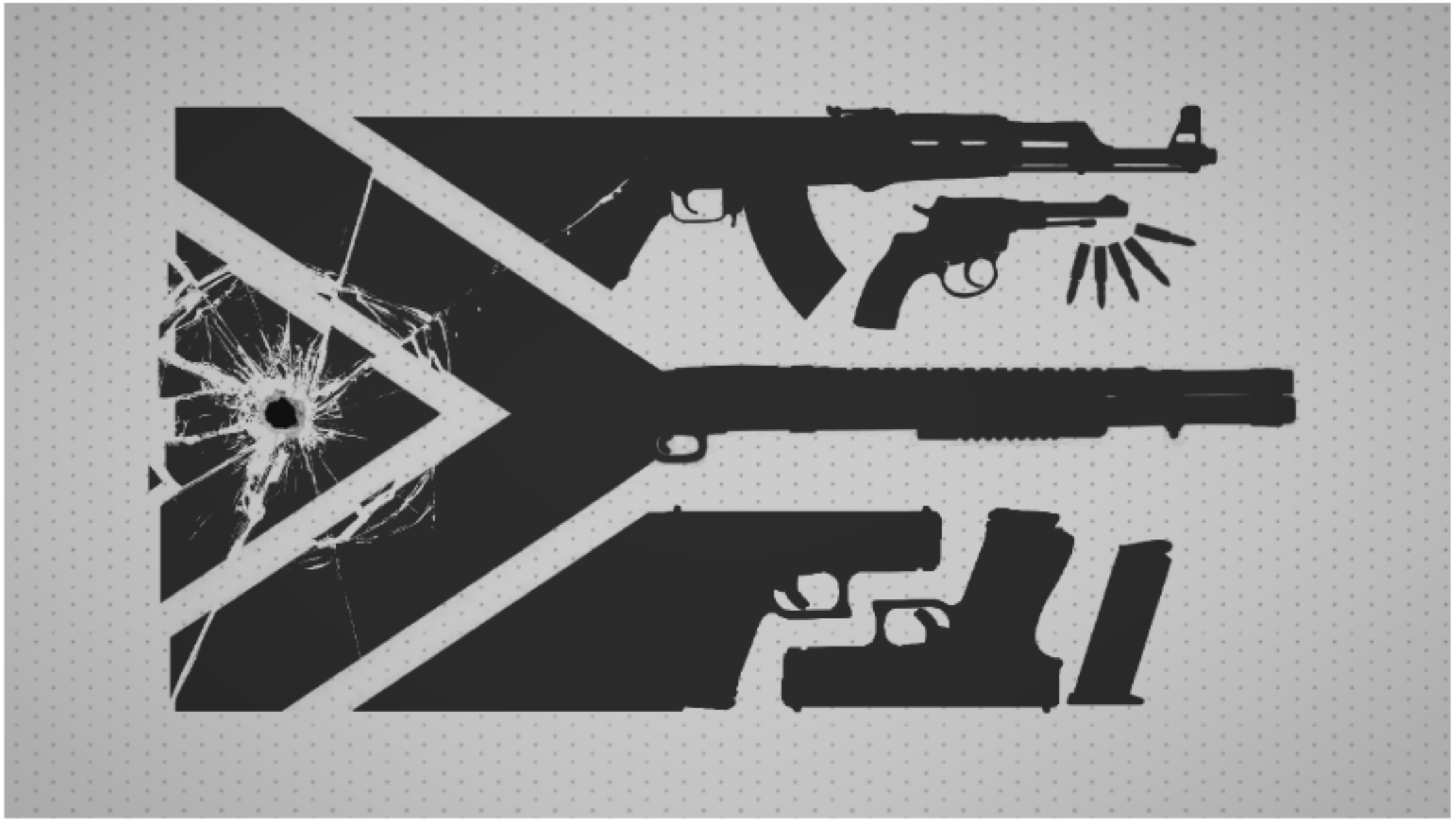


CIVILIAN FIREARM INJURIES

"There is no stupid question; stupid people don't ask questions."



- Important resus considerations
- Single tract with difficult locations:
  - neck
  - popliteal
  - pelvis
- Injury patterns

WHAT IS A CIVILIAN FIREARM?

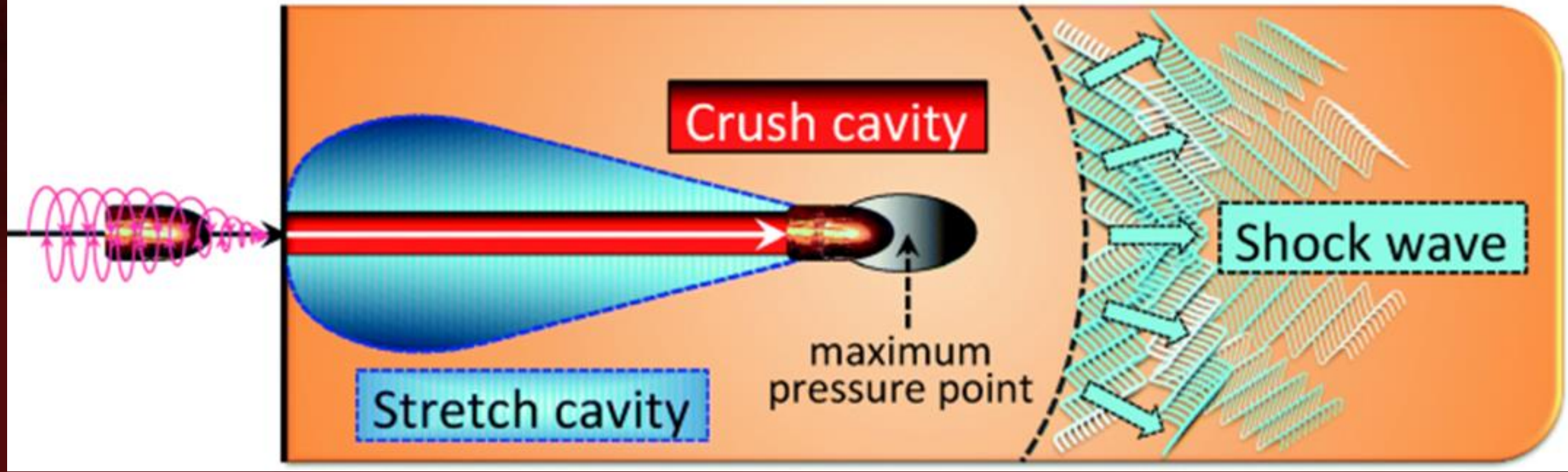


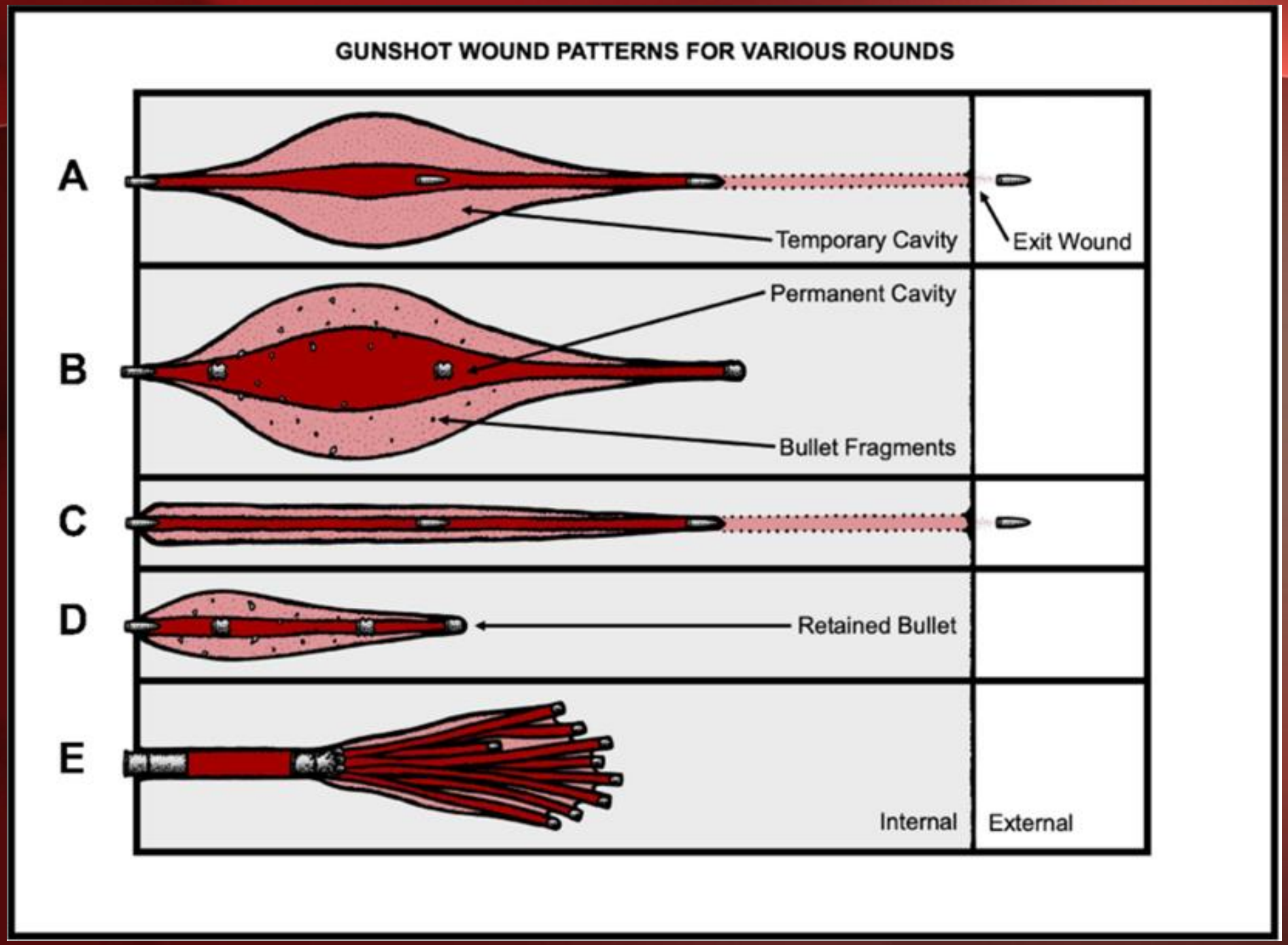


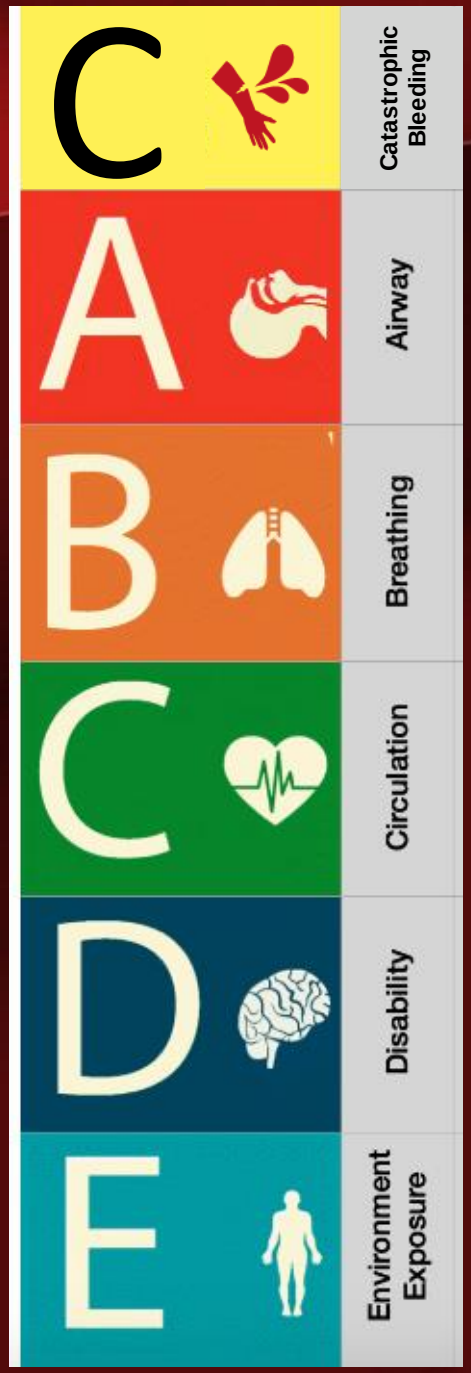
HOW DOES FIREARM INJURY OCCUR?

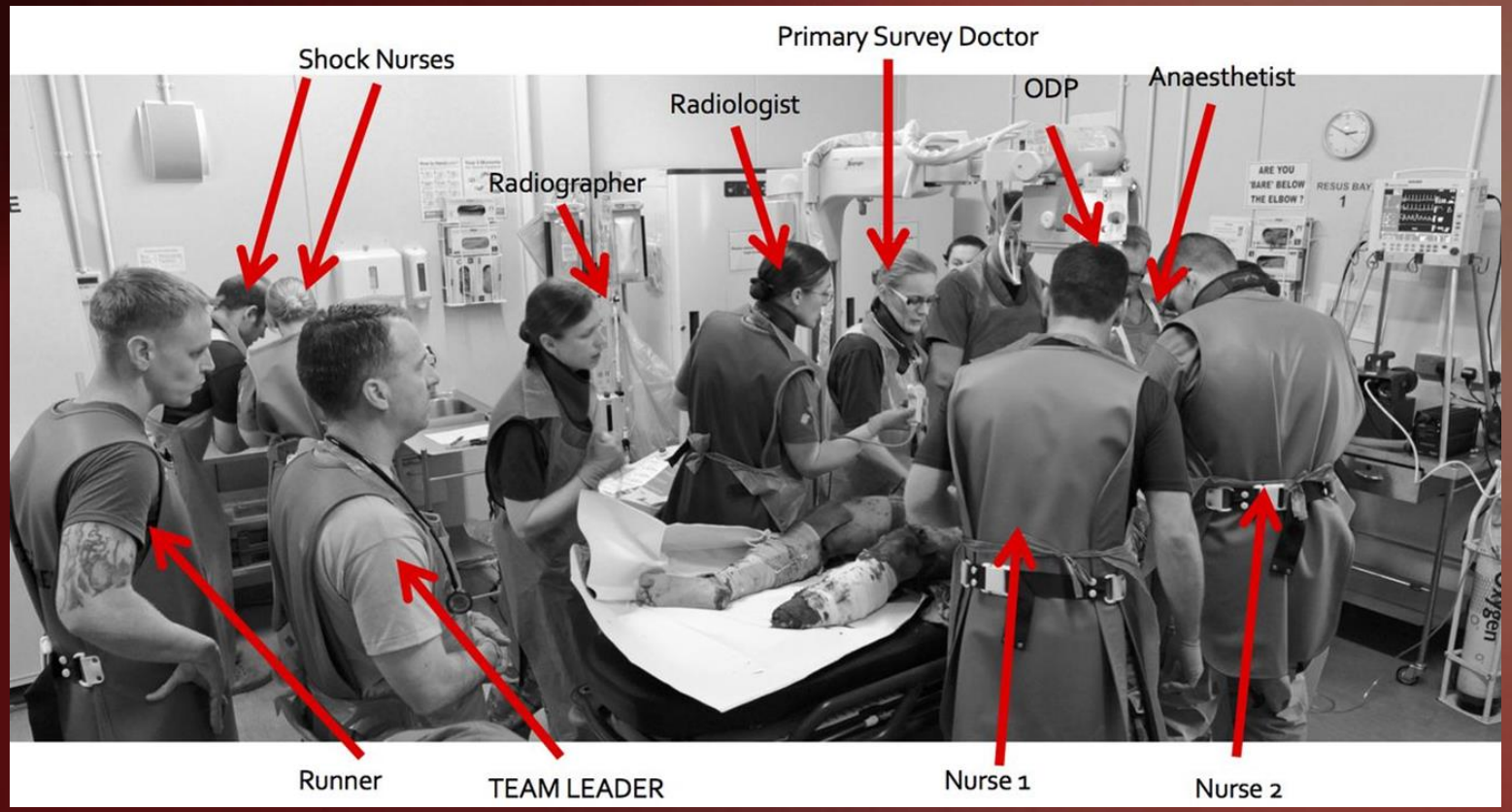
Direct damage

Crush cavity
(Permanent cavity)




GUNSHOT WOUND PATTERNS FOR VARIOUS ROUNDS
A
Temporary Cavity
Exit Wound
B
Permanent Cavity
Bullet Fragments
C
D
Retained Bullet
E
Internal
External


C
Catastrophic Bleeding
A
Airway
B
Breathing
C
Circulation
D
Disability
E
Environment Exposure


Shock Nurses
Primary Survey Doctor
Radiologist
ODP
Anaesthetist
Radiographer
Runner
TEAM LEADER
Nurse 1
Nurse 2

AIRWAY

- Expect distorted anatomy
- Expect bleeding

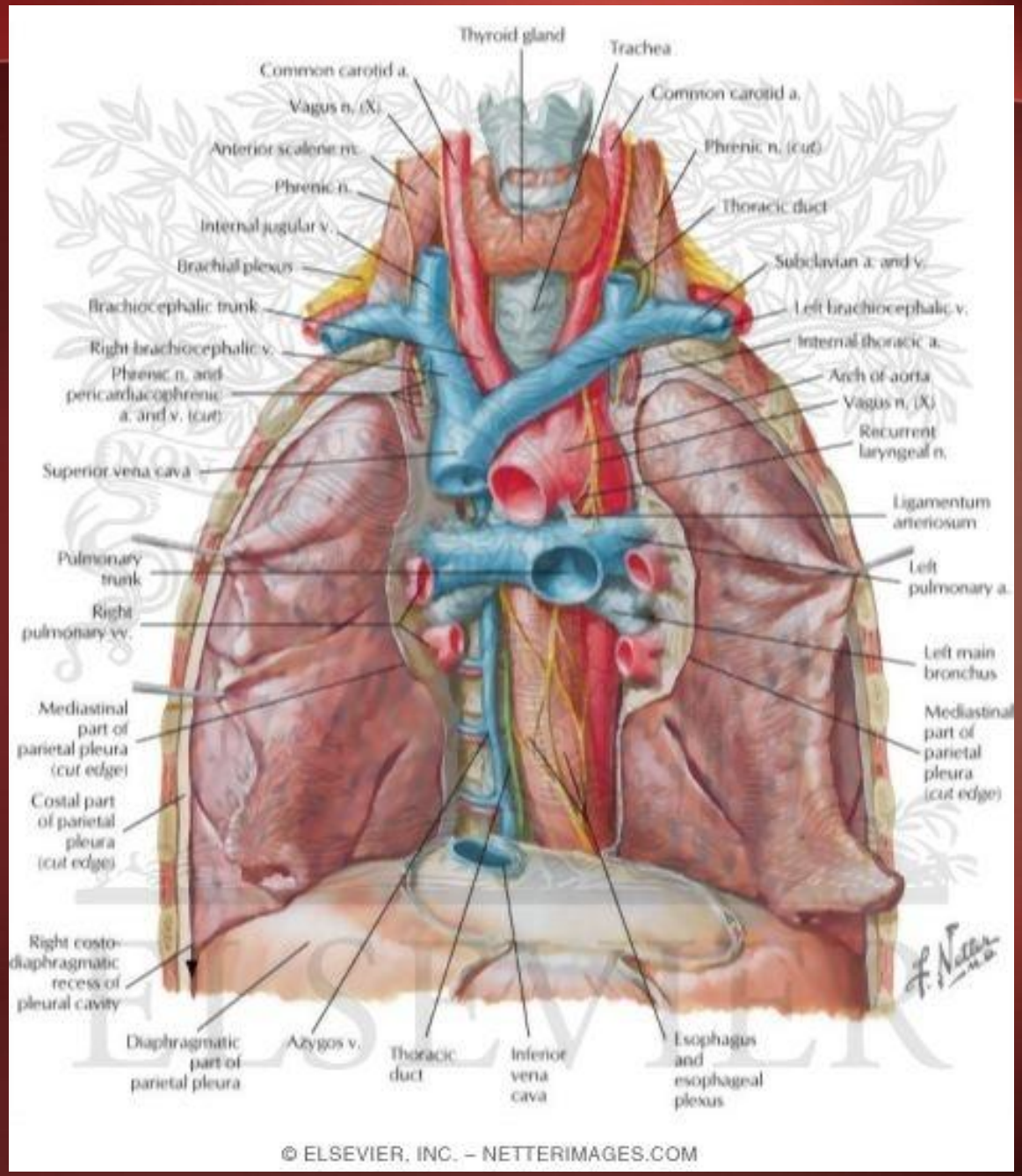
- ✓ Prep for disaster
- ✓ Definitive airway
- ✓ FONA early



BREATHING

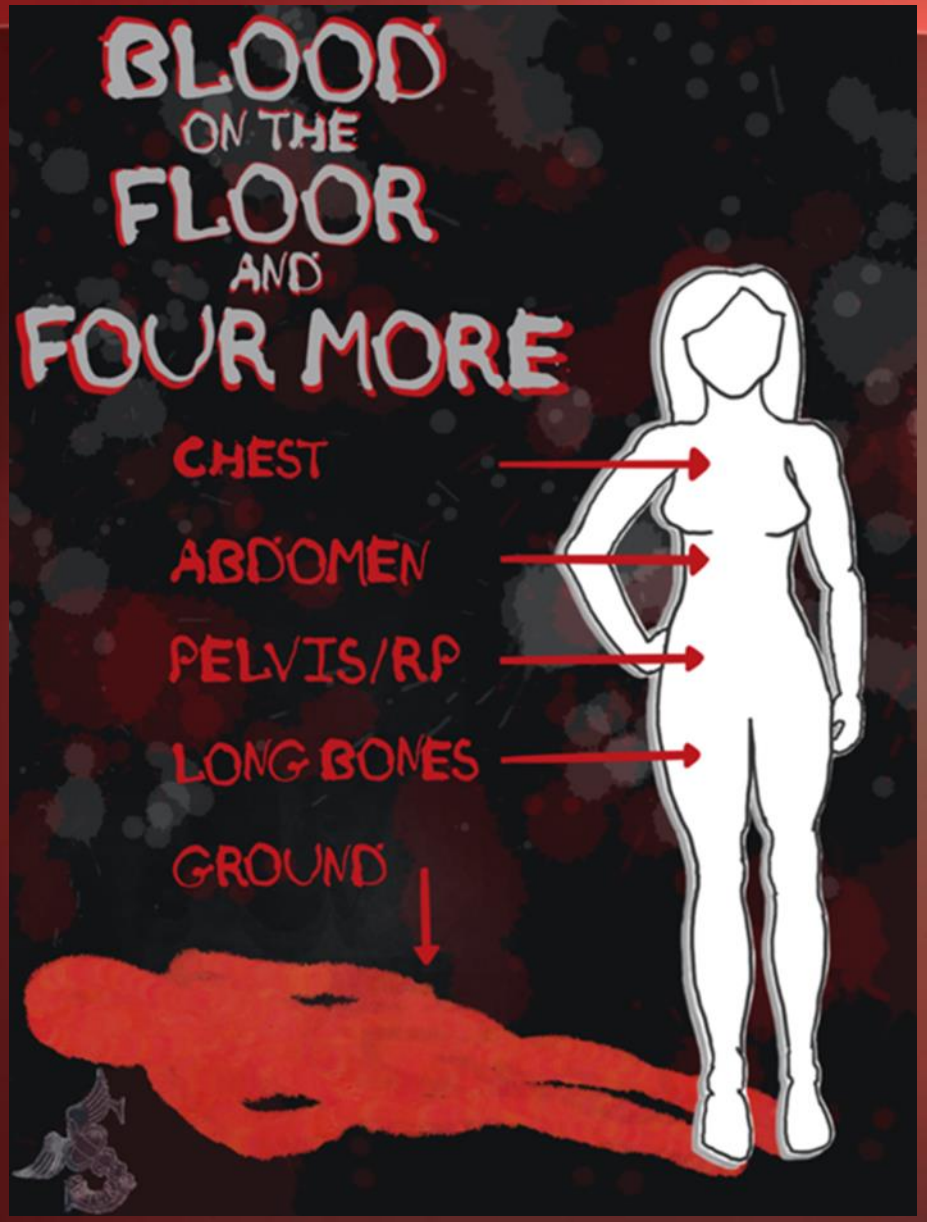
- Haemothorax
- Pneumothorax
- Lung laceration
- Any thoracic structure!

✓ Early ICD placement
✓ Replace losses



CIRCULATION

- ✓ Identify where the loss is
- ✓ Control it
- ✓ Replace it



CONTROL OF:

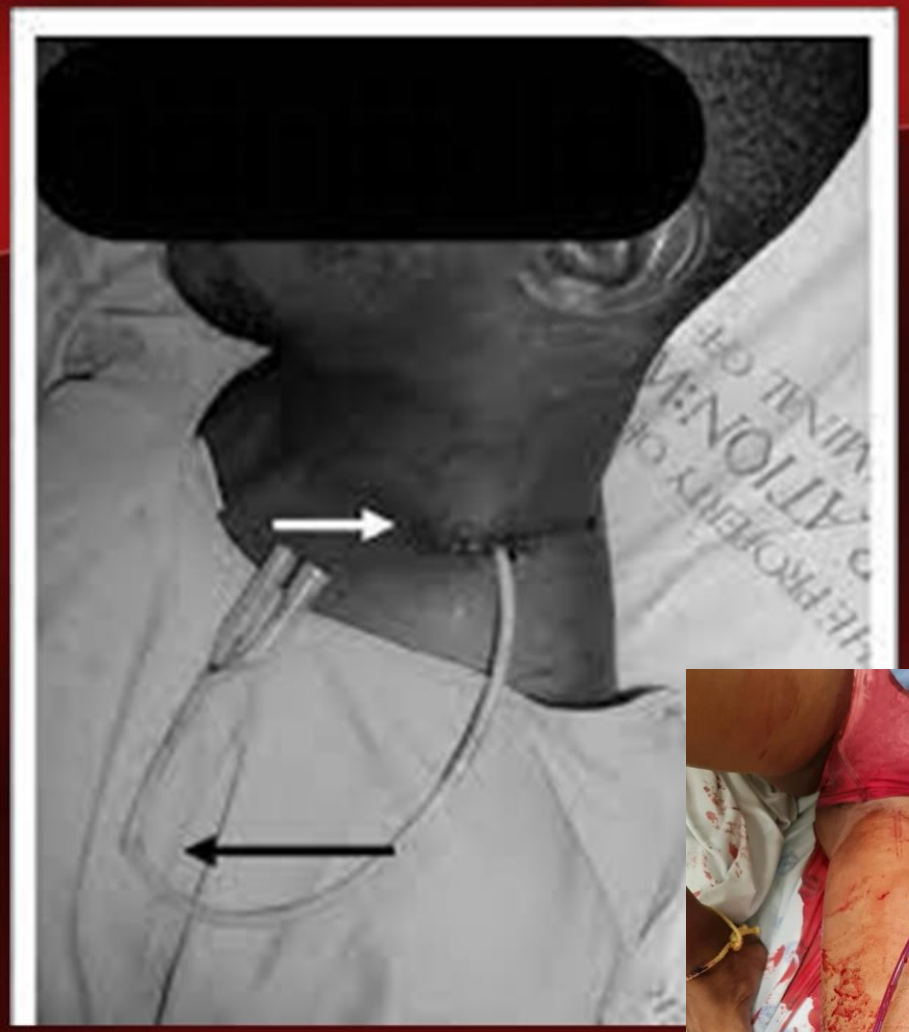
FREE BLEEDING → pressure, packing, sutures, Foley's

CHEST → ICDs, replace, surgery

ABDOMEN → recognise, replace, surgery

PELVIS → recognise, replace, surgery

BONES → recognise, traction, immobilise








a

DAMAGE CONTROL RESUSCITATION

Start things the right way…

eRound #17

2 Hits → injury
→ intervention

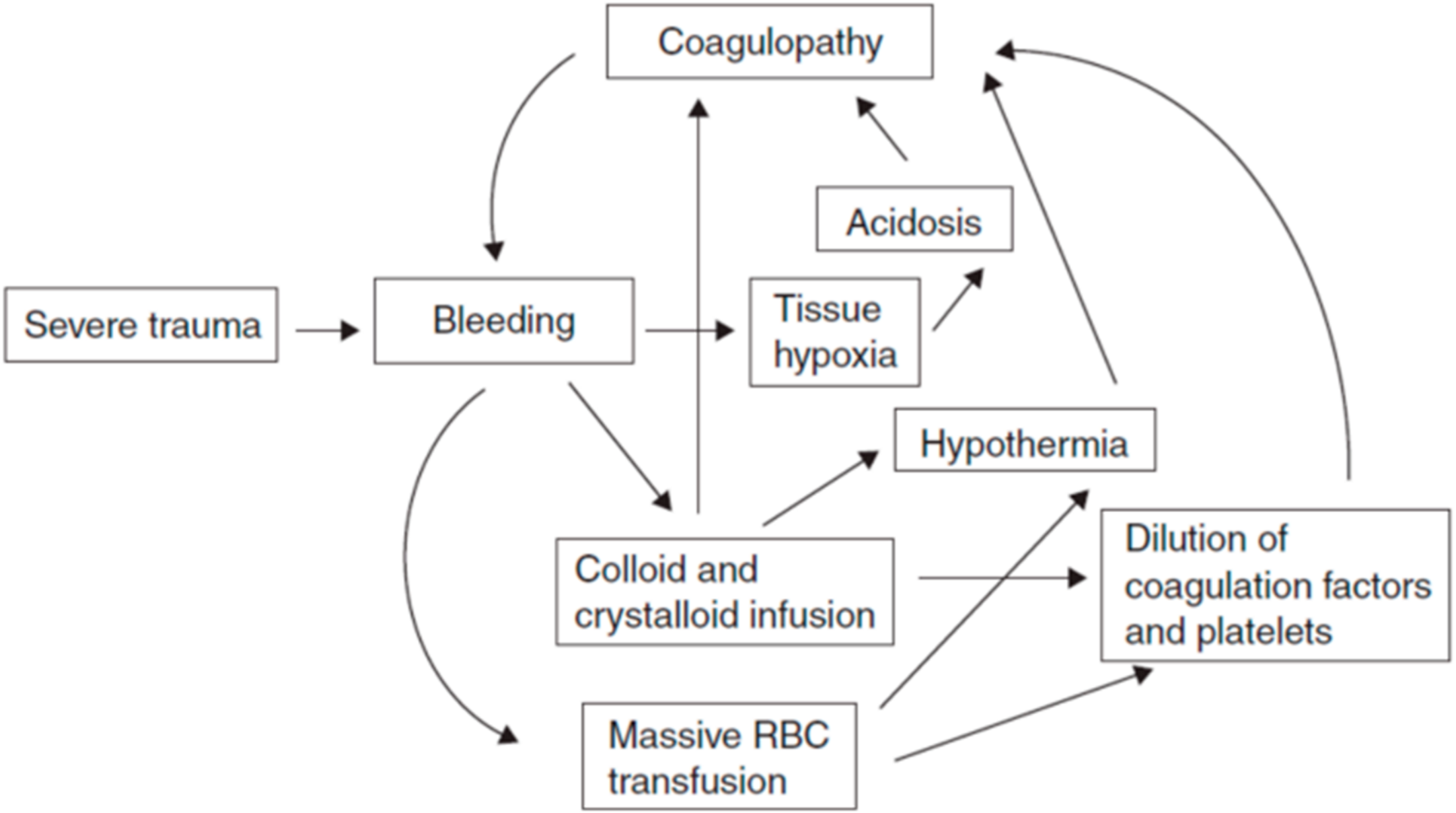


- ¼ preventable trauma deaths due to uncontrolled haemorrhage
  - usually first 24hrs, *mostly within 3-6hrs*
- Ongoing loss vs clotting failure
- Lab bleeding ≠ patient bleeding

PREVENT PHYSIOLOGICAL DERANGEMENT RATHER THAN CORRECTING!

DCR issues

- Hypothermia
- Acidosis
- Coagulopathy
- Hypocalcaemia


Coagulopathy
Acidosis
Severe trauma
Bleeding
Tissue hypoxia
Hypothermia
Colloid and crystalloid infusion
Dilution of coagulation factors and platelets
Massive RBC transfusion



LETHAL TRIAD

Hypothermia

Acidosis

Coagulopathy

DCR fixes

- Warming
- Early blood products
- Haemorrhage control

- What we do:
  fluids, dilution
- What the trauma does: loss of components, hypercoagulability
- What the body does:
  TIC

MSF-DCR PROTOCOL

	GUIDANCE	ACTION
TRIAGE & RAPID ASSESSMENT	Rapidly recognize the need for early damage control resuscitation	• Identify severe injury patterns requiring haemorrhage control and blood transfusions. • Assess for signs of shock • Perform C-ABC
HEMORRHAGE CONTROL (non-surgical)	Stop or reduce haemorrhage as close to time-of-injury as possible	Apply: • Direct pressure • Pressure dressings +/- haemostatic dressings • Windlass tourniquets • Pelvic binders
RESUSCITATION	Treat haemorrhagic shock, prevent complications, and restore normal physiology	• Target systolic blood pressure of 80 to 100 mmHg (unless traumatic brain injury or spinal cord injury) • Minimize use of crystalloids • Activate massive transfusion protocol • Rapidly give warm blood products • Keep patient warm, prevent hypothermia
PHARMACOLOGIC ADJUNCTS	Reduce fibrinolysis and stabilize clot formation	• Give Tranexamic acid 1g within 3-hours of injury and then second dose of 1g over 8 hours
	Prevent hypocalcaemia	• Give calcium gluconate after the first 2 units of blood then after every 4 units

Table 1. Summary of Guidance and Actions for Damage Control Resuscitation



Not just a last resort!

But Hb & Hct lower
Plt count lower
Low in clotting factors

No increased sepsis risk

good DCR = better surgical candidate

DCR ≠ DCS (may in fact limit need)

REPLACEMENT:







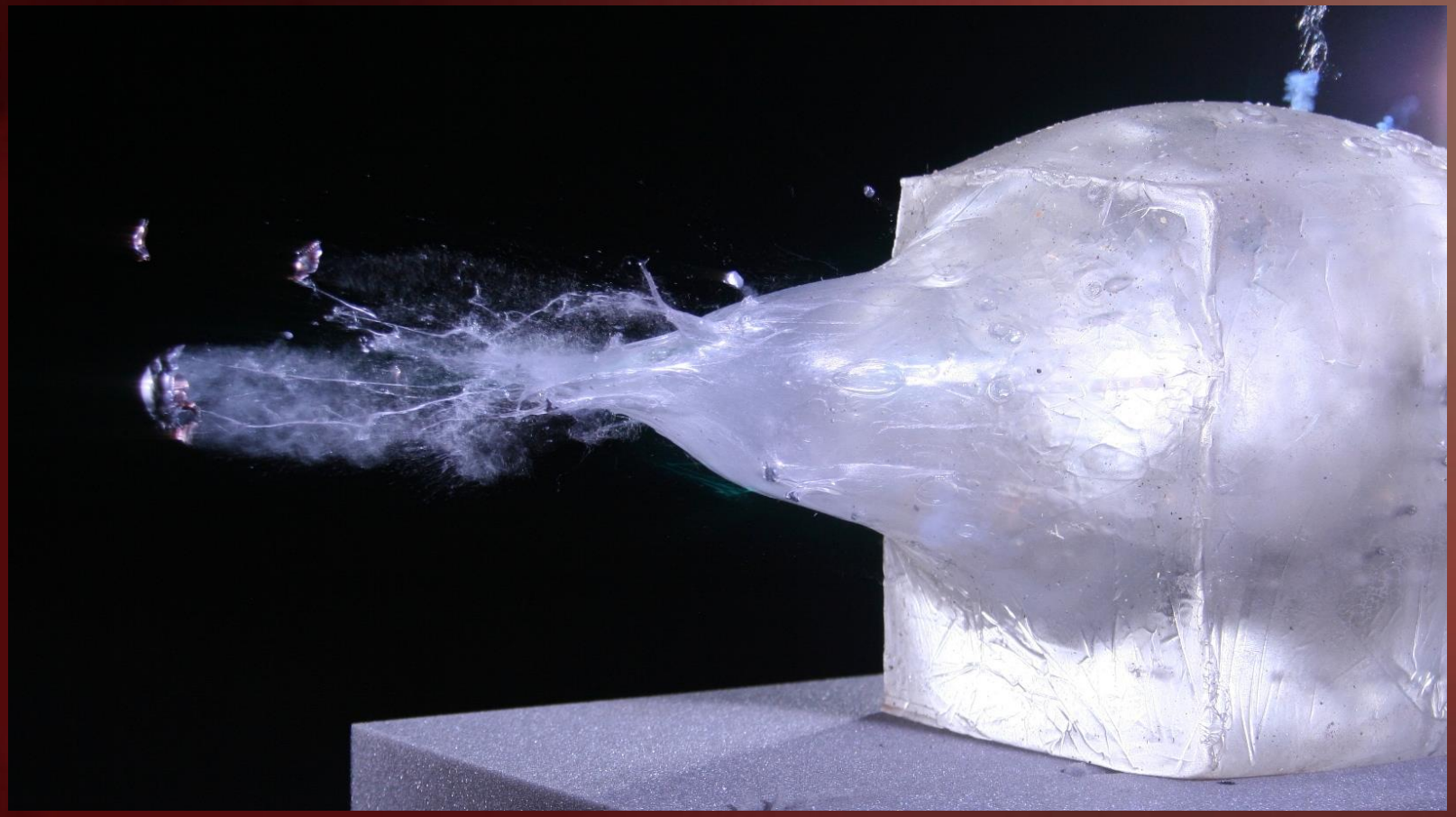




SINGLE

CHALLENGING LOCATIONS

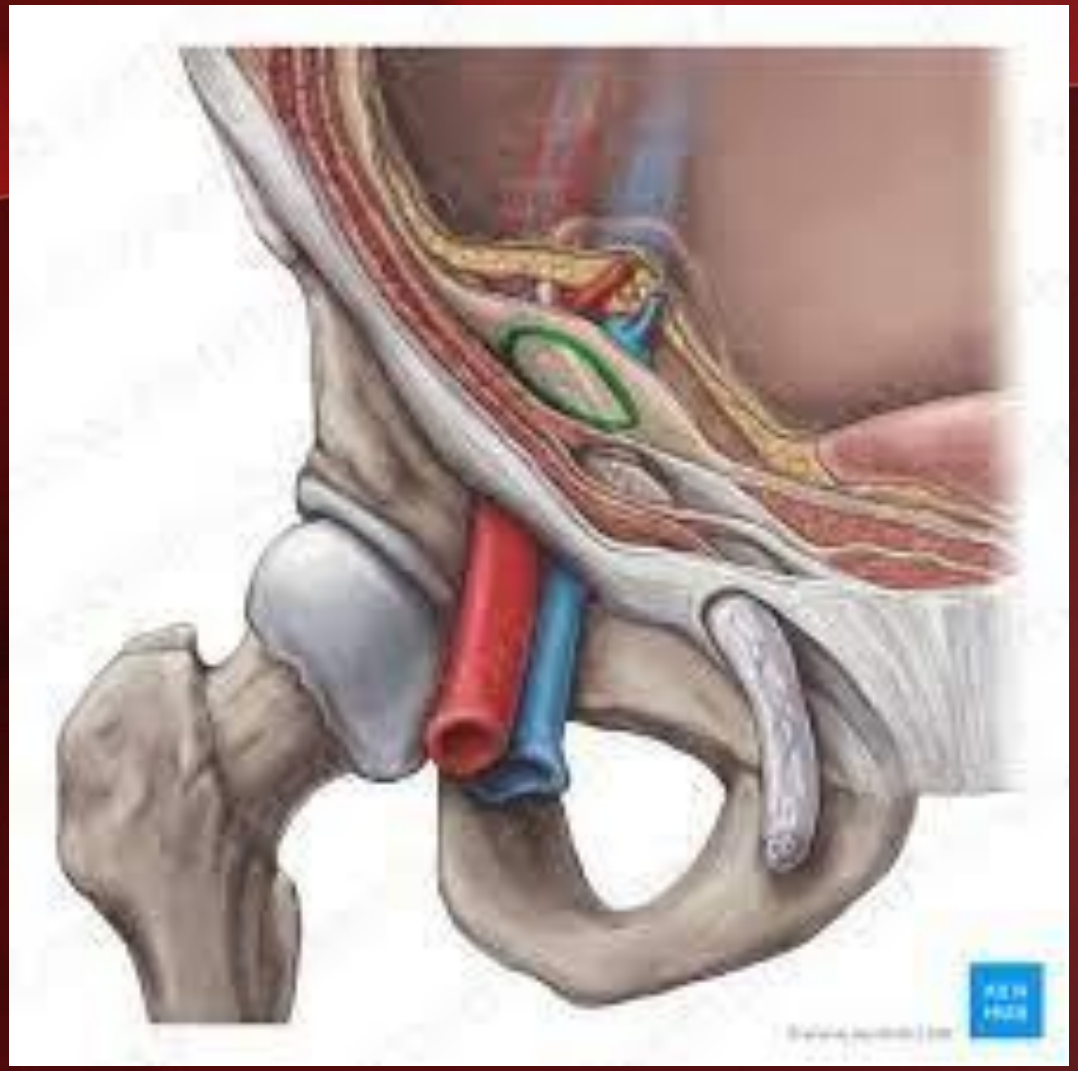
Some locations have limited space & high density of structures



Neck:

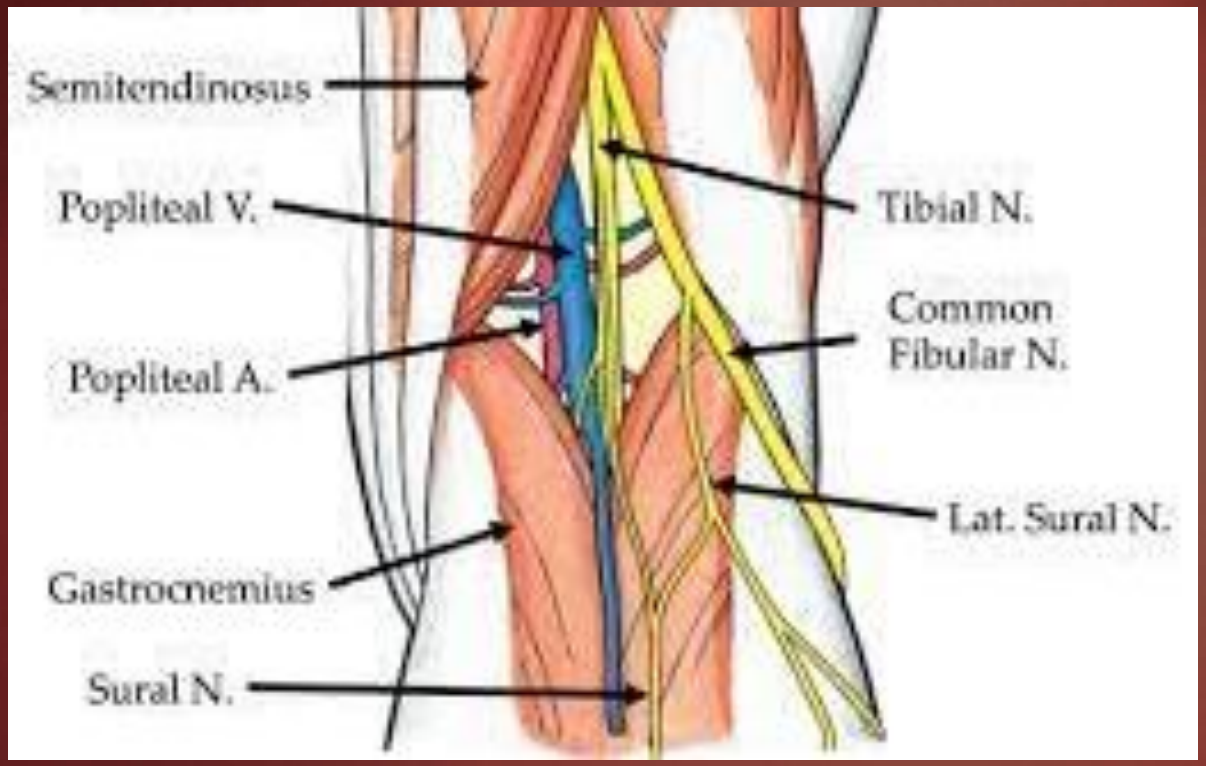
airway
vascular
oesophagus
spinal cord



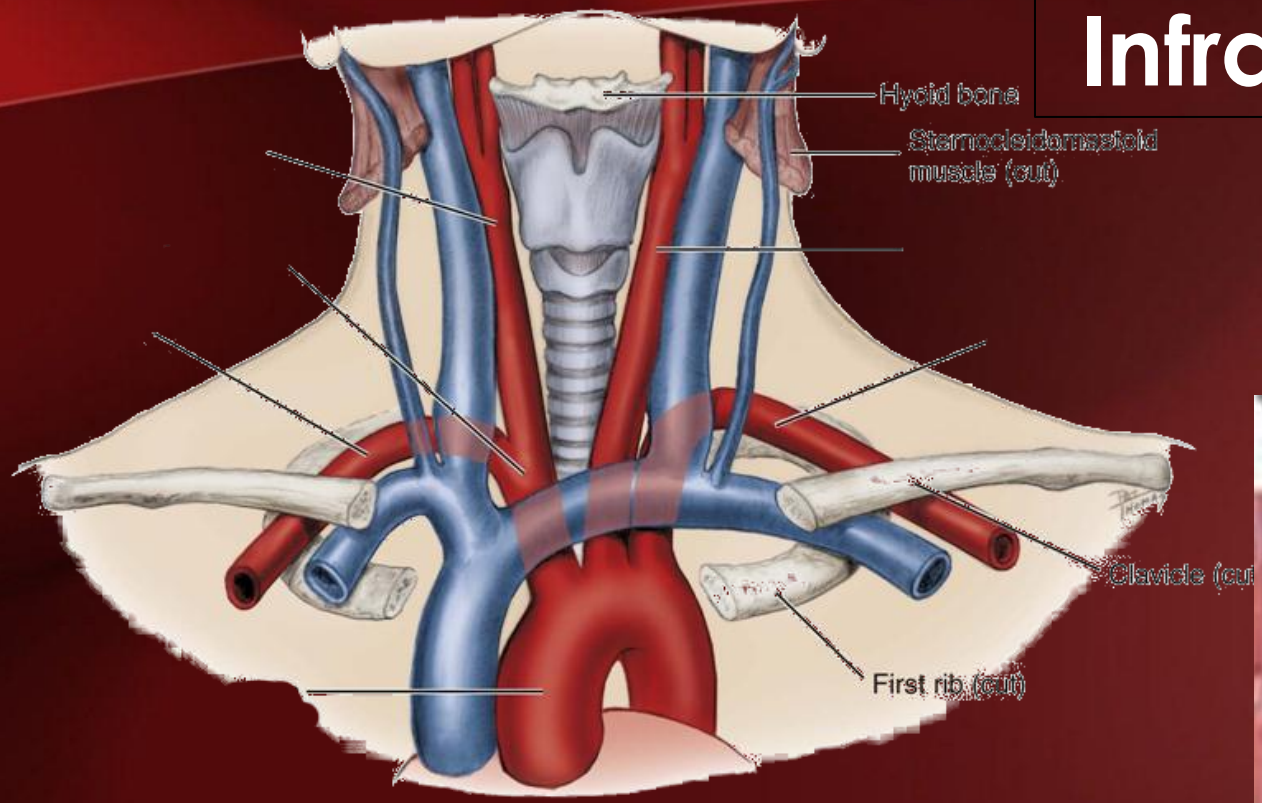


Groin area

Popliteal fossa

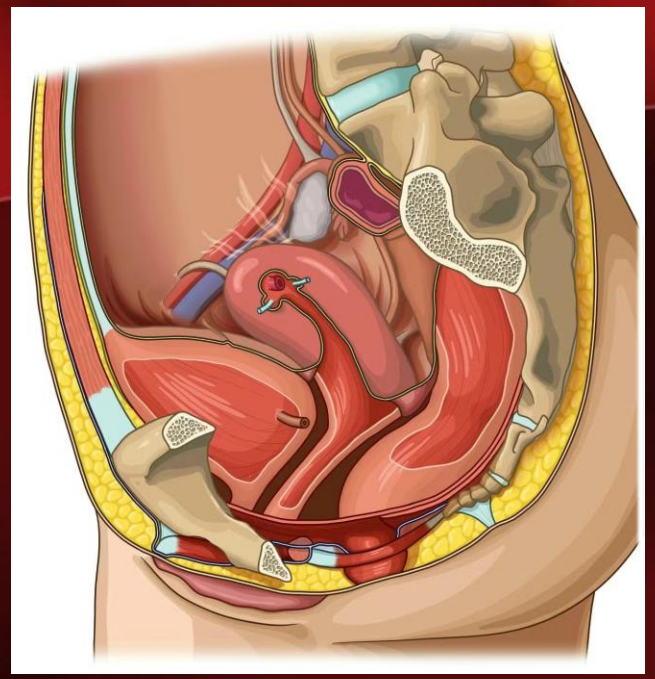


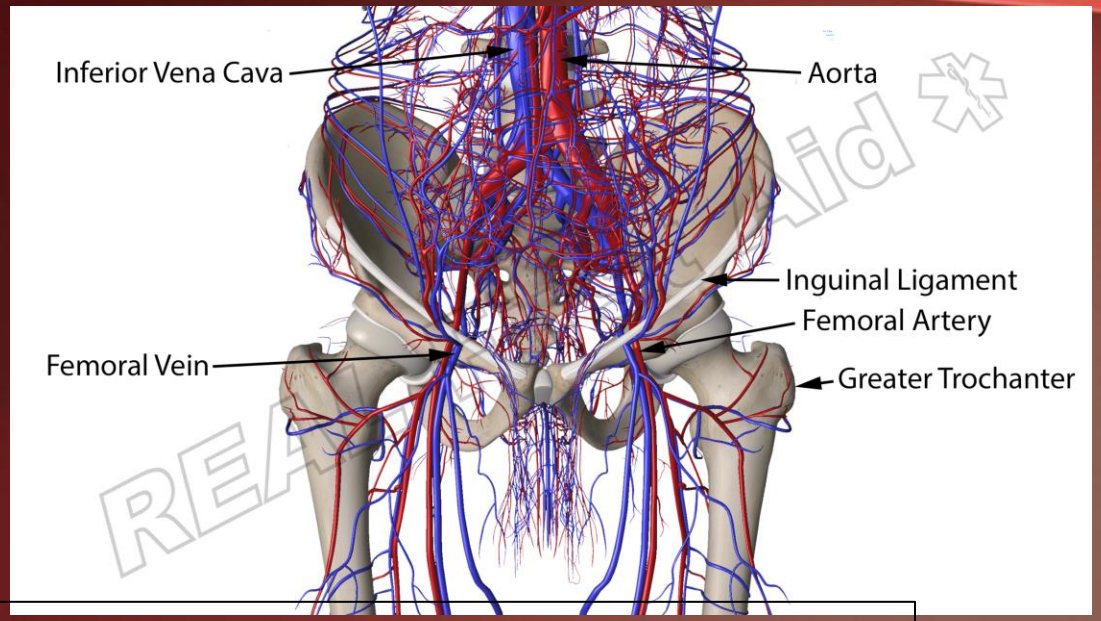
Infra/ supraclavicular area





Epigastrium





Transpelvic:

bowel, colon, rectum, bladder

vascular

bone

reproductive organs




STOP
THE
VIOLENCE


STOP
SHOOTING
NO TO
GUNS


NO
MORE.
NO
GUNS!



INTRA- OPERATIVE APPROACHES



SOLID ORGANS

Liver: tracts
burst lacerations

Push: Foley's catheter
Pack
Pringle
Suture









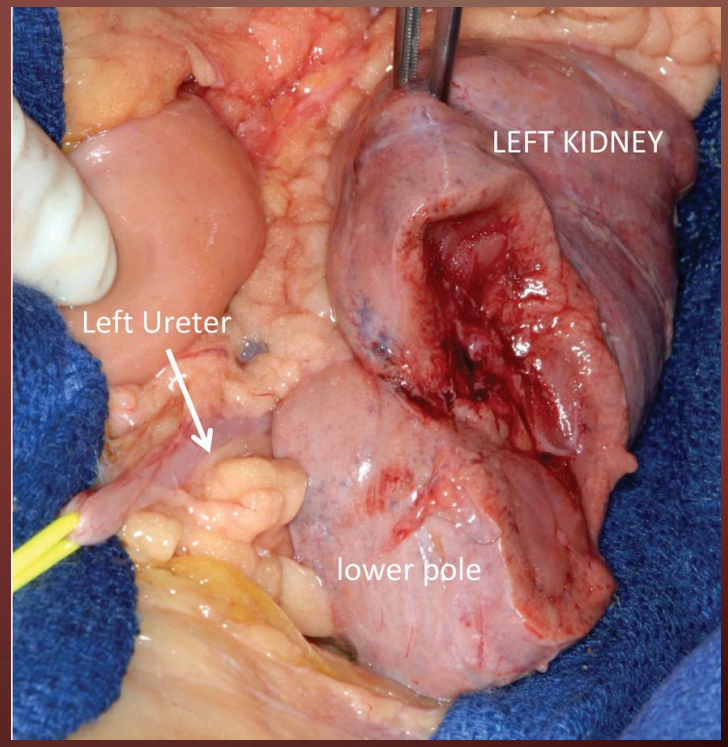


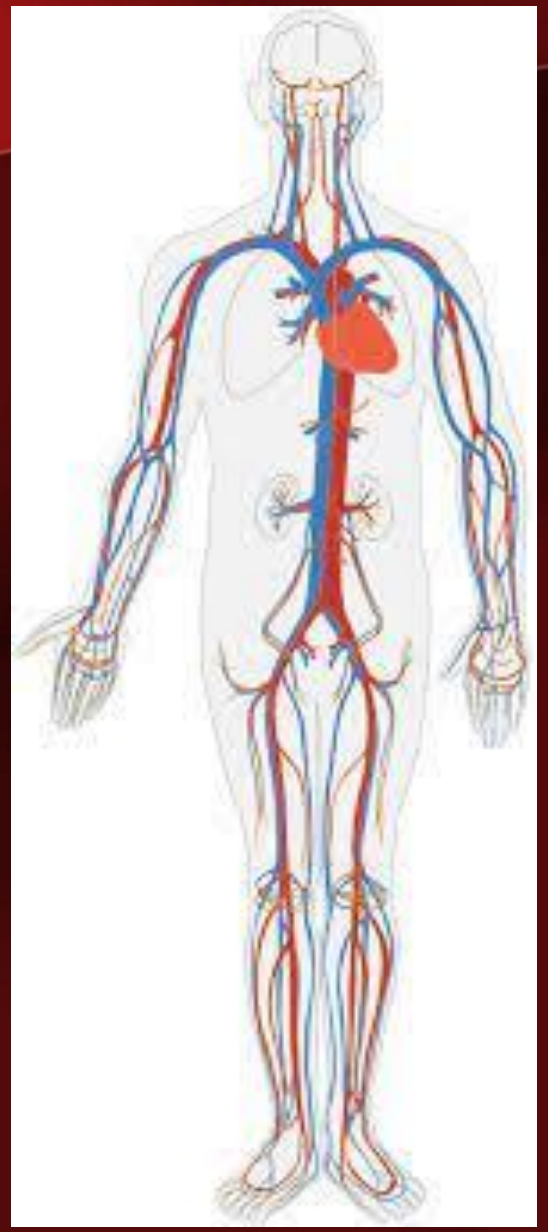
Spleen → Attempt to preserve in children
Adults: remove



Kidney: (evidenced by zone 2 haematoma)

→ pressure
-rrhaphy
nephrectomy



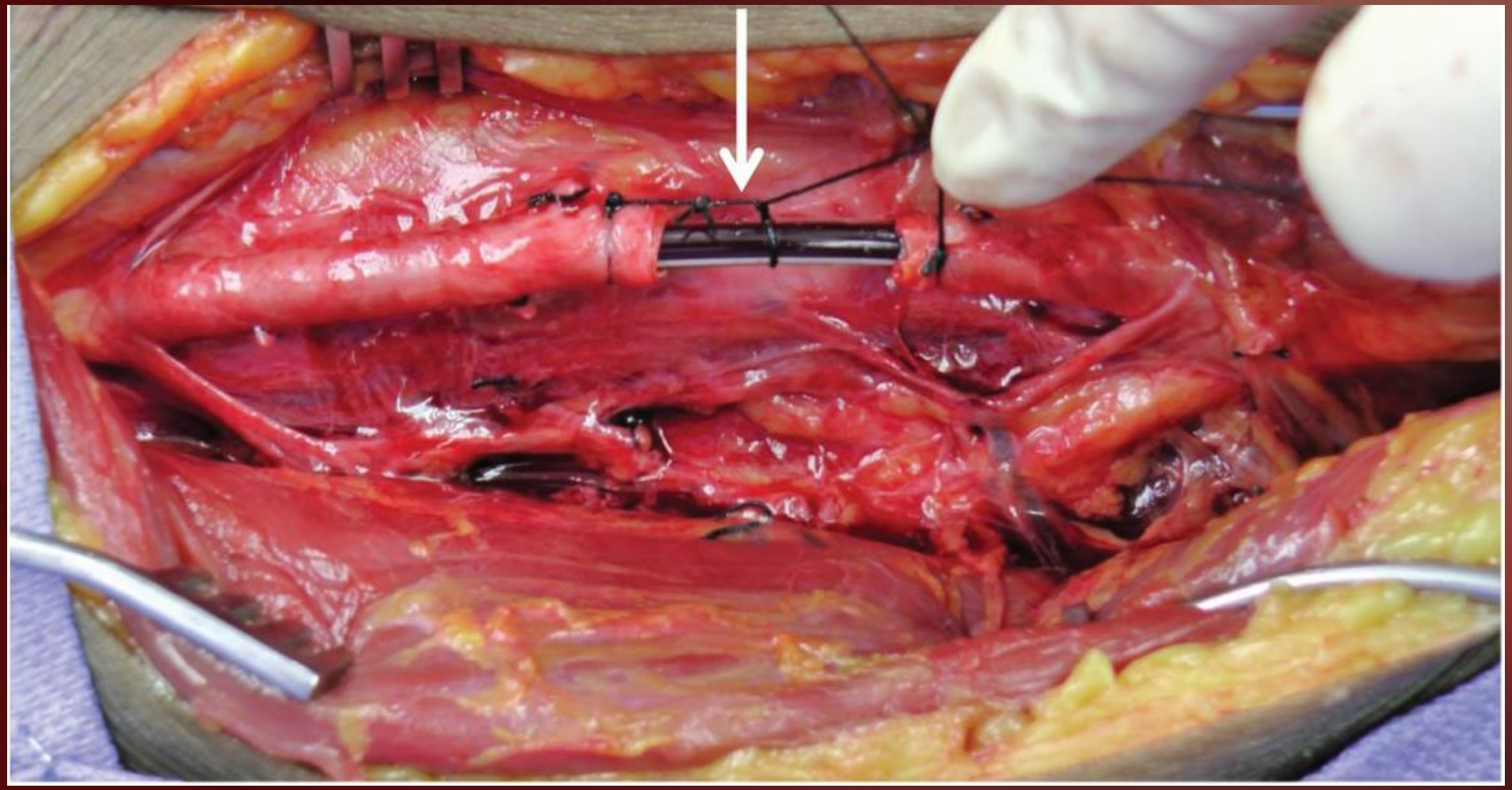


VASCULAR

Active bleeding → control & ligate (watch bowel viability in that area)

Venous injury → mostly tolerates ligation (repair IVC above renal veins & portal vein)

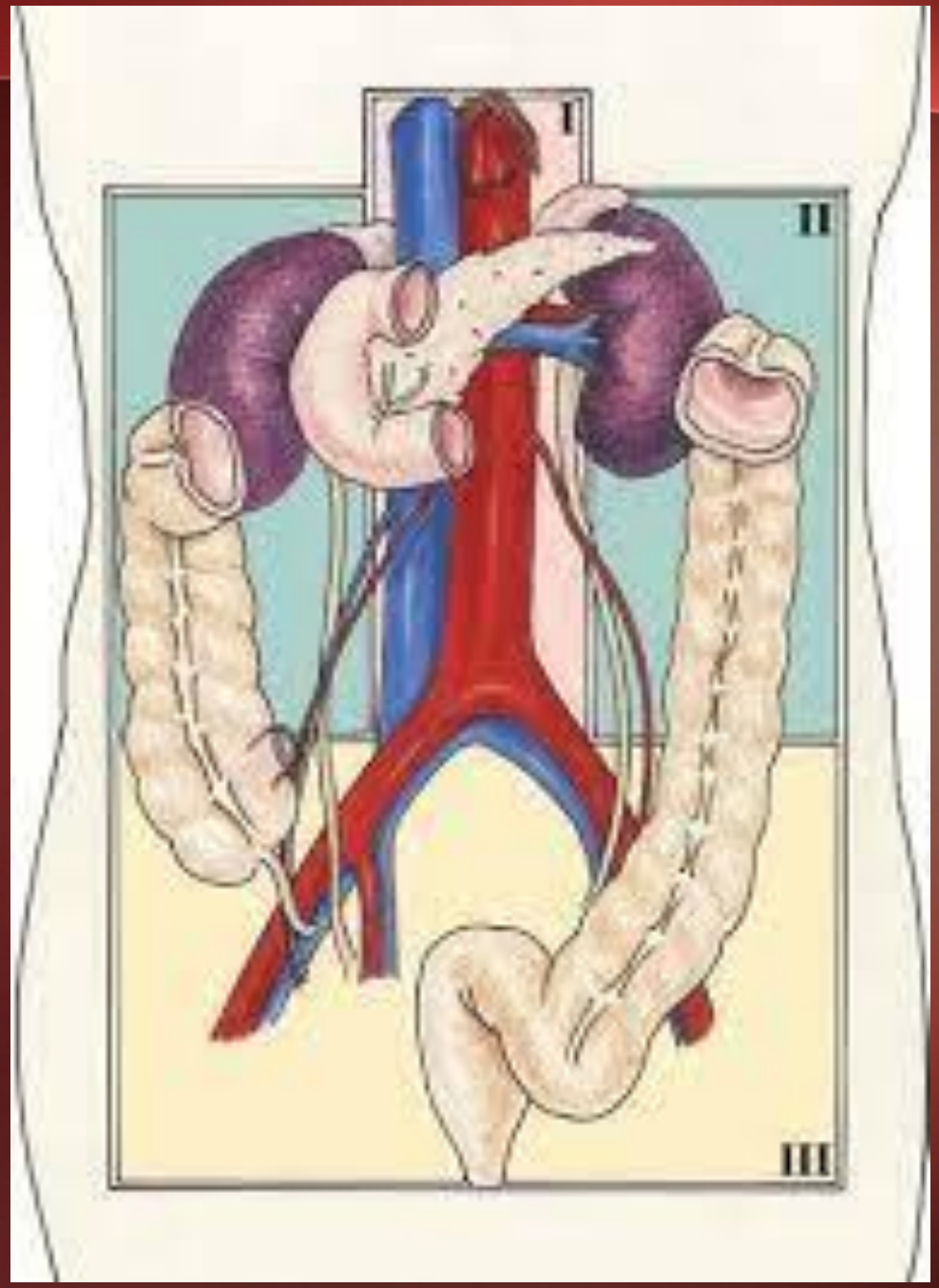
* Shunting?
Technically challenging & often time consuming!



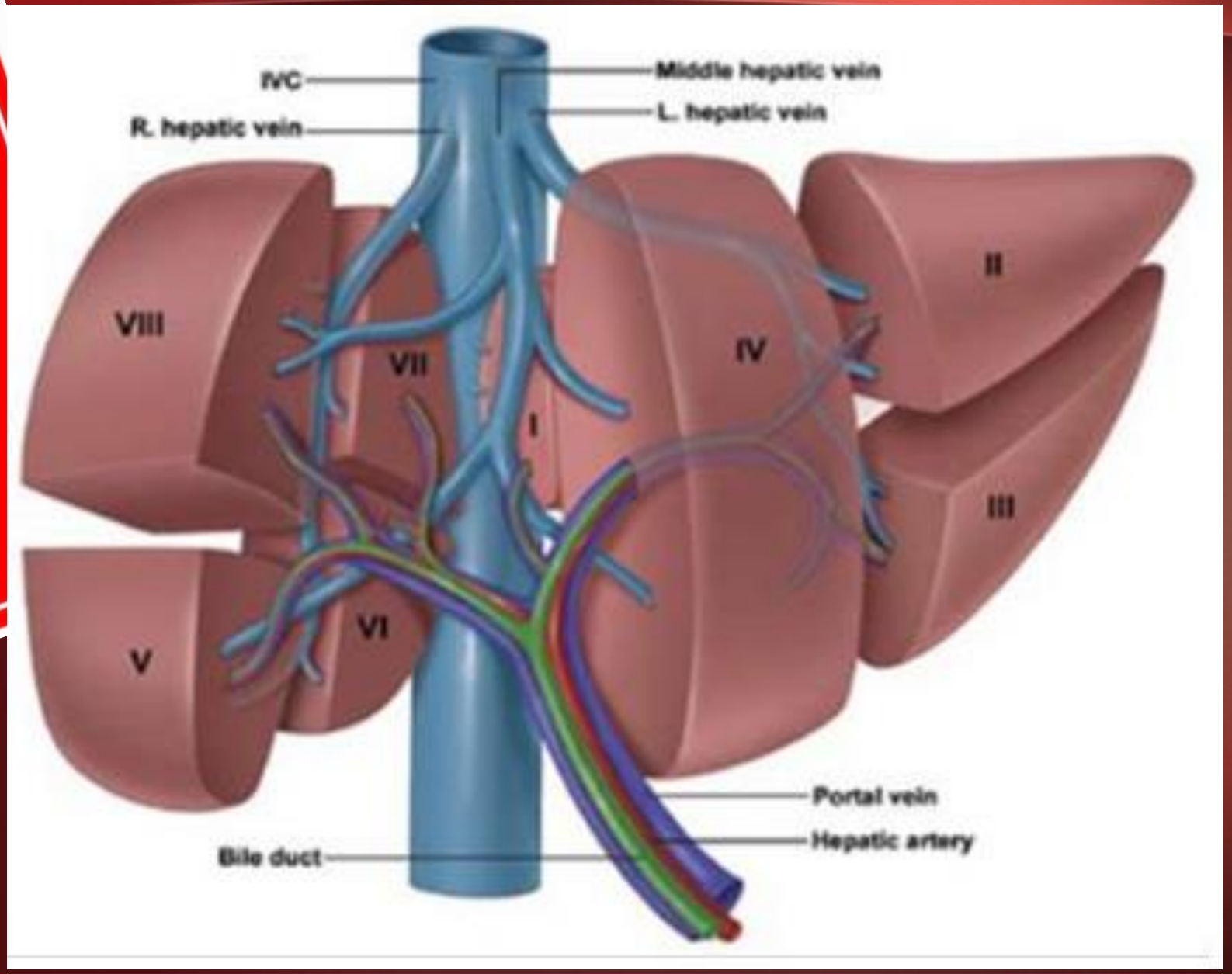
Retroperitoneal zones

Haematoma=

exploration




DANGER


IVC
R. hepatic vein
Middle hepatic vein
L. hepatic vein
VIII
VII
I
IV
II
III
V
VI
Portal vein
Hepatic artery
Bile duct

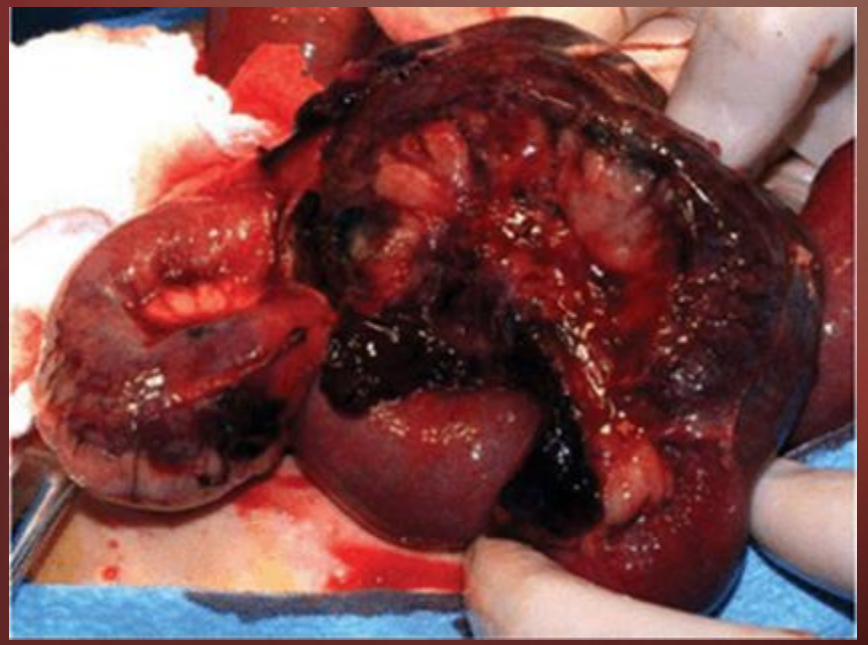
BOWEL

Small: debride & repair
resect & anastomosis



Large: debride & repair
resect & anastomosis
defunction

Damage control surgery: clip & drop
resect injured bowel only



CASES

CASE 1

A 36yr male is brought in after having been
the leg. A nurse at a clinic sutured the wour
control bleeding.
What is your approach?



A: moaning and complaining of pain
B: good air entry, no wounds
C: no active bleeding seen
BP160/75, HR115, Hb12
D: GCS 15, pupils equal, refuses to move injured leg due to pain
E: single wound as seen on picture
temp 37

CASE 1…

Left foot is cold & blue with no pulse palpable.

What should happen next?

? Urgent fasciotomy
? Alert & transfer to a surgeon quickly



CASE 2



18yr male arrives at your facility. Single posterior wound & a single anterior wound is obvious.

What is your approach?

ON EXAMINATION

A: swearing at you loudly in gasps

B: short of breath, RR 40

decreased movement left chest

decreased breath sounds left chest

C: no active bleeding

BP 89/47, HR 122, Hb11

D: intoxicated, GCS14

moving all limbs

E: wounds as indicated on picture, temp 36.8

TO DO

- Decompress left chest, insert ICD
- Insert IV lines & give fluid
- Assess abdomen:
  - ?Peritonitic
  - ?bleeding

CASE 3



A 48yr male is brought in by paramedics after being caught in a gang war. He has sustained multiple wounds to the face, chest and abdomen.

What is your approach?

A: makes some noises, blood in mouth, jaw feels fractured
B: poor air entry right chest
blood seen in ICD (inserted by paramedic on scene)
C: active bleeding from left flank wound
HR140, BP 60/?, Hb7.3
D: E2V2M5, moves all limbs
E: wounds as seen, temp 35.8



Issue	Plan
A	Definitive airway: intubate
B	Check ICD placement, watch output
C	IV access, give fluids & blood Control actively bleeding wounds Involve surgeon re. abdomen
D	Support ABC to improve GCS
E	Limit exposure & warm

* Severely injured patient, consider early alert & transfer as appropriate!