ASSESSMENT OF THE INJURED PATIENT (PRIMARY AND SECONDARY SURVEY)

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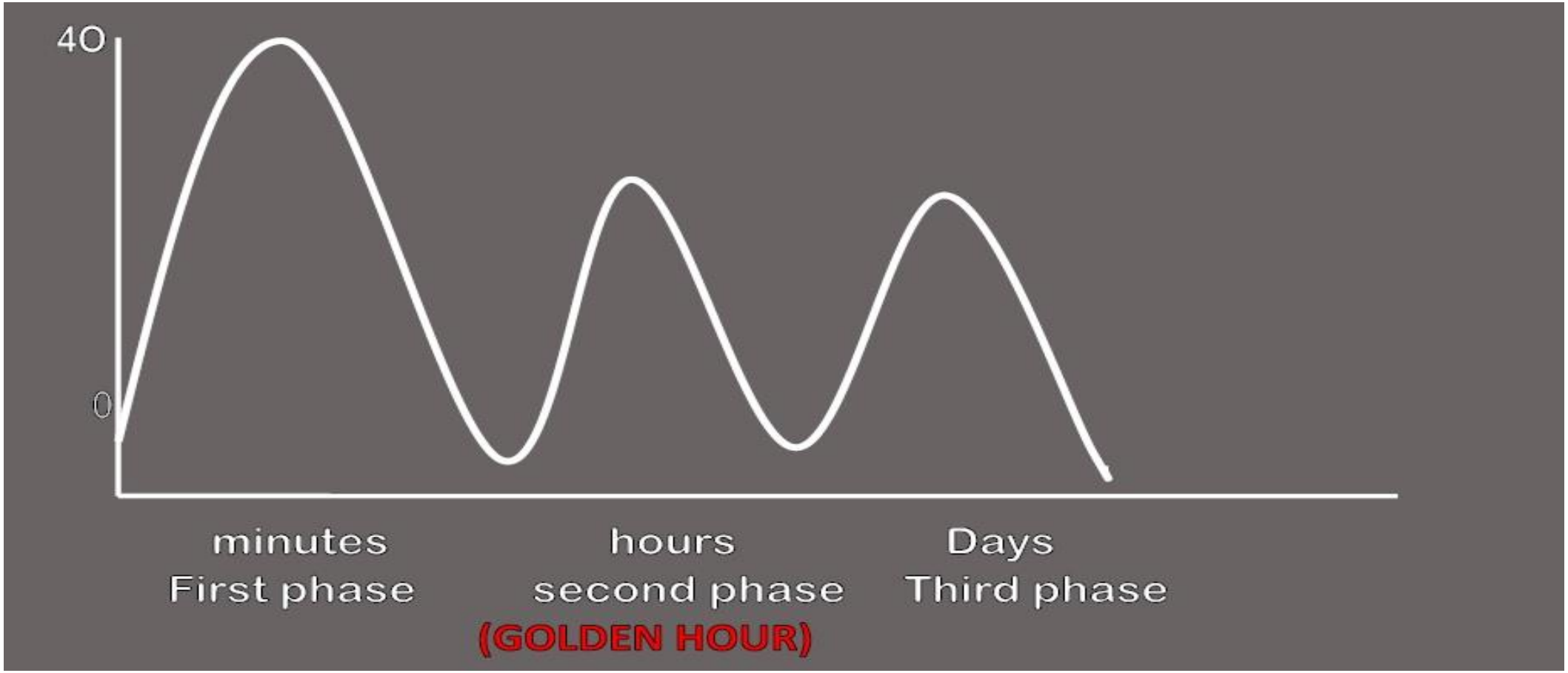
TRIMODAL DISTRIBUTION OF DEATH(%)



TRIMODAL DISTRIBUTION OF DEATH

First phase

- death within seconds to mins (40%)

- brain
- heart and great vessels
- cervical cord

TRIMODAL DISTRIBUTION OF DEATH

Second phase

- death within minutes to hours(30%) ‘The Golden hour’

- brain (treatable haematoma)
- lungs (haemo and pneumothorax)
- abdomen (haemorrhage)
- skeleton (pelvis and long bones)

TRIMODAL DISTRIBUTION OF DEATH

Third phase

- death within days to weeks (30%)

- infection
- multiple organ failure
- abdomen (haemorrhage)
- skeleton (pelvis and long bones)

PRIMARY SURVEY- AIM

- Identify all immediately life- threatening injuries
- and treat them in the correct order (ABC)
- i.e. find out what is killing the patient at the moment and stop it

SECONDARY SURVEY-AIM

Identify all other injuries

- prioritise (life-threatening, limb threatening, disability generating)
- many injuries are not an immediate threat to life but will become fatal if not diagnose and treated expeditiously

PATIENT ASSESSMENT

- Primary survey
- Resuscitation
- Secondary survey
- Definitive treatment

PRIMARY SURVEY

PATIENT ASSESSMENT

Primary survey

- Ac- Airway with cervical spine control (death -secs
- B - Breathing with oxygen (death- mins)
- C -Circulation with haemorrhage control (death-hrs)
- D - Disability
- E -Exposure

NB. Resuscitation team can deal with these three vital functions in parallel.

A – AIRWAY WITH CERVICAL SPINE CONTROL

The airway should be checked for patency

- Noisy breathing is obstructed breathing

Beware

1. 1.Foreign body in airway
2. 2.jaw/ facial fracture
3. 3.Upper airway disruption
4. 4.Cervical spine injury

AIRWAY MANAGEMENT

Basic airway techniques

- Chin lift/jaw thrust
- Remove fluid with suction & FB with forceps under direct vision
- Maintain airway with Guedel or nasopharyngeal airway (avoid facial trauma) + Bag-valve mask (inspired O2 ~ 90%
- Stabilise the cervical spine (hard neck collar)

Definitive airway

- Oral or nasoendotracheal intubation with anaesthetic or muscle relaxant unless unconscious
- Surgical cricothyroidotomy (upper airway disruption)
- Emergency tracheostomy – direct airway injury below the cricothyroid membrane

B –BREATHING WITH ADEQUATE VENTILATION

- All acutely ill patients need 100% oxygen via a non-rebreathing mask with a reservoir bag
- count respiratory rate – normal 12-18/min
- <9 or > 28 may require assisted ventilation

B –BREATHING WITH ADEQUATE VENTILATION

- Skin colour
- Tracheal deviation
- Chest movement
- Listen to the chest
- Touch the chest

B-BREATHING

- most life-threatening chest injuries can be managed without performing a thoracotomy

Life-saving techniques required are

a) assisted ventilation
b) needle thoracocentesis
c) insertion of a chest drain and/or
d) closure of an open chest wound

B- BREATHING - MANAGEMENT

- Beware
  - Tension pneumothorax
  - Open/sucking pneumothorax
  - massive haemothorax
  - Flail chest (segment) with pulmonary contusions
  - Cardiac tamponade

- Management (non-surgical)
  - Needle decompression, siting of a chest drain
  - Occlusion, siting of a chest drain
  - i/v cannula before inserting a chest drain
  - Analgesia, ventilatory support
  - Needle pericardiocentesis, open drainage and surgical repair should rapidly follow

RESUSCITATION ROOM THORACOTOMY

- Poor outcome

1. Severe injury
2. Limited equipment usually

Indicated for

1. Penetrating chest injuries with cardiac arrest but recently witnessed signs of life (within 5 mins)
2. Exsanguinating pulmonary bleeding that requires hilar clamping

EMERGENCY THORACOTOMY IN OPERATING THEATRE

1. Major (>200ml/hr for 2-4 hrs) blood loss from the chest
2. Cardiac tamponade: either penetrating or blunt trauma
3. Disruption of the aorta
4. Massive air leak or obvious airway injury
5. Oesophageal perforation
6. FB transfixion in or through the chest

C- CIRCULATION WITH HAEMORRHAGE CONTROL

- 2 large bore cannulas –antecubital fossa- (Poiseuille's law – flow ~ radius,/ length
- Assess
  - level of consciousness
  - Heart rate
  - Respiratory rate
  - Blood pressure
  - Capillary refill time

C-CIRCULATION

Beware

1. Intra-abdominal/ -thoracic injury
2. Femoral/ pelvic fracture
3. Arterial/venous penetrating injuries
4. External haemorrhage

C- CIRCULATION

Indications for X/match

- ❑initial systolic BP<80mmHg
- ❑obvious major blood loss
  - ✓>700cc immediately from chest drain
  - ✓Multiple long bone fractures
  - ✓Pelvic fractures
  - ✓Heavily blood soaked clothing
- ❑Persistent hypotension despite 2lit of crystalloid

C- CIRCULATION - MANAGEMENT

4 components

1. Estimate the volume of the blood loss
2. Find the site of the bleeding
3. Stop the bleeding
4. Restore the circulating volume

(1) ASSESS VOLUME OF BLOOD LOSS

	Class 1	Class 2	Class 3	Class 4
Blood loss %	<15 (750mls)	15-30 (1l)	30-40 (1.5l)	>40 (2l)
Systolic BP	N	N	decreased	v. low
Diastolic BP	N	raised	decreased	v.low
Respiratory rate	14-20	20-30	30-40	>35
Pulse rate	<100	100-120	>120	>140
Urinary output (ml/hr)	>30	20-30	5-15	Negligible (0-10)
Mental state	Alert	Alert/ anxious	Aggressive/confused	Confused/Drowsy/unconscious
Skin colour	N	pale	pale	Ashene (pale & cold)

ASSESS BLOOD LOSS

Difficult to assess blood loss in trauma pt

a) when overt
b) impossible if hidden within a body cavity

Persistently shocked patient (despite 2l of crystalloid)

Hidden massive bleeding

a) abdomen (incl retroperitoneum)
b) Pelvis (cf. hypotension in trauma- severe venous haemorrhage)
c) Exclude cardiac tamponade , major chest bleeding, pelvic #

Emergency laparotomy (without further investigations)

diagnostic and therapeutic

ASSESS BLOOD LOSS (INITIAL MANAGEMENT)

Fluid challenge (with crystalloid infusion)

gives clear guide to

1. the volume of blood loss
2. whether bleeding is continuing
3. how to direct further management

FLUID CHALLENGE (500CC CRYSTALLOID)

- Rapid response to fluid challenge– bleeding has stopped
  no further treatment
- Transient response– moderate blood loss
  bleeding is continuing,
  pt needs blood transfusion and possible surgery
- No response to fluids – massive blood loss
  bleeding is continuing,
  needs urgent surgery

(2) FIND SITE OF THE BLEEDING

- Mechanism of injury
  - ✓ a stab injury to the chest
  - ✓ crush injury to the pelvis
- Clinical examination,
- Chest or pelvic x/rays
- revealed during practical procedures- chest drain, DPL
- Imaging- (Focused assessment by sonography for trauma (FAST), CT, MRI or angiography

(3) STOP THE BLEEDING

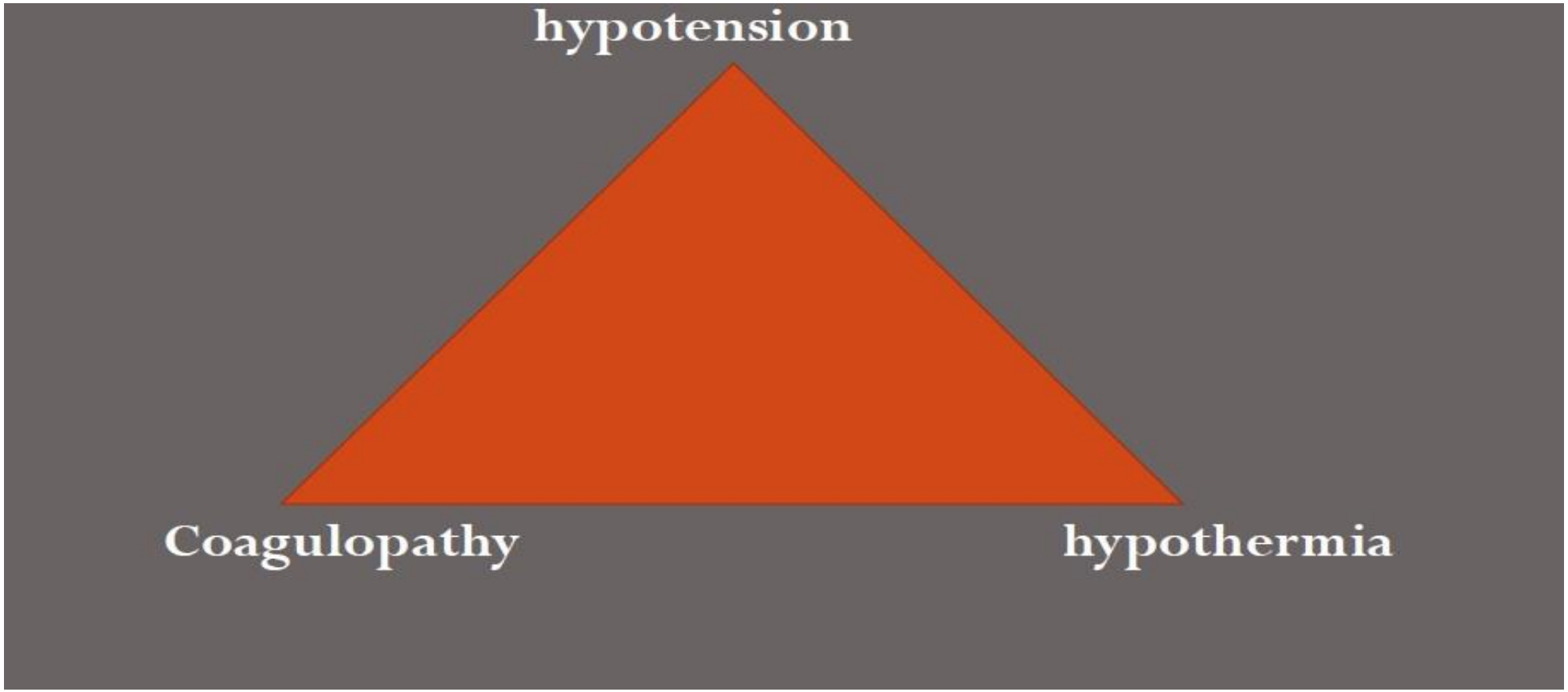
- For some patients:
- "Resucitation Surgery" - Laparatomy, thoracotomy or pelvic fixation is part of "C" of the primary survey

i.e. Primary survey completed in theatre and secondary survey completed either on ward, ICU or resuscitation room

- Hypotensive resuscitation – (conscious hypotension) maintain critical organ perfusion but not disrupt the blood clot in young fit patient
- Damage control laparotomy (severely –injured /exsanguinating pt)– rapidly restore physiology and return (24-48hrs) for anatomical correction

DAMAGE LIMITATION SURGERY

prevents the vicious cycle



SURGEON'S FACTOR

influences pt's immediate survival, progress and survival in ICU

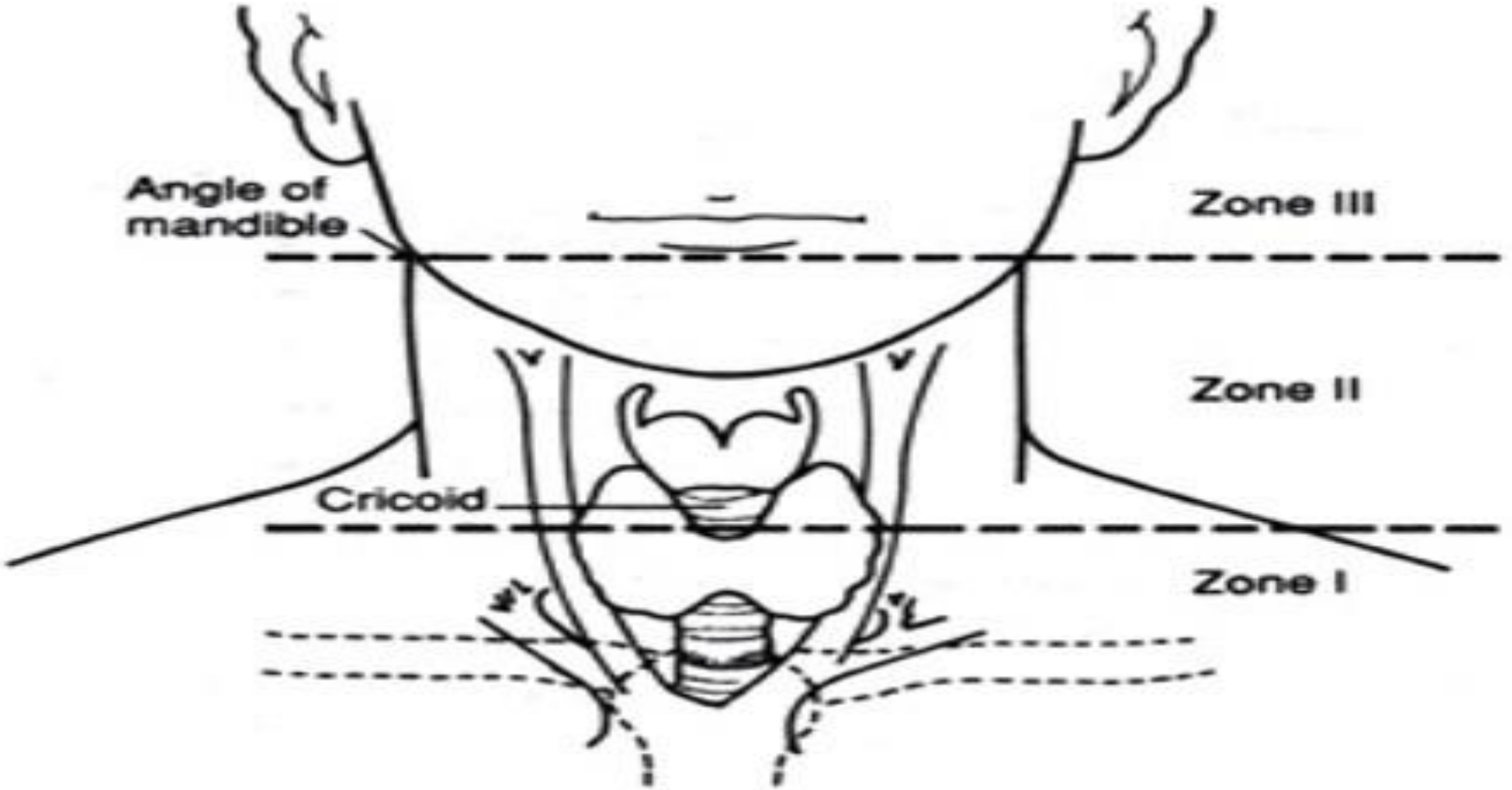
1) timely and appropriate decisions
2) correct incisions
3) identifying the bleeding site rapidly
4) stopping the bleeding efficiently

NON-SURGICAL APPROACHES TO HAEMORRHAGE CONTROL- INTERVENTIONAL RADIOLOGY

- diagnostic angiography
- transcatheter embolisation
- percutaneous intraluminal balloons for temporary haemostasis

USE

- Operative control is not possible e.g. Pelvic injuries, zone 3 of neck (carotid artery at base of skull)
- Haemodynamically stable liver bleeding
- Some complex vascular injuries


Angle of mandible
Zone III
Zone II
Cricoid
Zone I

RESTORE THE CIRCULATING VOLUME

Continuous bleeding with massive transfusion

1. life threatening (short and long term)
2. independent risk factor for MOF and late death after major trauma (transfusion of > 6 units of blood within first 12 hrs of injury)

(4) RESTORE THE CIRCULATING VOLUME

- found bleeding and stopped it
- tissue perfusion & oxygenation restored
- maintenance of circulating vol is more important than the ability to carry oxygen- if vol is maintained a loss of 75% of RBCs can be tolerated (but 30% vol loss is fatal)

solns	Distribution space	% retained in intravascular space
Dextrose	Total body water	6-10%
crystalloid	ECF	15-20%
colloid	Intravascular volume	90-100%
Blood	Intravascular volume	90-100%

RESTORATION OF BLOOD VOLUME

Improvement of circulation assessed by

- improvement in level of consciousness
- return to normal pulse rate
- maintenance of adequate blood pressure
- normal respiration rate
- adequate urine output

In major trauma- CVP line, direct arterial line, continuous ECG, peripheral pulse oximetry, urine output measurement

D- DISABILITY OF THE CNS

Quick assessment

- A- Alert
- V-response to verbal stimuli
- P- response to painful stimuli
- U- unresponsive

Beware

1. Head injury (prevent 2ary injury: resuscitation (ABC), measures to lower ICP, avoid hypoxia and hypotension)
2. Decreased oxygenation
3. Shock
4. Alcohol and drugs

Patients with obvious head injury should not have CT scans until after the ABC is complete

E-EXPOSURE FOR CLINICAL EXAMINATION

- Examine the whole pt looking for hidden injury or signs of external bleeding
- Keep to a minimum to satisfy primary survey and avoid hypothermia

SECONDARY SURVEY

SECONDARY SURVEY

- starts when primary survey is completed and resuscitation begun
- in parallel with continued reassessment of the ABC at frequent intervals
- Head- to –toe total patient assessment
- Special investigations e.g. CT scans are performed at this time once patient is adequately resuscitated and stable.

SECONDARY SURVEY

History

- R- Report of incident
- A- Allergies
- M- Medication
- P- Past medical history

SECONDARY SURVEY

Injury prediction

Unrecognised injury when:

- fatality in same compartment
- speed greater than 2o mph
- ejection from vehicle
- rollover accident
- fall greater than 20ft
- Significant deformation of vehicle

HEAD- TO- TOE EXAMINATION

- Head (eyes, scalp, head injury)
- Maxillofacial (airway. c-spine, lacrimal ducts)
- C- spine / neck (oesophagus, airway ,carotid)
- Chest (tension, Open, flail, tamponade, aorta)
- Abdomen (intra/retroperitoneum,pelvis)
- Perineum/rectum (urethra,bladder)
- Musculoskeletal (spine,digital,vascular)
- Neurological (ICP, depressed skull fracture)

FINGERS AND TUBES

- PR-assess rectal wall/prostate
- PV-assess vaginal vault
- Urinary catheter (no blood at meatus/normal prostate)
- NG tube (not in patients with midline fracture)

PATIENT ASSESSMENT- SUMMARY

The injured patient must be assessed rapidly and meticulously.

- Primary survey (ABCDE)
- Resuscitation/ reassessment
- Secondary survey (tubes/fingers)
- Definitive diagnosis & care


THANK
YOU