord/rope is cleared from neck
- Check breathing – Assisted Ventilation if necessary and CPR
- Full Examination and treat for spinal injury
- You will need to get help to get the casualty down. Get help first.
- Watch your back!
- Be aware that some suicides use steel cable and chains to hang themselves and to release the noose you must undo the knots or use bolt cutters.

Strangulation
Strangulation occurs when the tracheae and larynx are compressed or crushed by pressure from outside.

Treatment of Strangulation

- Check and Clear Airway - ensure cord/rope is cleared from neck
- Check breathing – if necessary and CPR
- Full Examination if possible
- Take and record observations

Drowning
People drown quietly. In drowning the victim can swallow a lot of air and water that fills their stomach and oesophagus before flowing over into the windpipe and lungs. In children this can mean that the stomach can be hyper-inflated so that it distends into the chest cavity and reduces the ability of the lungs to expand. In adults the stronger body structures prevent this happening.

With both adults and children, vomiting of water and stomach contents increases the danger to the casualty’s airway.

Although fresh and salt water drowning lead to differing chemical problems, the first aid treatment remains the same.

Treatment of Strangulation

- CPR
- Place unconscious casualty on side
Chest Injuries

The walls of the chest are made up of the thoracic spinal vertebrae at the back, the twelve sets of ribs moving around the sides to the front, where 10 sets of ribs connect up to the sternum. This skeletal structure gives the chest wall the rigidity that is essential for respiration and is the mechanism of respiration. This mechanism of respiration can be disrupted by damage or restriction.

Fractured Ribs

With simple rib fractures, the major problem is pain. This makes breathing difficult and is very uncomfortable.

Identifying Fractured Ribs

**History**

- Direct blow/trauma
- Usually 5th through 9th ribs - these are unprotected by shoulder

**Signs**

- Respiratory pattern faster and shallower than normal
- Deformity
- Bruising
- Site of fracture very tender to touch

**Symptoms**

- Pain on breathing and casualty is able to easily localise pain

![Fig. 5.2: Treatment of simple fractured ribs using arm sling](image)

Treatment of Fractured Ribs

- Examine casualty, look for other injuries and problems
- Examine chest wall - isolate area of pain
- Allow casualty to find comfortable position (usually lying on injured side)
- Apply Arm Sling
- Take and record observations
- Send casualty to hospital
Flail Segment

A flail segment is where a rib or series of ribs are fractured in two places allowing a segment of the chest wall to float free from the surrounding chest wall. This reduces the amount of air that can be taken into the lungs and can lead to asphyxia.

Identifying a Flail Segment

**History**
- Direct blow/ trauma

**Signs**
- Poor perfusion
- Respiratory distress
- Chest wall collapses in during inspiration
- Site of fracture tender to touch

**Symptoms**
- Severe pain on attempt to breathe deeply
- Shortness of breath
- Patient is able to easily localise pain
- Conscious state may be reduced

![Fig. 5.3: Treatment of Flail segment](image)

Treatment of a Flail Segment

- Examine casualty and establish perfusion status
- Look for other injuries
- Examine Chest Wall - isolate area of injury
- Call ambulance immediately
- Stop flail segment moving by:
  - Using hands, then
  - Placing towel or large pad over flail segment
  - Bandage pad firmly to chest:
  - Tie knots on front of uninjured side over pads
- Place arm on the injured side in an Arm sling
- Allow casualty to find most comfortable position
- Take and record observations
- Recheck casualty frequently
Sucking Chest Wound

A sucking chest wound is usually the result of sharp trauma caused by a bullet or knife that penetrates the chest wall. This hole allows air to move into the chest cavity through the hole in the chest wall and not through the mouth. Sucking chest wounds are life threatening and quick treatment is essential.

Chest wounds may not be immediately obvious as they are small, inside the clothing and the casualty may be too ill or unconscious to report symptoms. Any unconscious patient who appears poorly perfused as a result of a fight must have their chest visually inspected. This includes under the armpits and across the back.

Identification of a Sucking Chest Wound

History
- History of violence, a fight, assault or shooting

Signs
- Defence wounds on hands or arms
- Poor perfusion
- Fast and shallow respiration
- Distended neck veins
- Blood stained froth in mouth or on lips
- Wounds to chest wall

Symptoms
- Pain
- Patient apprehensive and distressed

Treatment of a Sucking Chest Wound

- Check airway, breathing and circulation
- Call ambulance immediately if injury identified
- If necessary CPR
- Examine chest wall and check for bleeding
- Look for more than one wound
- Locate all wounds
- Leave foreign objects in place
- Seal wound during inspiration and release during expiration
- If you have time dress wound (This may not be possible on sweaty skin)
  - Place air-tight (plastic/rubber) dressing on wound
  - Tape only three sides of dressing
  - Ensure dressing seals during inspiration and lets air vent during expiration
- If Conscious, let casualty find most comfortable position
- Take and record observations
Abdominal Wounds

Any wound to the abdomen is a serious injury until the casualty is fully assessed in hospital. Even minor punctures of the abdomen can be associated with severe life threatening internal bleeding.

Identifying Abdominal Wounds

Like chest wounds, abdominal wounds may not be immediately obvious. They lie behind clothing and may not bleed freely.

**History**
- Patient suffering blunt trauma in an accident
- Stabbing or shooting
- Area subjected to sharp trauma

**Signs**
- Poor perfusion
- Guarding and rigidity of abdomen
- Obvious injury to body
- Frank blood excreted from body

**Symptoms**
- Pain and tenderness

Treatment of Abdominal Wounds

- Treat external bleeding with direct pressure and rest
- As soon as possible cover superficial wounds with sterile non-stick dressing
- Immediately call ambulance
- Examine and continuously assess casualty’s perfusion status
- Posture casualty comfortably - usually shoulders raised and knees bent
- Give nothing to eat or drink
- Reassure casualty

Eviceration

Eviceration is the spilling or protruding of organs from the abdomen through a wound.

Treatment of Eviceration

- Immediately call ambulance
- Treat external bleeding with direct pressure and rest
- As soon as possible cover all organs with waterproof non-stick dressing (Gladwrap is excellent)
- Cover gladwrap and everything with towels so casualty cannot see the injury
- Examine and continuously assess casualty’s perfusion status
- Posture casualty comfortably - usually shoulders raised and knees bent
- Give nothing to eat or drink
- Reassure casualty – If conscious these casualties are quite distraught
Internal Bleeding

Internal bleeding into the abdomen is a common injury that presents a major threat to life and there is nothing you can do to control the bleeding. It is essential that the bleeding is identified and the casualty taken to a surgical hospital as soon as possible.

Identification of Internal Bleeding

History
- Patient suffering blunt trauma in an accident
- Sudden onset of severe pain

Signs
- Poor perfusion
- Guarding and rigidity of abdomen
- Obvious injury to body
- Frank blood excreted from body

Symptoms
- Pain and tenderness

Treatment of Internal Bleeding

- Immediately call ambulance
- Examine and continuously assess casualty’s perfusion status
- Posture casualty comfortably - usually shoulders raised and knees bent
- Give nothing to eat or drink
- Reassure casualty

Abdominal Aortic Aneurysm

An abdominal aortic aneurysm occurs when a weakness in the wall of the main artery coming from the heart gives way.

Identifying Ruptured Aortic Aneurysm

History
- Older casualty, especially male
- Onset of abdominal pain/discomfort
- Patient reports a tearing sensation in abdomen

Signs
- Possible poor perfusion
- Guarding and rigidity of abdomen
- Possible orange sized pulsating mass in upper abdomen

Symptoms
- Pain often radiating to legs
- Tenderness
- Tearing sensation

Treatment of Aortic Aneurysm

- Immediately call ambulance
- Examine and continuously assess casualty’s perfusion status
- Posture casualty comfortably - usually shoulders raised and knees bent
- Give nothing to eat or drink
- Reassure casualty
Limb Trauma

The limbs are the most common sites of injury. The injuries that you will encounter include bruising, sprains, strains, dislocations, fractures, avulsions, and crush injuries. Limb injuries, even when severe, are not directly life threatening unless associated with uncontrolled bleeding.

The priorities are in order; control bleeding and prevent further injury by immobilising the injured limb.

Fractures

A fracture is a break in the continuity of a bone caused by:

- **Direct Force**: - a blow to the body breaks the bone directly where the blow is made
- **Indirect Force**: - force to one end of a limb fractures a bone further away
- **Abnormal Muscle Action**: - severe muscle contraction can sometimes break bone

There are three types of fracture:

- **Closed fracture**: - the bone is broken and there is no wound to the atmosphere and no injury to other body organs
- **Open fracture**: - the ends of broken bone are pushed through the skin or a wound leads down to the bone. An open fracture is serious because of associated bleeding and the increased risk of infection in the bone itself
- **Complicated fracture**: - other body organs are damaged by the fracture

Dislocation

Dislocation occurs when a bone is moved out of place by forces twisting or pulling it. The treatment of dislocations and fractures is the same.

Identifying a Dislocation or a Fracture

**History**
- Story of a blow or other impact to the body
- Patient engaging in physical activity

**Signs**
- Abnormal or no movement
- Deformity - (sometimes)
- Swelling
- Bruising
- Shortening of limb (Legs)
- Crepitus - a coarse grating sound which should be prevented

**Symptoms**
- Loss of power, movement or control
- Pain
- Tenderness
Treatment of Fractures and Dislocations in Legs

- Rest the casualty and the limb
- If necessary call ambulance immediately
- Check circulation below injury (pulse and skin)
- If ambulance will be some time in arriving and any signs of poor circulation are present
  - Straighten other leg and place towels against it
  - Straighten injured limb (This will be painful!!)
  - Move injured leg against good leg
  - Bandage around feet
  - Bandage above the fracture
  - Bandage below fracture
  - Bandage joint above the fracture
  - Bandage joint below the fracture
- Tie all knots over padding or splints
- Check circulation below bandages
Treatment of Fractures and Dislocations in Arms

- Rest the casualty and the limb
- If necessary call ambulance immediately
- Check circulation below injury (pulse and skin)
- Straighten lower arm and have casualty cradle it
- Place splint made of newspaper or cardboard under arm
- Bandage around hand
- Bandage above the fracture
- Bandage below fracture
- Tie all knots over padding or splints
- Check circulation below bandages by watching colour of finger tips
- Loosen bandages if fingers become blue etc.
- Place arm in sling

Fig. 5.7: Tie knots on uninjured side over padding

Fig. 5.8: Newspaper used as splint for forearm fracture
Avulsion of a Limb

Avulsion is the non-surgical amputation of a limb or other body part. In most avulsion cases the limb or body part is torn or ripped off the body. The loss of a limb to a shark is the most obvious form of this type of injury. Because of the tearing, stretching and mashing of tissues and blood vessels, avulsion can sometimes be accompanied with severe uncontrolled bleeding.

Treatment of an Avulsed Limb

- Rest the casualty and the limb
- If necessary call ambulance immediately
- Pack stump with towels or large absorbent material
- Keep the casualty still and flat
- Elevate stump
- Have by-standers help maintain pressure directly onto bleeding stump
- Cover casualty with a blanket

Crush Injuries

With crush injuries the weight must be left in place until the arrival of the ambulance if casualty has been trapped for more than an hour. This prevents the chemicals from burst cells from reaching the heart and stopping it.

Treatment of Crush Injuries

- Immediately lift weight if this can be done
- Call ambulance immediately
- If possible, check circulation below injury (pulse and skin)
- Look for bleeding from trapped part
- Stop bleeding if possible
- Consider constrictive bandage if bleeding is there is a lot of bleeding
- Manage poor perfusion – blanket etc.
Soft Tissue Injuries

Bruising

Bruising on a limb may range from a small dark spot to a large area. The extent of the injury depends on the damage to the tissues and blood vessels within the limb. Severe bruising can also occur where a small injury occurs but the casualty has a blood clotting disorder or they are taking anti-clotting medication. These casualties need to be monitored and if the bruise becomes large they should be taken to hospital or to their medical practitioner.

Treatment of Bruising

- Rest casualty and stop them using the injured part
- Ice Compress on the injured area for twenty minutes
- Consider a compression bandage for reducing swelling
- Elevate injured part
- Confirm if casualty takes anti-coagulant medication – aspirin, etc.
- Manage poor perfusion – blanket etc.

Sprain and Strain

Sprains and strains are over-stretching and tearing injuries. Sprains affect ligaments and strains occur in muscles. It is sometimes difficult to tell the difference between a severe sprain and dislocation or fracture involving the joint. If you are in doubt treat the injury as a fracture.

Identifying a Sprain or a Strain

History
- Story of playing sport or physical exertion
- Patient has over-extended or twisted
- Patient may have felt or heard a snap before pain

Signs
- Swelling
- Bruising
- Unable to bear weight or use limb

Symptoms
- Pain
- Tenderness

Treatment of Sprain and Strain

- Rest the casualty and the limb
- Ice compress applied to injury for 20 minutes
- Compression bandage
- Elevate injured limb
- If you think there may be a fracture/dislocation treat for that injury
- Refer to appropriate care such as medical practitioner or physiotherapist
Bandaging

Bandaging in first aid should be kept simple and practical. There is little point in splinting a fractured leg with triangular bandages and wood if the ambulance service is going to be on the scene within an hour. They will use traction splints and remove any splinting applied by the first aider.

The Triangular bandage

The most useful bandage in the first aid kit is the triangular bandage. It can be used to make a variety of slings, it can be used as a bandage to hold splints on the body and it can be used as a pad and bandage for bleeding. The triangular bandage can be folded as follows:

Phases of Triangular Bandage

![Diagram of Triangular Bandage Phases]

Fig. 10-1: Folding a triangular bandage to create broad and narrow bandages

The Roller Bandage

![Diagram of Roller Bandage Application]

Fig. 10-3: Application of a compression bandage to ankle