Trauma Management

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Trauma Management

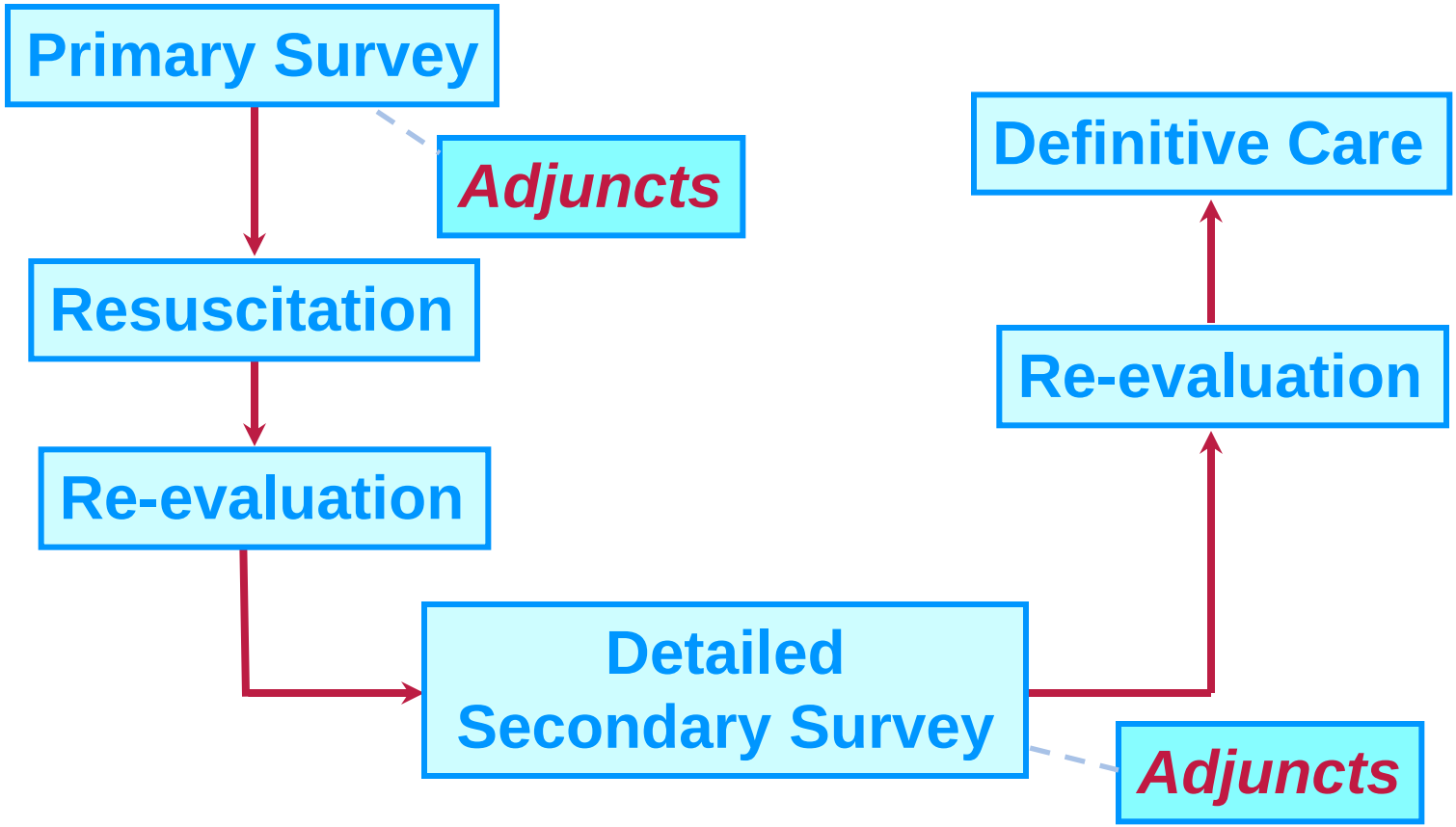
- **Principles of management**
- **Pitfalls**
- **Special situations**
- **Anaesthetic management**

Basic Rules

- **Clear handover from first responder**
- **Assessment and Resuscitation should be carried out simultaneously**
- **Team work of paramount importance**
- **Quick response (Golden Hour)**
- **Attention to details is crucial to the management plan**

Kam et al, World J Emerg Med 2010

Concepts of Initial Assessment



Primary Survey

Airway with c-spine protection

Breathing with adequate oxygenation

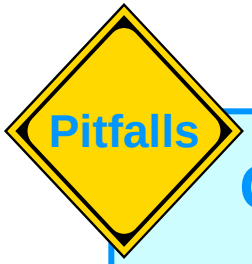
Circulation with hemorrhage control

Disability

Exposure / **E**nvironment

Airway

Establish patent airway and protect c-spine



Occult airway injury

Progressive loss of airway

Equipment failure

Inability to intubate

Airway Management

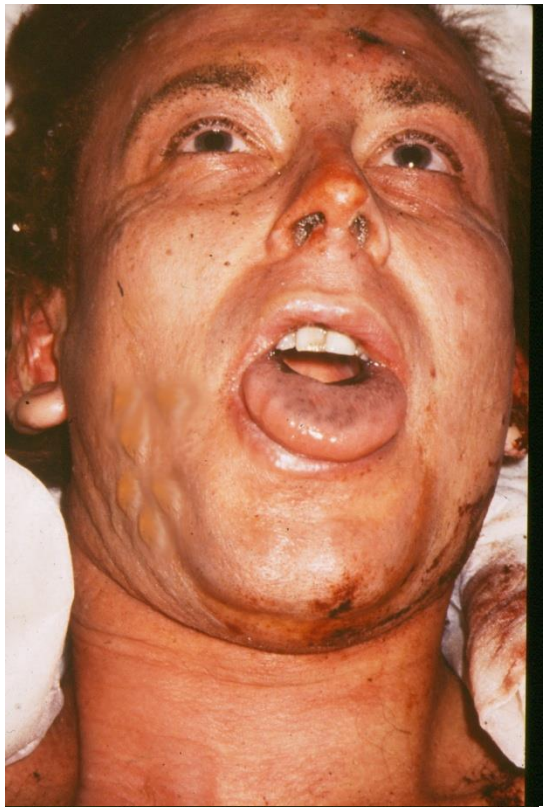
Caution

Protect the cervical spine during airway management!

Place the hand on either side of the head and maintain neck midline

Airway Assessment

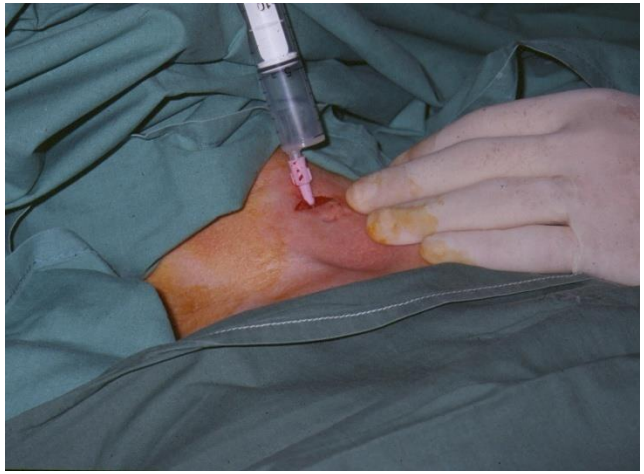
Impending Airway Obstruction



Airway Management

Definitive Airway

- Surgical airway
- Cricothyroidotomy



Summary

- **With all airway maneuvers, the cervical spine must be protected by inline immobilization.**
- **A surgical airway is indicated when an airway is needed and intubation is unsuccessful.**
- **The assessment of airway patency and adequacy of ventilation must be performed quickly and accurately.**
- **Pulse oximetry and end-tidal CO_2 measurement are essential.**

Breathing

- **Respiratory rate**
- **Chest movement**
- **Air entry**
- **Oxygen saturation**

Airway versus ventilation problem?

Iatrogenic Pneumothorax
or
Tension Pneumothorax?
or
Flail Chest
or
Massive Hemothorax

Tension Pneumothorax

Clinical diagnosis before x-ray

- **Respiratory distress**
- **Shock**
- **Distended neck veins**
- **Unilateral decrease in breath sounds**
- **Hyperresonance**
- **Cyanosis (late sign)**

Needle/chest drain

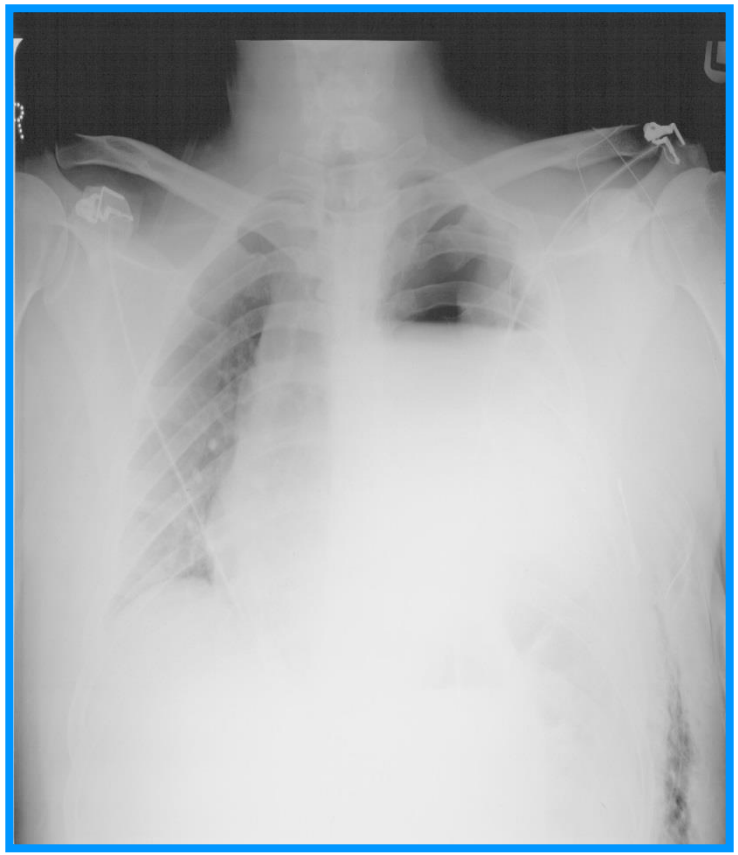
Management of Open Pneumothorax

- Ensure adequate airway
- 100% oxygen
- Seal open wound
- IV access & fluids
- Chest X-ray / CT

Courtesy of David Effron, M.D.

Massive Hemothorax

- **≥ 1500 mL blood loss**
- **Flat neck veins in shock**
- **Distended in tension pneumothorax**
- **Shock with no breath sounds + percussion dullness**



Massive Hemothorax

- **Rapid volume restoration**
- **Chest decompression and x-ray**
- **Autotransfusion**
- **Operative intervention**

Summary

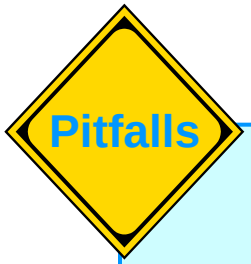
- **Rely on clinical judgment as well as clinical tools**
- **Beware of respiratory decompensation**
- **Rapid reaction time and prompt intervention**

Circulation

- **Level of consciousness**
- **Skin color and temperature**
- **Pulse rate and character**
- **Check capillary refill time**
- **Blood Pressure**

Circulatory Management

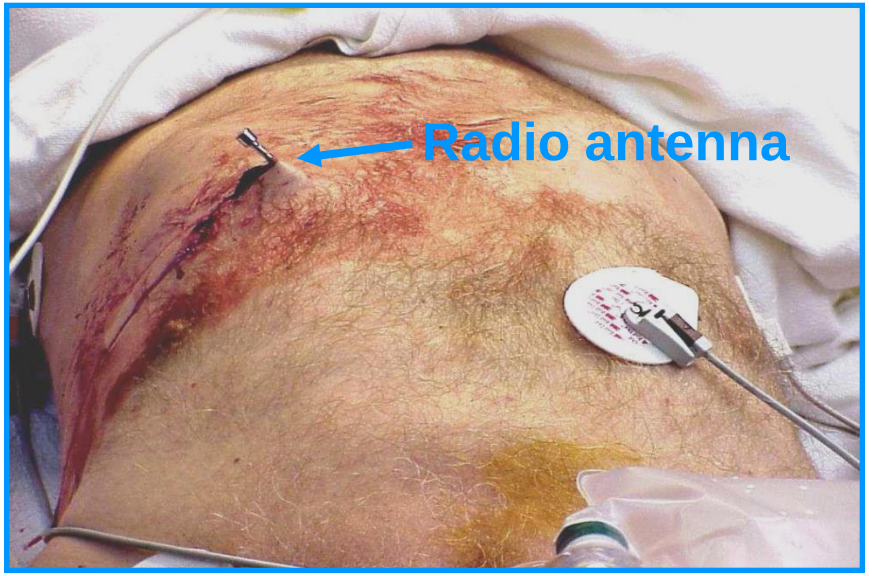
- **Control hemorrhage**
- **Restore volume**
- **Reassess patient**



Elderly
Children
Athletes
Medications

Cardiac Tamponade

- **Decreased arterial pressure**
- **Distended neck veins**
- **Muffled heart sounds**
- **Pulseless electrical activity**

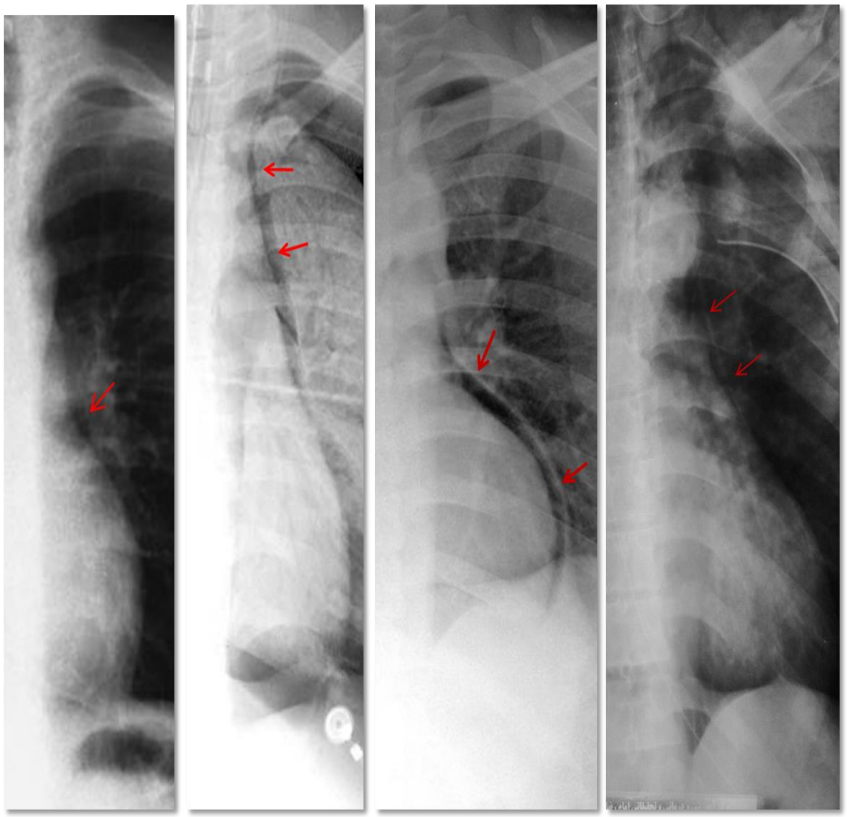


Traumatic Aortic Disruption

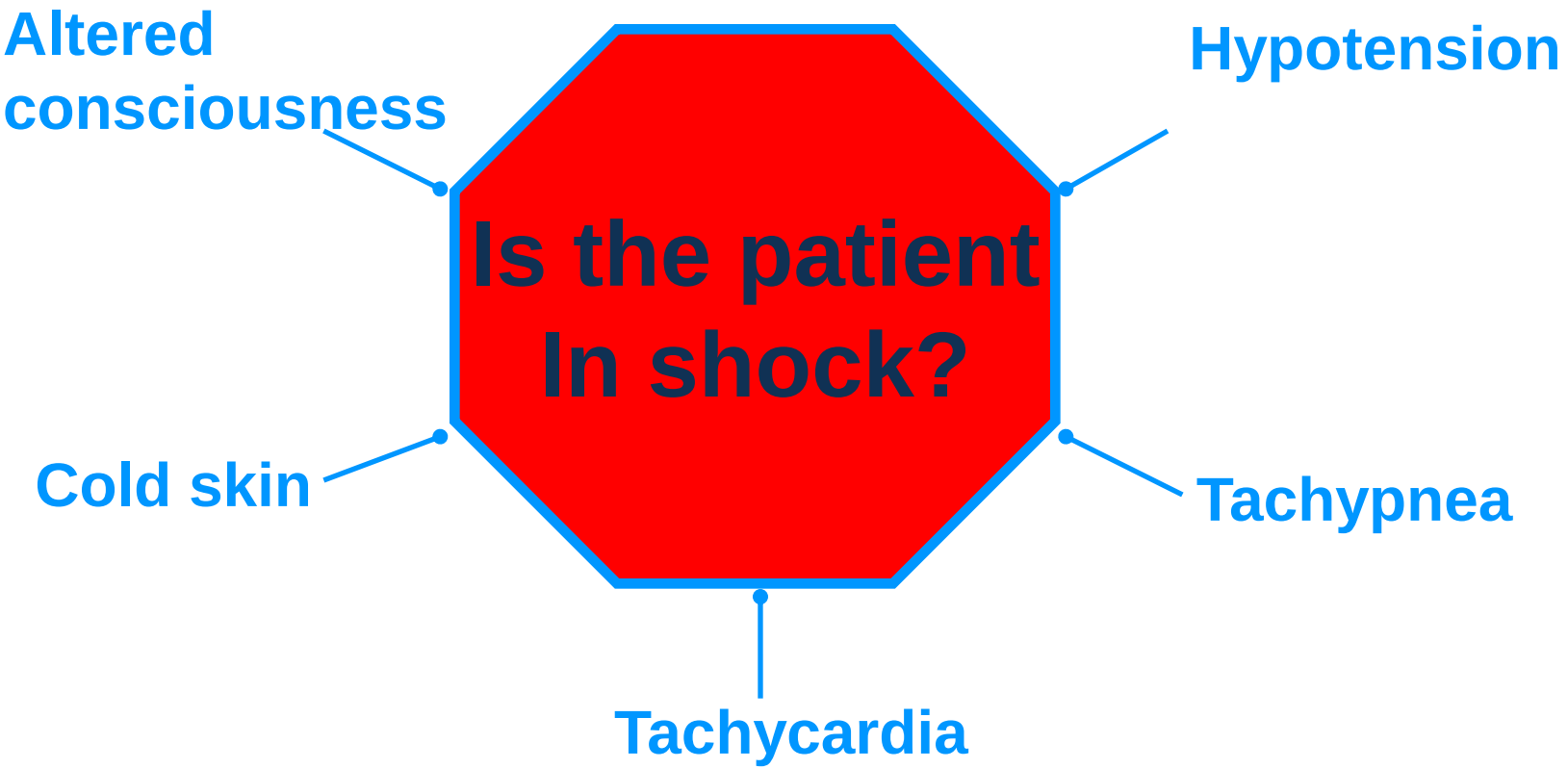
- **Rapid acceleration / deceleration mechanism**
- **X-ray signs**
- **High index of suspicion**
- **Surgical Input**

Oesophageal Injury

- **Chest tube: Particulate matter**
- **Mediastinal air**
- **Contrast swallow, Endoscopy**
- **Operation**



Shock


Altered consciousness
Hypotension
Is the patient In shock?
Cold skin
Tachypnea
Tachycardia

Shock

What is the cause of the shock state?

Hypovolaemic

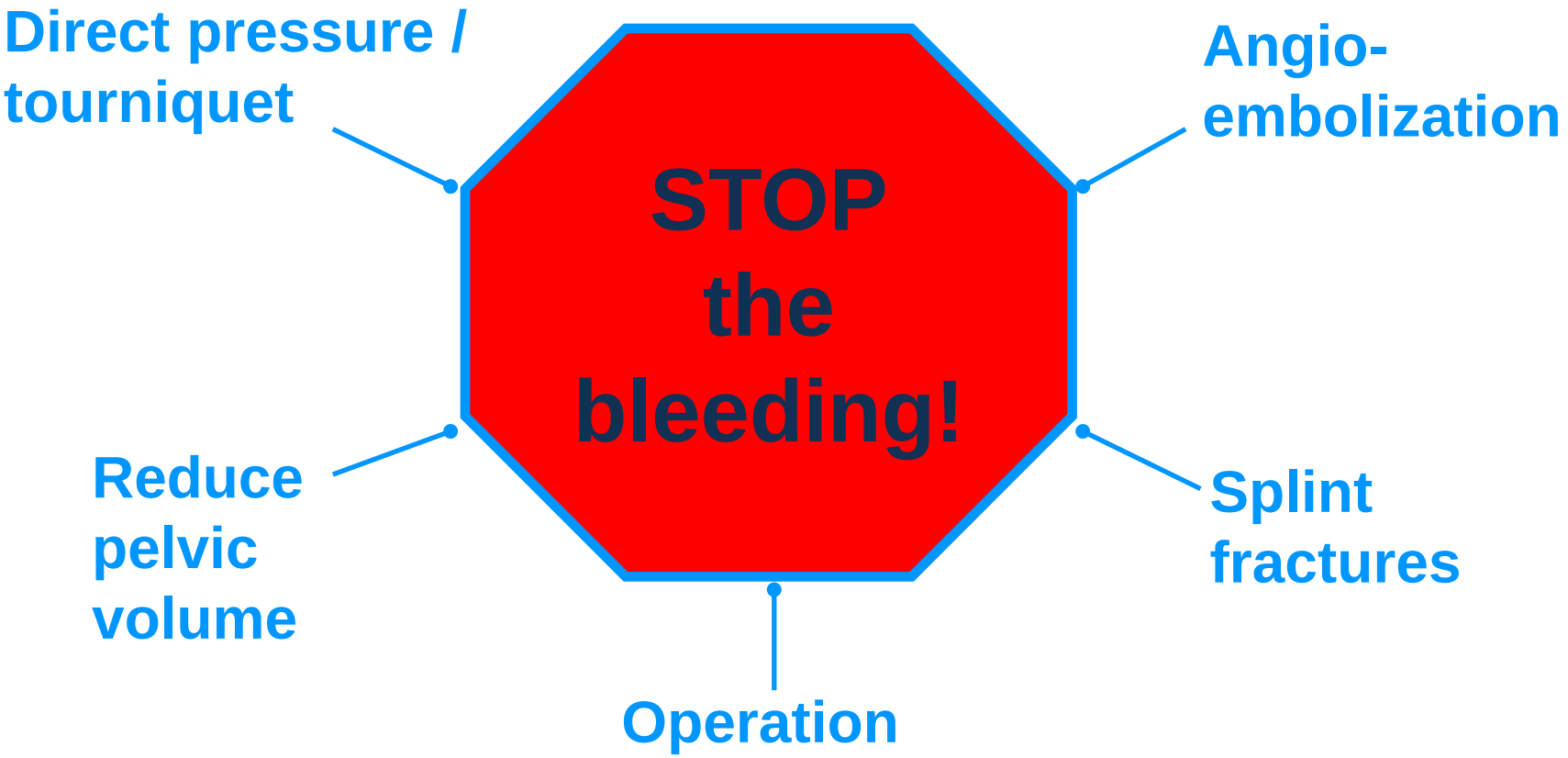
- **Blood loss**
- **Fluid loss**

Non-haemorrhagic

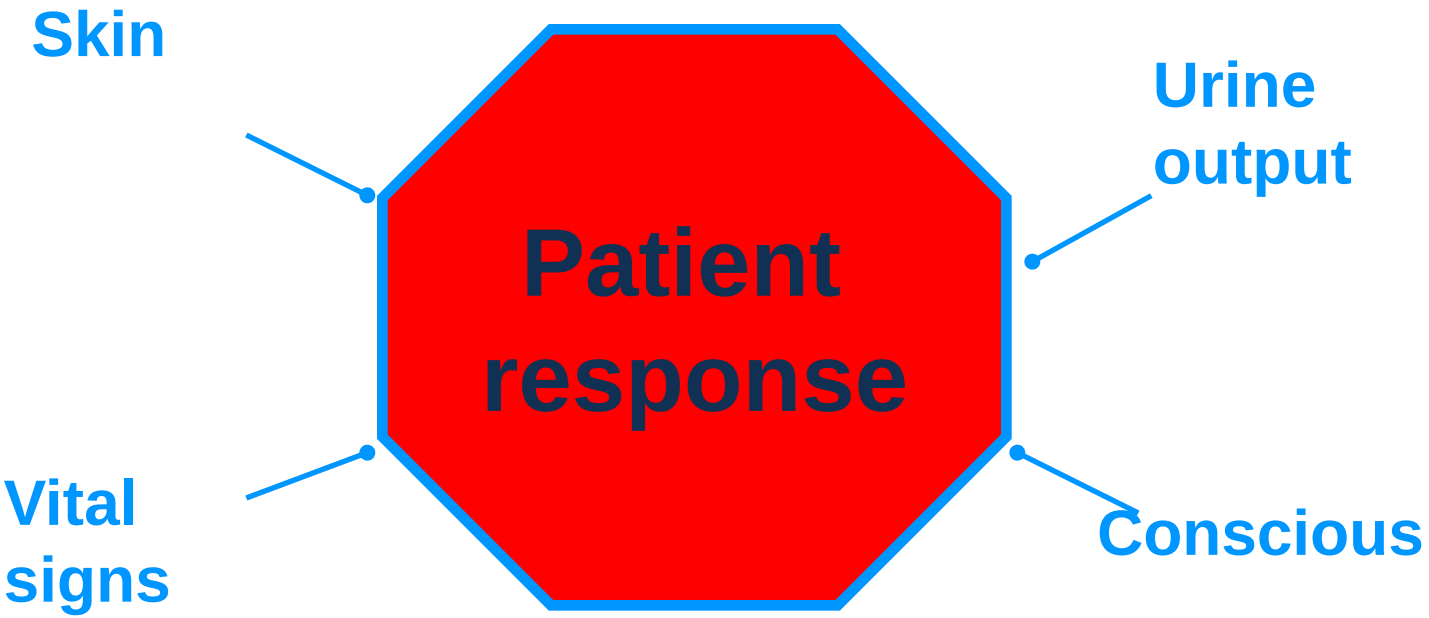
- **Tension pneumothorax**
- **Cardiac tamponade**
- **Cardiogenic**
- **Septic**
- **Neurogenic**

Interventions

What can I do about it?



Signs of improved organ function



Rapid responders, Transient responders and non-responders

Fluid Resuscitation

- **Components of haemostatic resuscitation**
  - **Permissive hypotension**
  - **Early transfusion**
  - **Early use of plasma and platelets**
  - **Specific pro-coagulant therapy (tranexamic acid 2g)**

Summary

- **Shock is inadequate organ perfusion and tissue oxygenation.**
- **Determine the cause of shock**
- **Hypovolemia is the cause of shock in most trauma patients until proven otherwise.**
- **Stop the bleeding**
- **Re-evaluate**

Primary Survey

Disability

- Baseline neurologic evaluation
- Glasgow Coma Scale score
- Pupillary response
- AVPU
- Blood sugar
- Lateralising signs

Observe for neurologic deterioration

Exposure and Environment

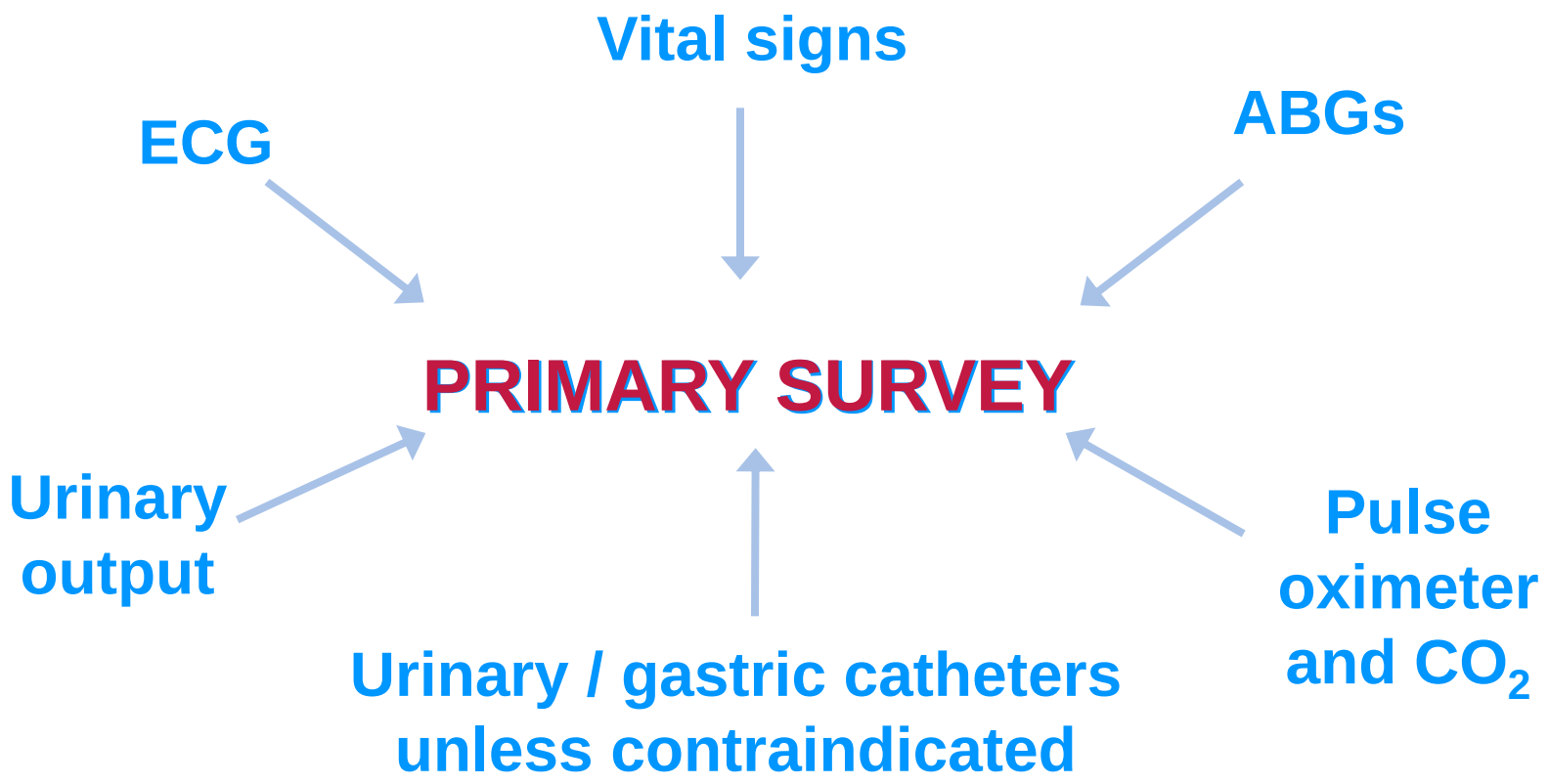
Completely undress the patient

Caution

Prevent hypothermia

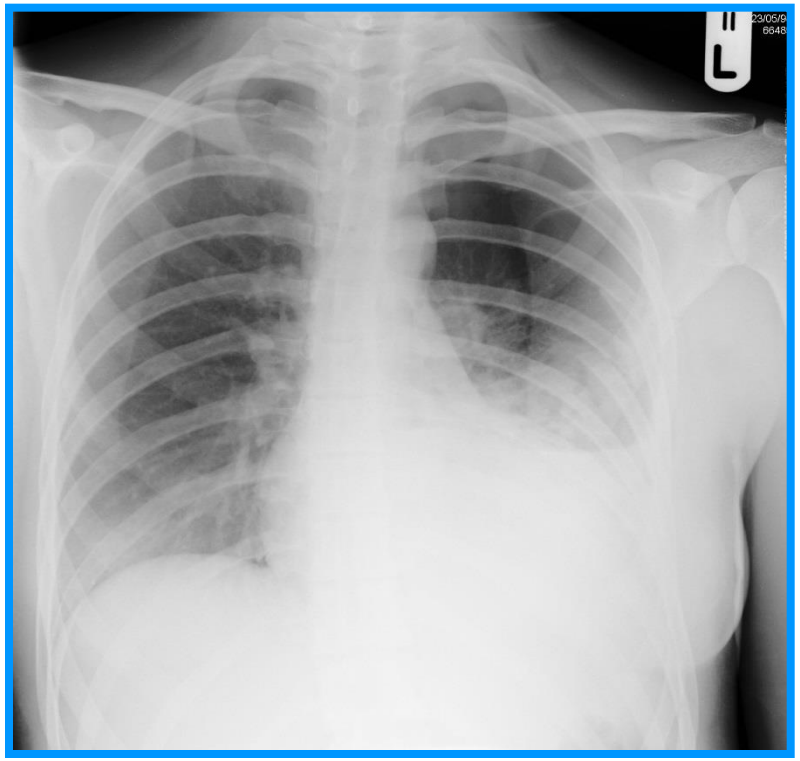
Missed injuries

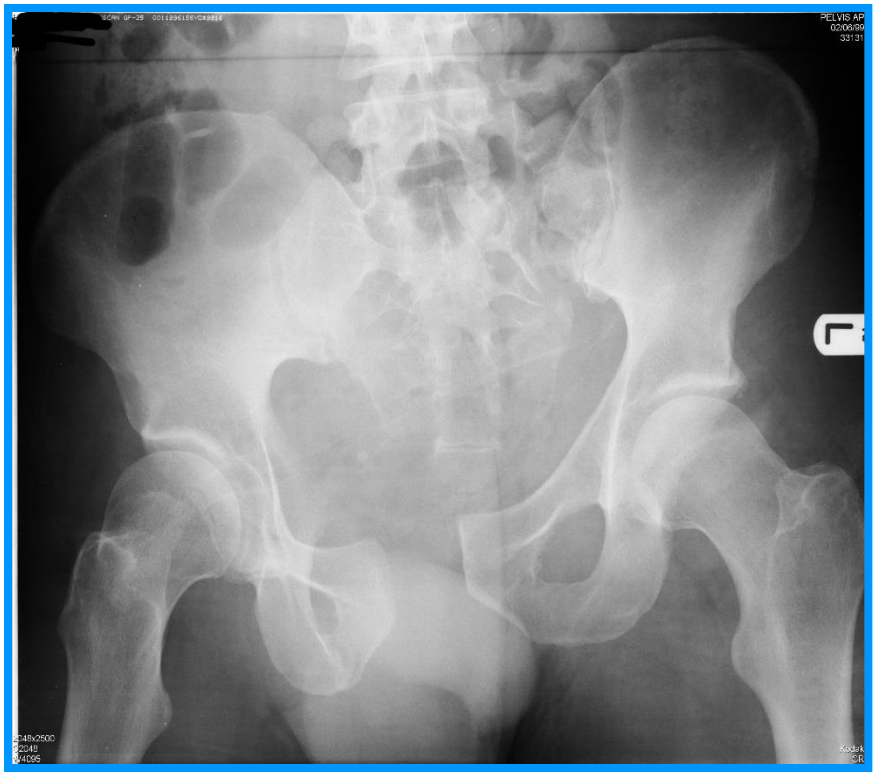
Adjuncts to Primary Survey



Adjuncts to Primary Survey

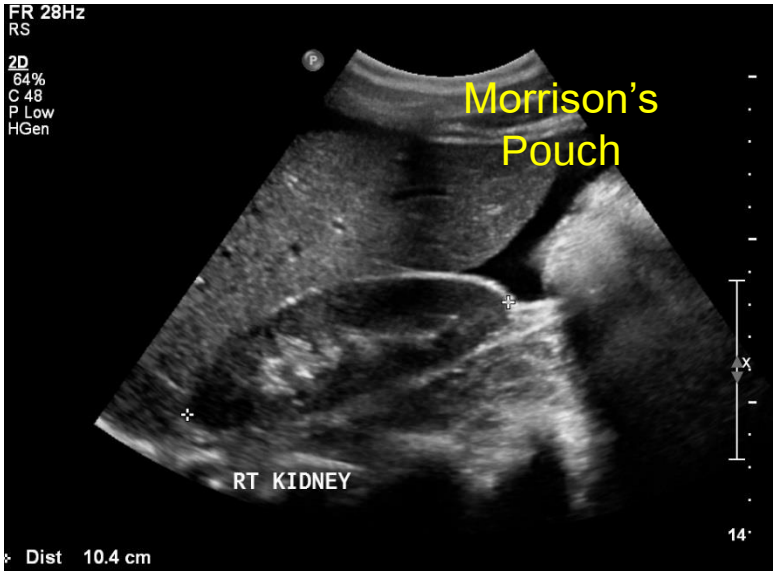
Diagnostic Tools

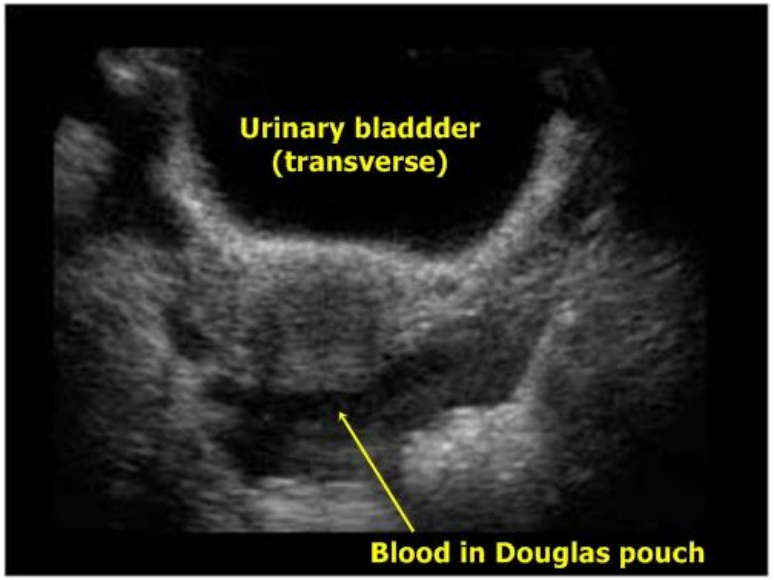




Diagnostic Tools

Fast-sensitive and specific
DPL-Obsolete



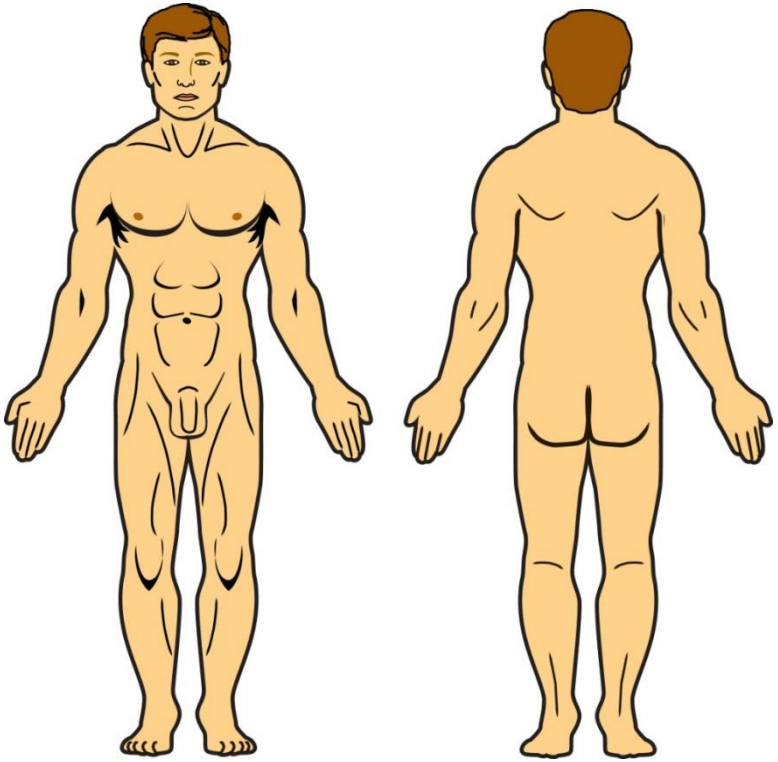


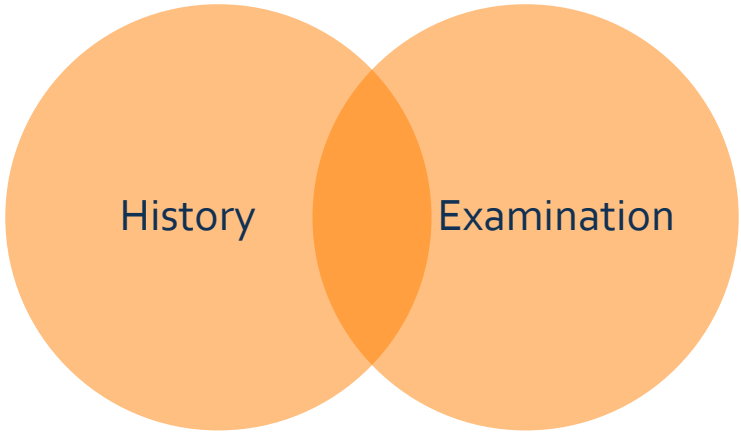
Adjuncts to Primary Survey

Consider Early Transfer

- Use time before transfer for resuscitation
- Do not delay transfer for diagnostic tests

What is the secondary survey?





Secondary Survey

History

- **A**llergies
- **M**edications
- **P**ast illnesses
- **L**ast meal
- **E**vents / Environment / Mechanism

Neck (soft tissues)

Mechanism:	**Blunt vs penetrating**
Symptoms:	**Airway obstruction, hoarseness**
Findings:	**Crepitus, hematoma, stridor, bruit**

Pitfalls

Delayed symptoms and signs

Progressive airway obstruction

Occult injuries

Secondary Survey

Chest and Abdomen

- Inspect / Auscultate
- Palpate / Percuss
- Reevaluate
- Special studies

Pitfalls

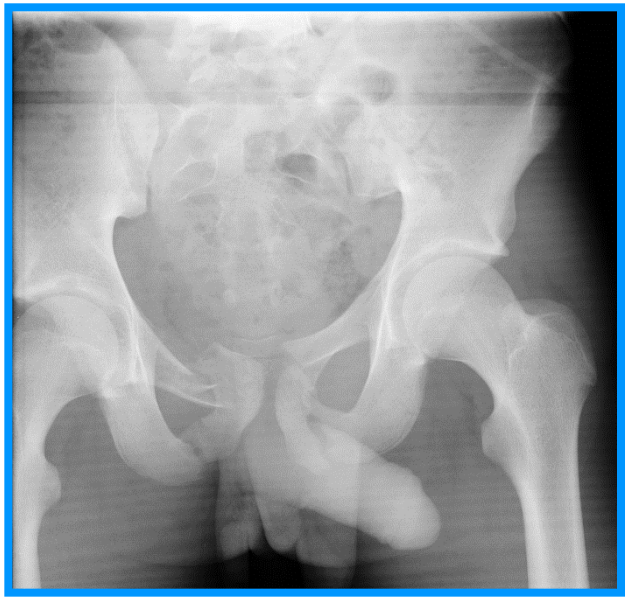
Hollow viscus injury

Retroperitoneal injury

Secondary Survey

Pelvis

- Pain on palpation
- Leg length unequal
- Instability
- X-rays as needed



Pitfalls

Excessive pelvic manipulation

Underestimating pelvic blood loss

Secondary Survey

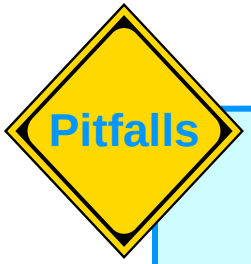
Extremities

- Contusion, deformity
- Pain
- Perfusion
- Peripheral neurovascular status
- X-rays as needed

Don’t Forget The Back

Secondary Survey

Musculoskeletal



Potential blood loss

Missed fractures

Soft tissue or ligamentous injury

Compartment syndrome (especially with altered sensorium / hypotension)

Secondary Survey

Neurologic: Brain

- GCS
- Pupil size and reaction
- Lateralizing signs
- Frequent reevaluation
- Prevent secondary brain injury

Early neurosurgical consult

Traumatic Brain Injury

- **Leading cause of death**
- **Evacuation of hematoma is time critical**
- **Hypotension and hypoxia occurring during resuscitation → worsens outcomes from TBI**
- **Minimize secondary brain injury from intracranial edema and inflammation**

Secondary Survey

Neurologic: Spine and Cord

Conduct an in-depth evaluation of the patient's spine and spinal cord

Early neurosurgical / orthopedic consult

Pitfalls

Incomplete immobilization

Neurologic deterioration

Spinal Cord Injury

- Very few therapies available
- Hemodynamic and respiratory support
- Surgical fixation
- High dose steroid therapy
- Cervical injury causes respiratory impairment
- Early intubation recommended

Transfer

Which patients do I transfer?

Refer to trauma centre for:

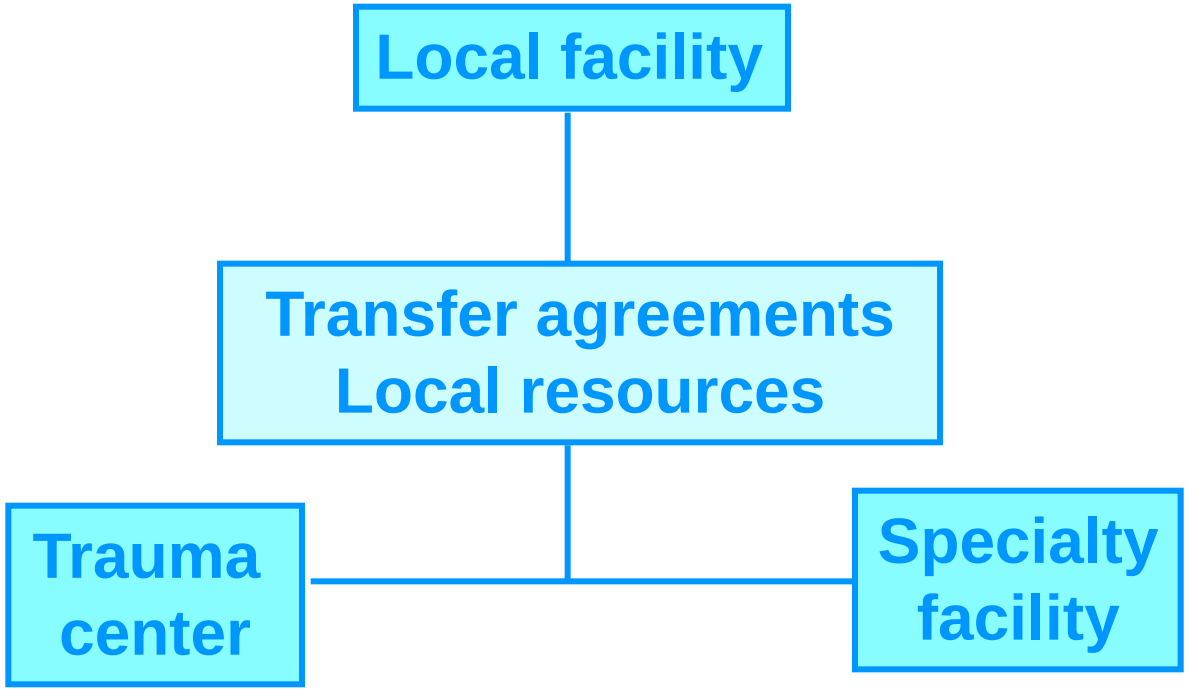
- **Multisystem injuries**
- **Paediatrics**
- **Cardio-thoracic/Neurosurgery**
- **Burns**

When do I transfer?

As soon as possible after:

- **Airway control**
- **Hemorrhage control**

Transfer to Definitive Care



Routine, Urgent and Time Critical

Pause & check

- Are all immediately life-threatening injuries identified?
- Ensure all monitoring is in place?
- Investigation results available?
- Adequate Analgesia?
- Relatives informed?

Anaesthetic Management of Multiple Injuries Patient

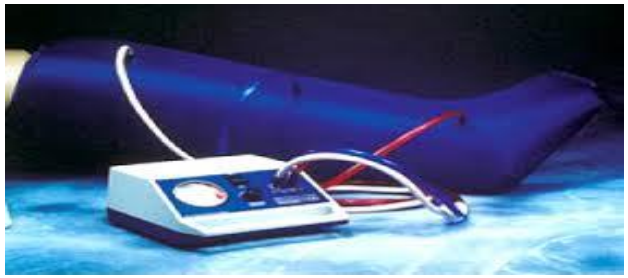
Main Consideration

- Multiple Teams will be involved
- Patient might not be fully resuscitated
- Blood loss and blood products
- Monitoring and access
- Multiple injuries and Prolonged surgery
- Post operative concerns

Multiple Teams (Theatre)

- MDT meeting
- You are Team Leader
- Role allocation to different team members
- Triage, limitations and sequence of procedures

Patient may not be fully resuscitated

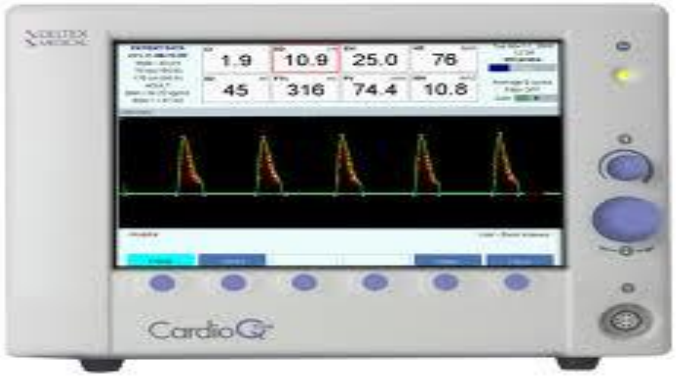


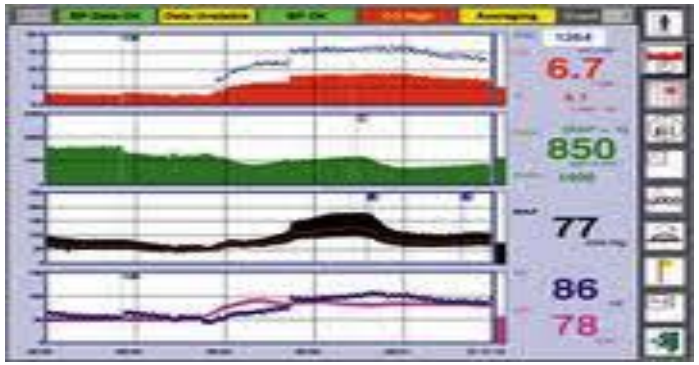
Blood Loss and Products

- **Packed red cells**
- **Platelets**
- **FFP**
- **Trauma pack**
- **Hematologist**

Monitoring & Access

- Central and arterial lines
- Temperature monitoring
- ETCO2 (head injury)
- ABGs, Coag, FBC, Us & Es
- Limited access to one central line so
  - Oesophageal Doppler
  - LidCo





Prolonged surgery

- **Positioning in relation to different injuries (head)**
- **Warming and the impact of Hypothermia**
- **Triage**
- **Family**

Conclusion

- **Principles of management**
- **Pitfalls**
- **Special situations**
- **Principles of anaesthetic management**

Questions?

Thank you