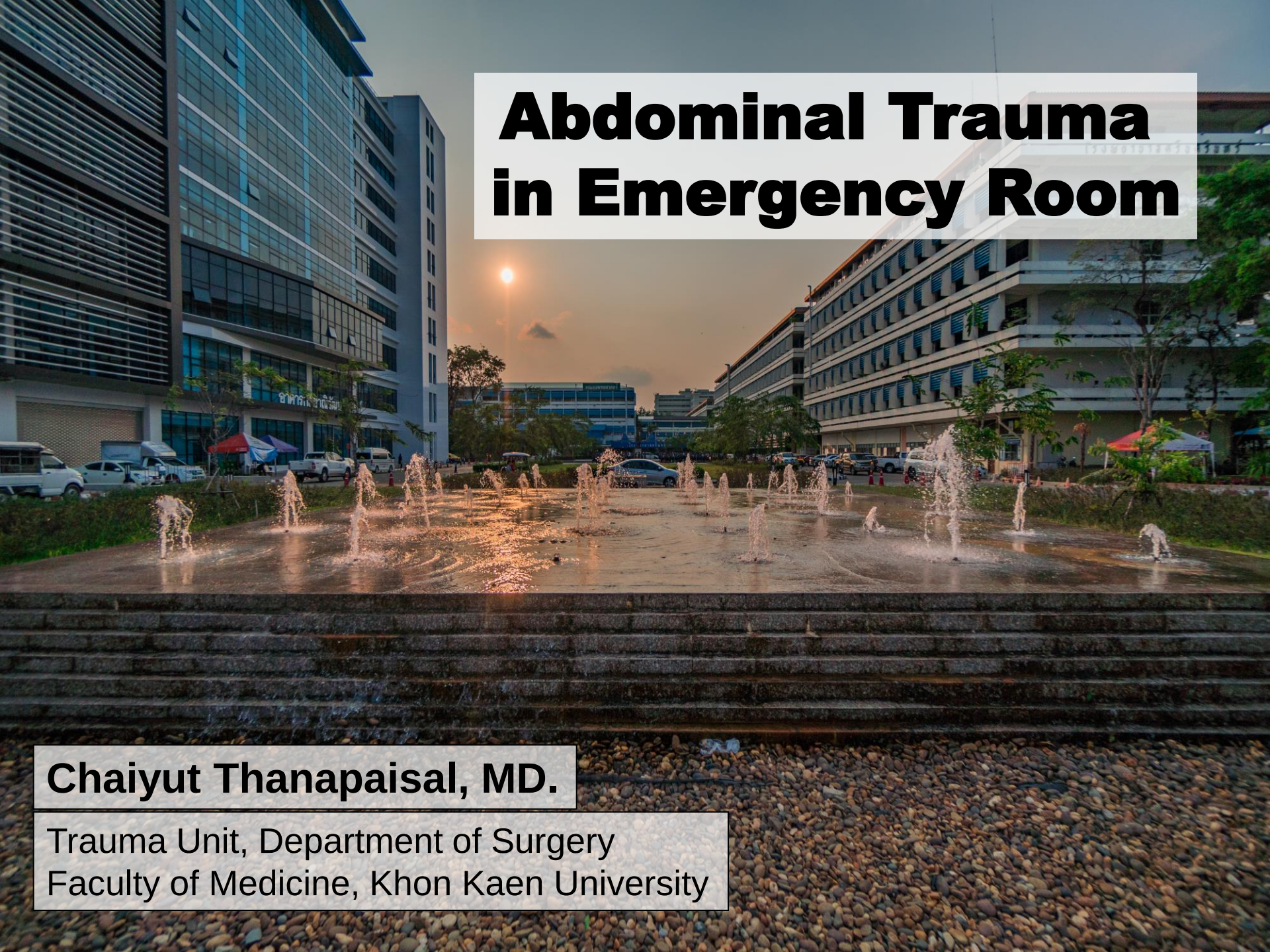


Abdominal Trauma in Emergency Room

Chaiyut Thanapaisal, MD.

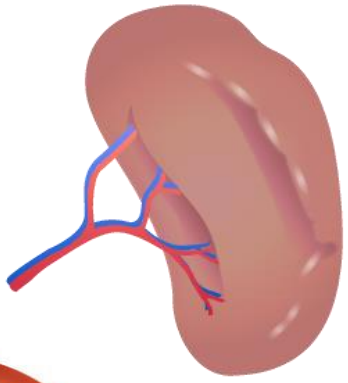
Trauma Unit, Department of Surgery
Faculty of Medicine, Khon Kaen University

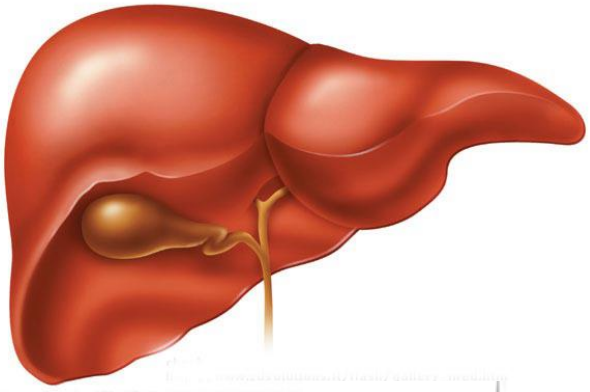
Incidence

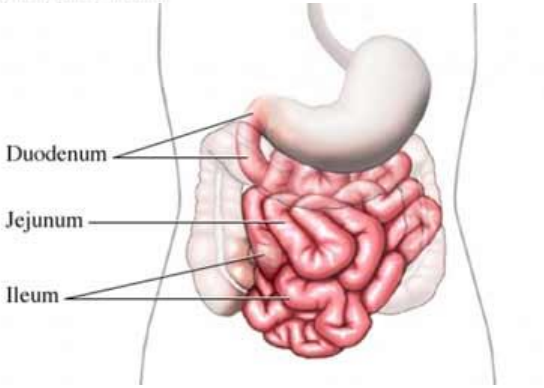
- Peak incidence abdominal trauma 15-30 years old
- Injury accounts for 10% of all deaths
- Mechanism:
  - Motor vehicle accident
  - Fall
  - Assault
  - Suicide

Common injuries

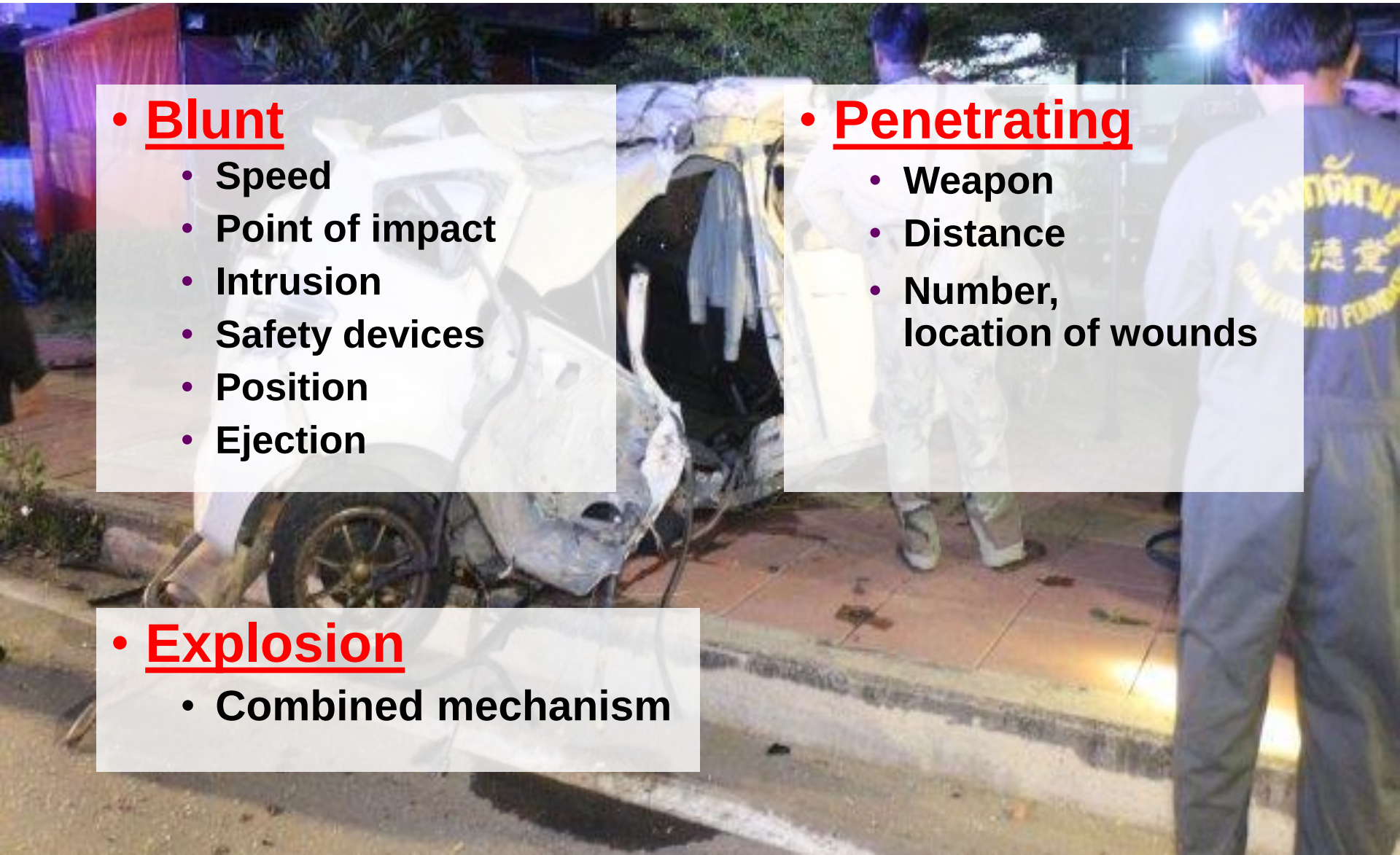
- Liver
- Spleen
- Small bowel
- Pelvis







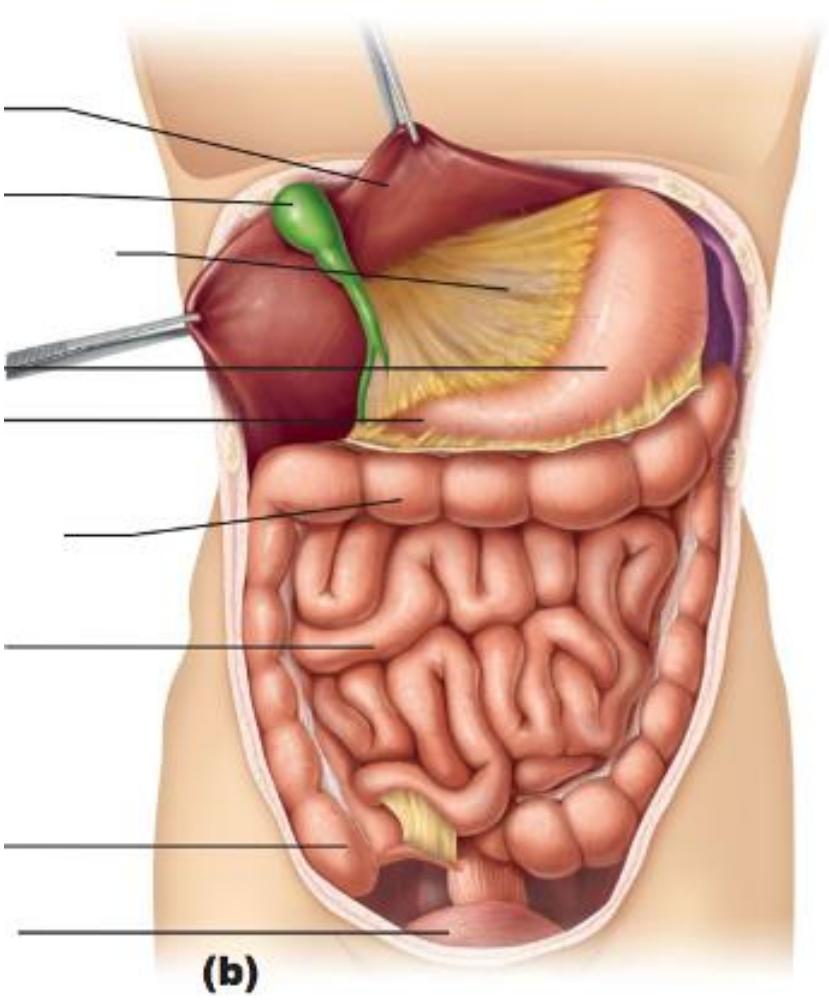
Mechanism of Injury



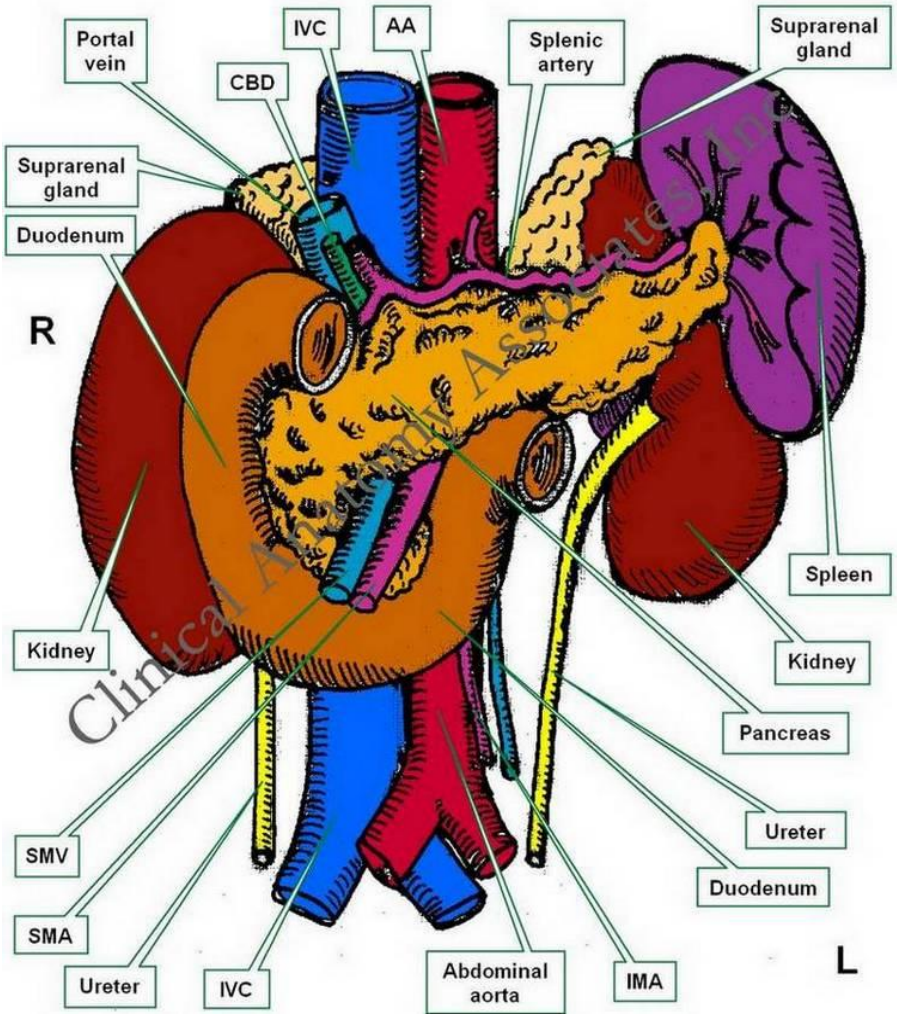
- **Blunt**
  - Speed
  - Point of impact
  - Intrusion
  - Safety devices
  - Position
  - Ejection
- **Penetrating**
  - Weapon
  - Distance
  - Number, location of wounds
- **Explosion**
  - Combined mechanism

Anatomy of abdomen

Anatomy of abdomen



Intraperitoneal organs



Retroperitoneal organs

Prehospital care

- Minimal scene time < 10 minutes
- Airway management
  - Clear airway and high flow oxygen supplement
- Breathing and ventilation
  - Detect tension pneumothorax
- Circulation and hemorrhagic control
  - Stop external bleeding
  - IV resuscitation

In-hospital management

- Preparation -Team
  -Equipment
  -Universal precaution
- Primary survey, Resuscitation
- Adjunct to primary survey
- Transfer
- Secondary survey
- Adjunct to secondary survey

Primary survey

- **“Explore the life threatening condition”**

➢Airway maintenance and C-spine protection

➢Breathing and ventilation

➢Circulation and hemorrhagic control

➢Disability (Neurologic evaluation)

➢Exposure and environmental control

Primary survey

➢**Airway maintenance and C-spine protection**

Airway obstruction

- Intraluminal (tongue, foreign body, blood, secretion)
- Laryngeal injury, laryngeal edema
- External compression (neck hematoma)

❑Supplement high flow oxygen

Primary survey

➢Breathing and ventilation

Life threatening conditions

- Tension pneumothorax
- Flail chest
- Open chest wound
- Massive hemothorax

Primary survey

➢Circulation and hemorrhagic control

- External bleeding
- Internal bleeding
  - Intraperitoneal
  - Retroperitoneal
  - Pelvis
  - Long bone fracture

❑Control hemorrhage and fluid resuscitation

Assessment

Physical Exam

- Inspection
- Auscultation
- Percussion
- Palpation
- Examination of pelvis and perineum

Adjuncts to Primary Survey

- Pelvic x-ray
- FAST
- DPL

Physical exam: Inspection

Physical examination

- **Percussion/Palpation**
  - **Point of tenderness**
  - **Sign of peritonitis**
- **Auscultation**
  - **Hypoactive bowel sound**

Factors that Compromise the Exam

- Alcohol and other drugs
- Injury to brain, spinal cord
- Injury to ribs, spine, pelvis

Initial resuscitation

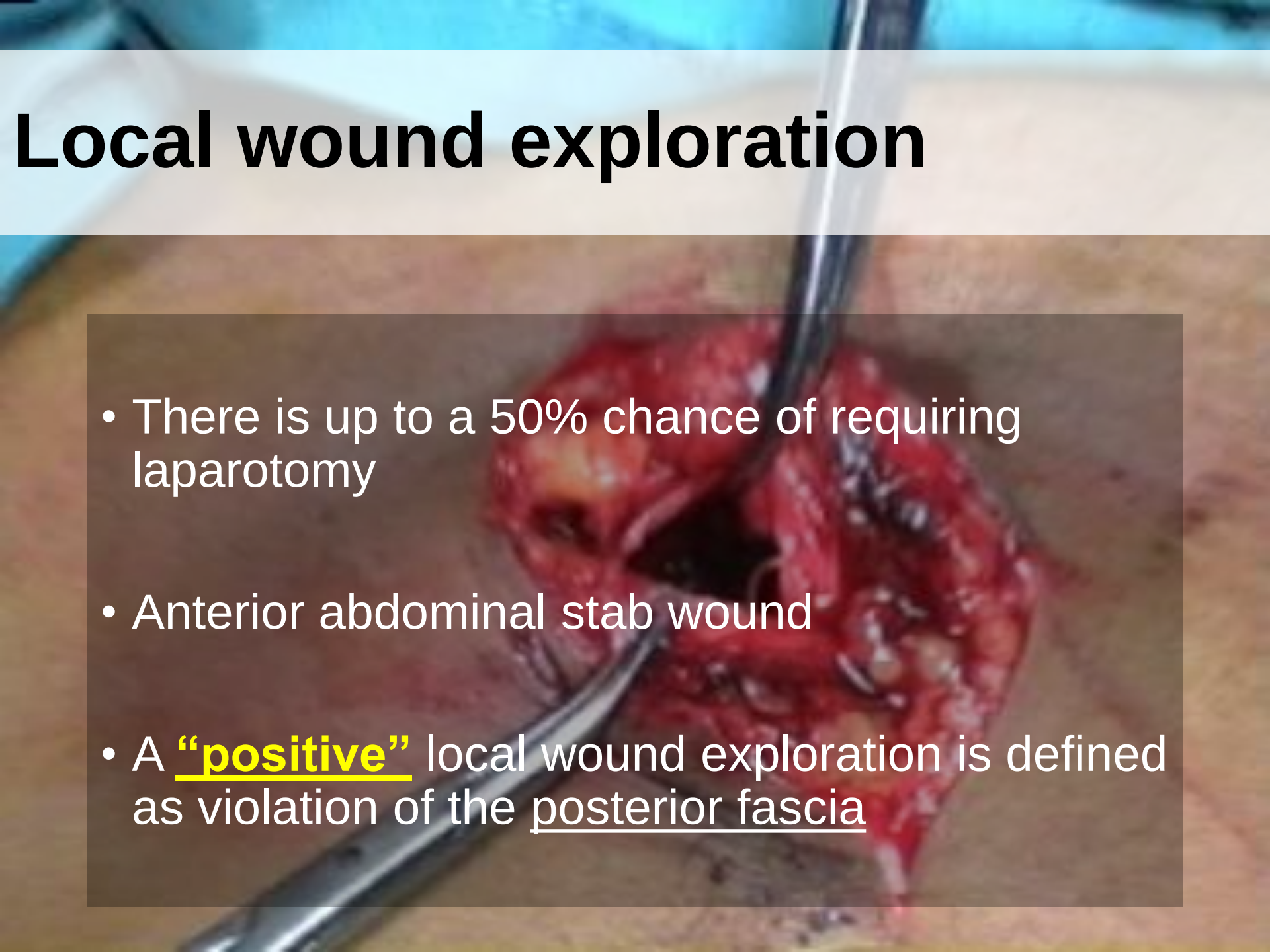
Fluid resuscitation

- Hypotensive resuscitation
  - SBP 80-90 mmHg
  - SBP 90-100 mmHg in traumatic brain injury
- “Warm”
- Ringer lactate solution or Normal saline
- 2 Large bore needles

Investigation in Abdominal injury

- Local wound exploration
- Serial physical examination
- FAST (Focused Assessment with Sonography in Trauma)
- DPL (diagnostic peritoneal lavage)
- CT abdomen

Local wound exploration

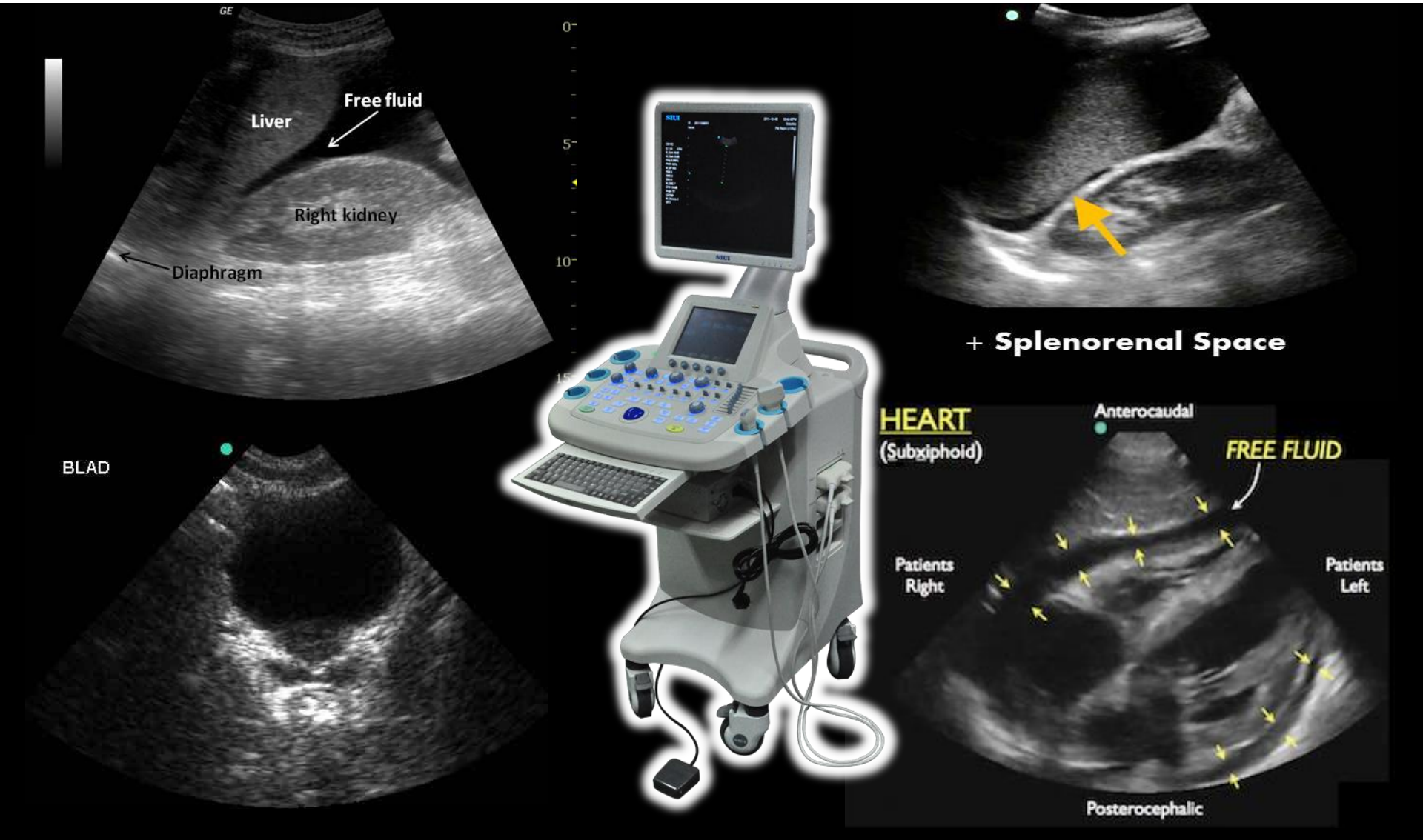


- There is up to a 50% chance of requiring laparotomy
- Anterior abdominal stab wound
- A **“positive”** local wound exploration is defined as violation of the posterior fascia

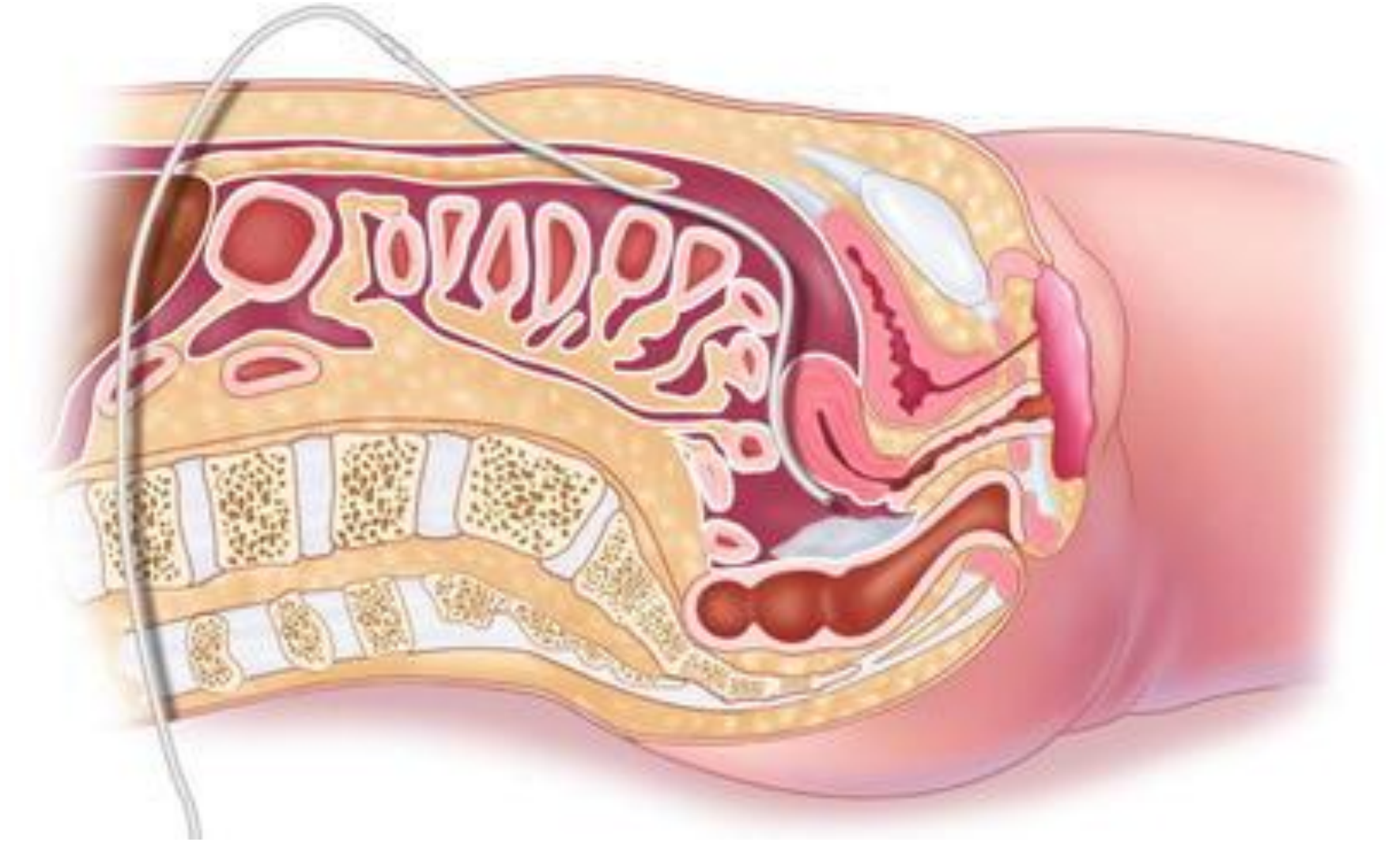
Serial physical examination

- Equivocal abdominal sign
- Unclear radiological exam
- Should be the same examining physician

Focused Assessment with Sonography in Trauma



Diagnostic peritoneal lavage



Diagnostic peritoneal lavage

Criteria for "positive" finding on diagnostic peritoneal lavage		
	ABDOMINAL TRAUMA	THORACOABDOMINAL STAB WOUNDS
Red blood cell count	>100,000/mL	>10,000/mL
White blood cell count	>500/mL	>500/mL
Amylase level	>19 IU/L	>19 IU/L
Alkaline phosphatase level	>2 IU/L	>2 IU/L
Bilirubin level	>0.01 mg/dL	>0.01 mg/dL

CT abdomen

- **“Hemodynamically stable”**

Indications for CT:
-Altered mental status
-Confounding injury
-Gross hematuria
-Pelvic fracture
-Abdominal tenderness
-Unexplained Hct <35%

- **Positive FAST in blunt trauma**
  - **If NEGATIVE**
- **Back/Flank penetrating trauma**

	DPL	FAST	CT SCAN
Advantages	• Early diagnosis • Performed rapidly • 98% sensitive • Detects bowel injury • Transport: No	• Early diagnosis • Noninvasive • Performed rapidly • Repeatable • 86%–97% accurate • Transport: No	• Most specific for injury • Sensitive: 92%–98% accurate
Disadvantages	• Invasive • Specificity: Low • Misses injuries to diaphragm and retroperitoneum	• Operator-dependent • Bowel gas and subcutaneous air distortion • Misses diaphragm, bowel, and pancreatic injuries	• Cost and time • Misses diaphragm, bowel, and some pancreatic injuries • Transport: Required
Indications	• Unstable blunt trauma • Penetrating trauma	• Unstable blunt trauma	• Stable blunt trauma • Penetrating back/flank trauma

Non-operative management(NOM)

Indication of NOM

- Hemodynamic stability
- No sign of peritonitis
- Solid organ injury

Not contraindication of NOM

- **Age** > 55
- **Grade of injury**
- **Amount of hemoperitoneum**
- **Multiple injured**
- **Severe head injury**

NOM, how to

- **Admit ICU**
- **Close monitoring (V/S , urine output……)**
- **Correct coagulopathy**
- **Correct acidosis**
- **Correct hypothermia**

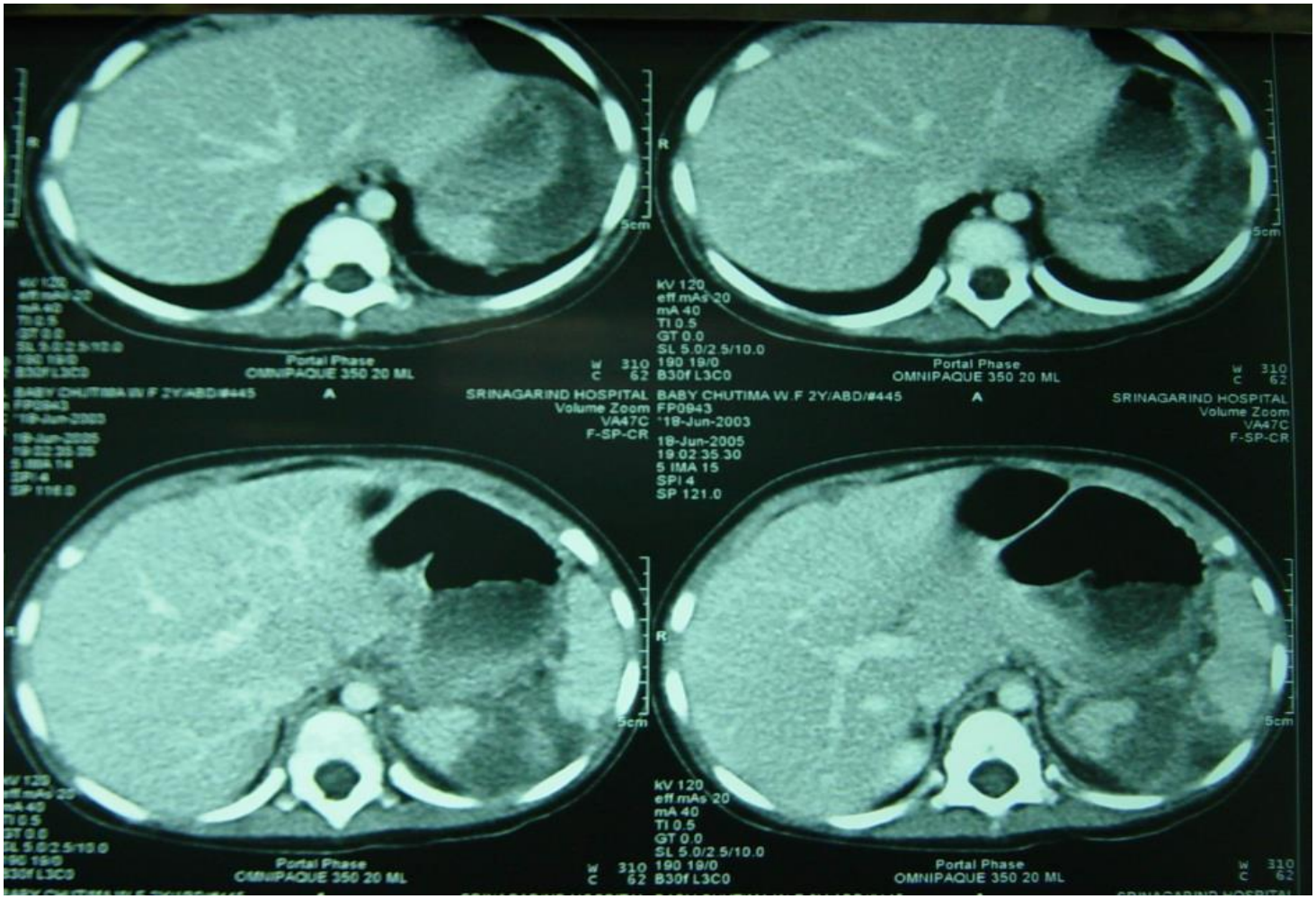
Successful NOM depends on

- Surgical team
- ICU facility
- OR facility
- Blood bank facility

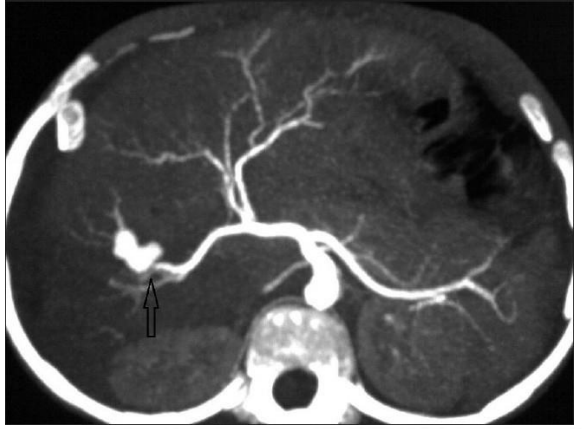
End point of NOM

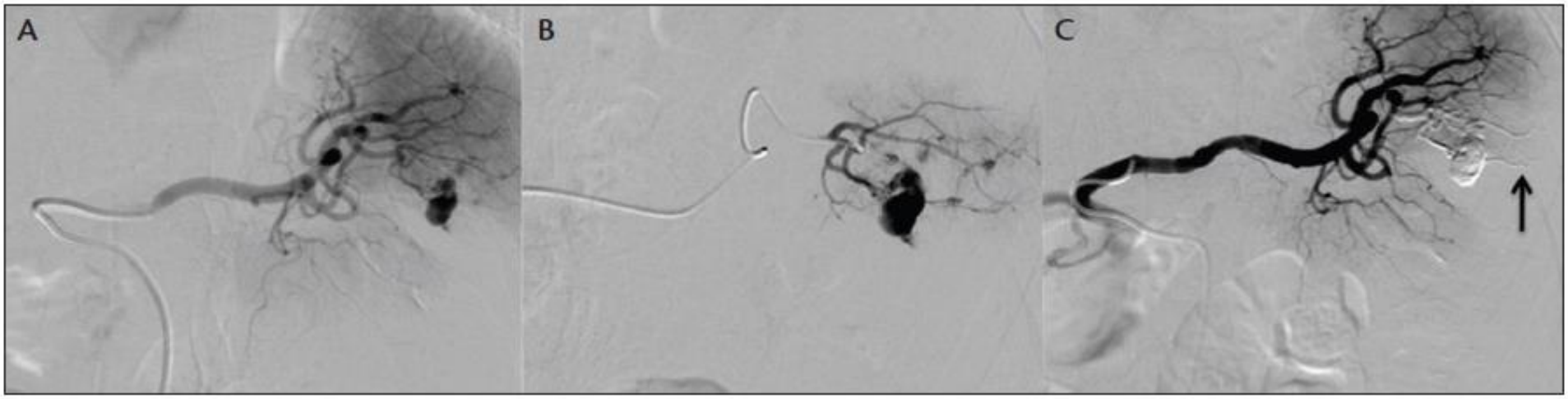
- **Unstable vital signs after observation**
- **Radiological finding**

Move to OR


Portal Phase
OMNIPAQUE 350 20 ML
W 310
C 62
SRINAGARIND HOSPITAL
Volume Zoom
VA47C
F-SP-CR
kV 120
eff mAs 20
mA 40
TI 0.5
GT 0.0
SL 5.0/2.5/10.0
190 19/0
B30f L3C0
BABY CHUTIMA W.F 2Y/ABD/#445
A
FP0943
18-Jun-2003
18-Jun-2005
19:02:35.30
5 IMA 15
SPI 4
SP 121.0
5cm
R

Embolization

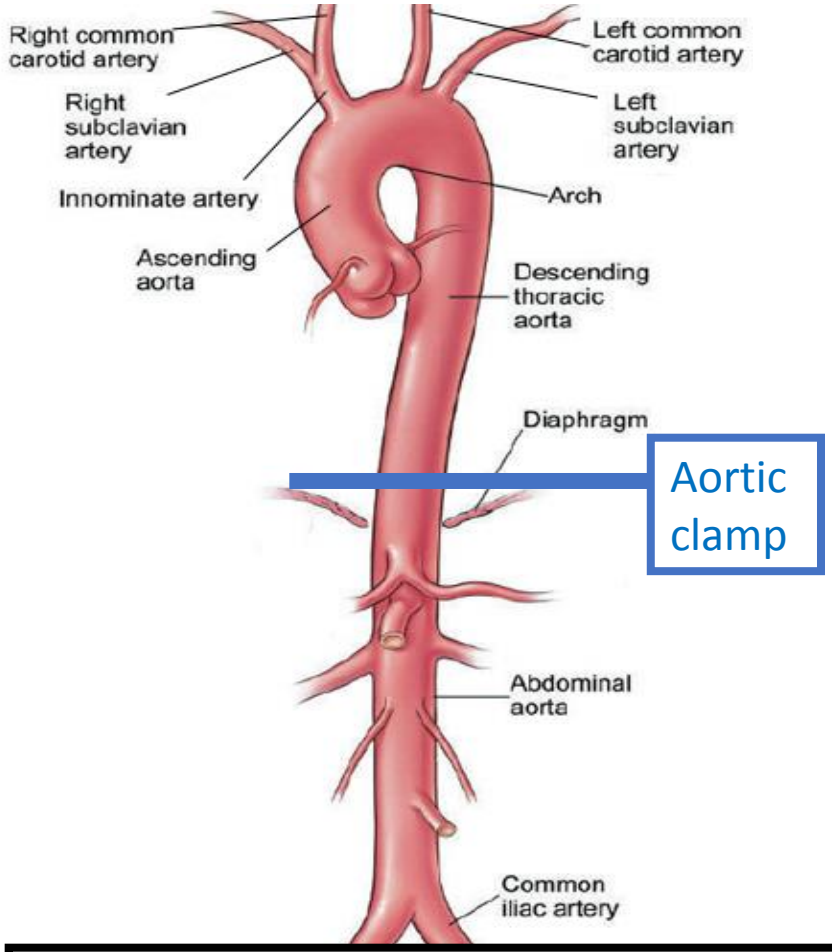




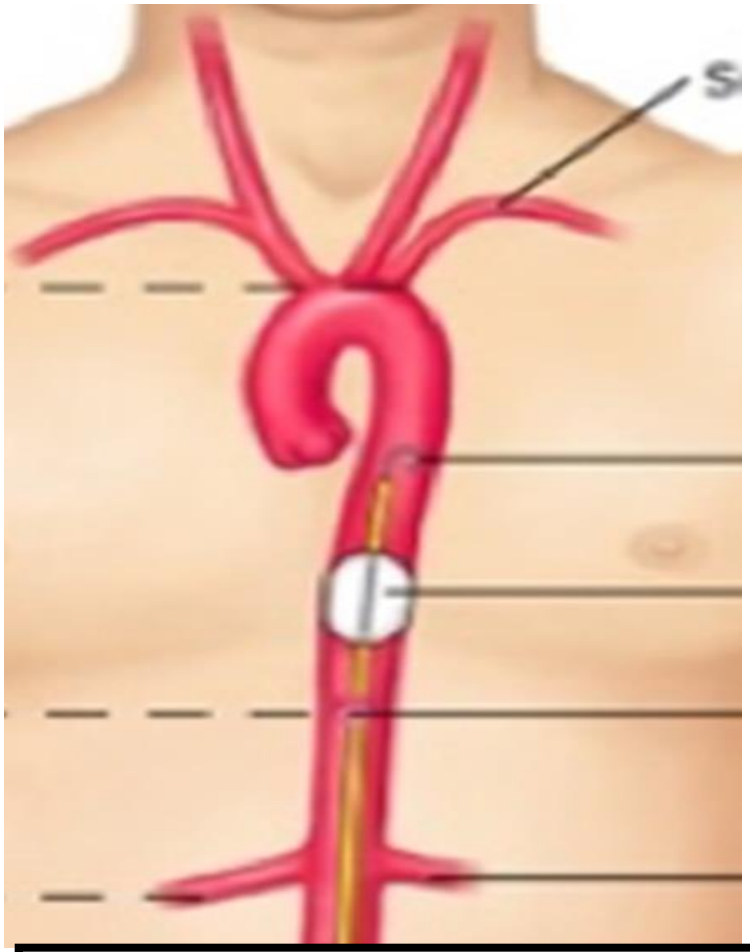
- **Severe trauma with cardiac arrest**

or

severe hypotension

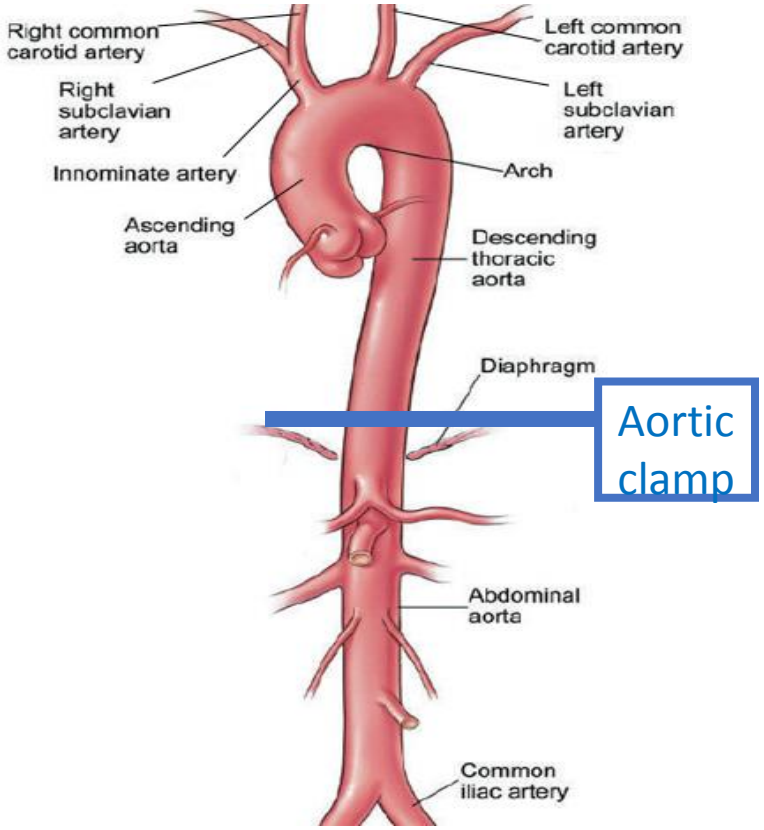


Emergency department thoracotomy and aortic cross clamp



resuscitative endovascular balloon occlusion of the aorta(REBOA)

Emergency department(ED,ER) thoracotomy and aortic cross clamp



Indication for ER thoracotomy

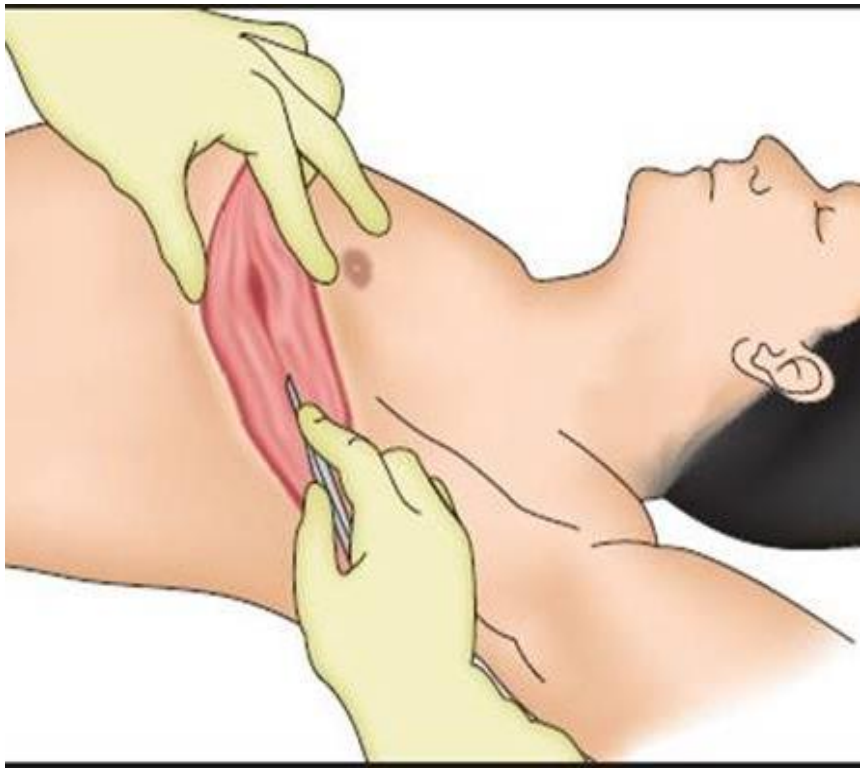
1. **Post-injury cardiac arrest**
   - Penetrating trauma <15 minutes
   - Blunt trauma <5 minutes

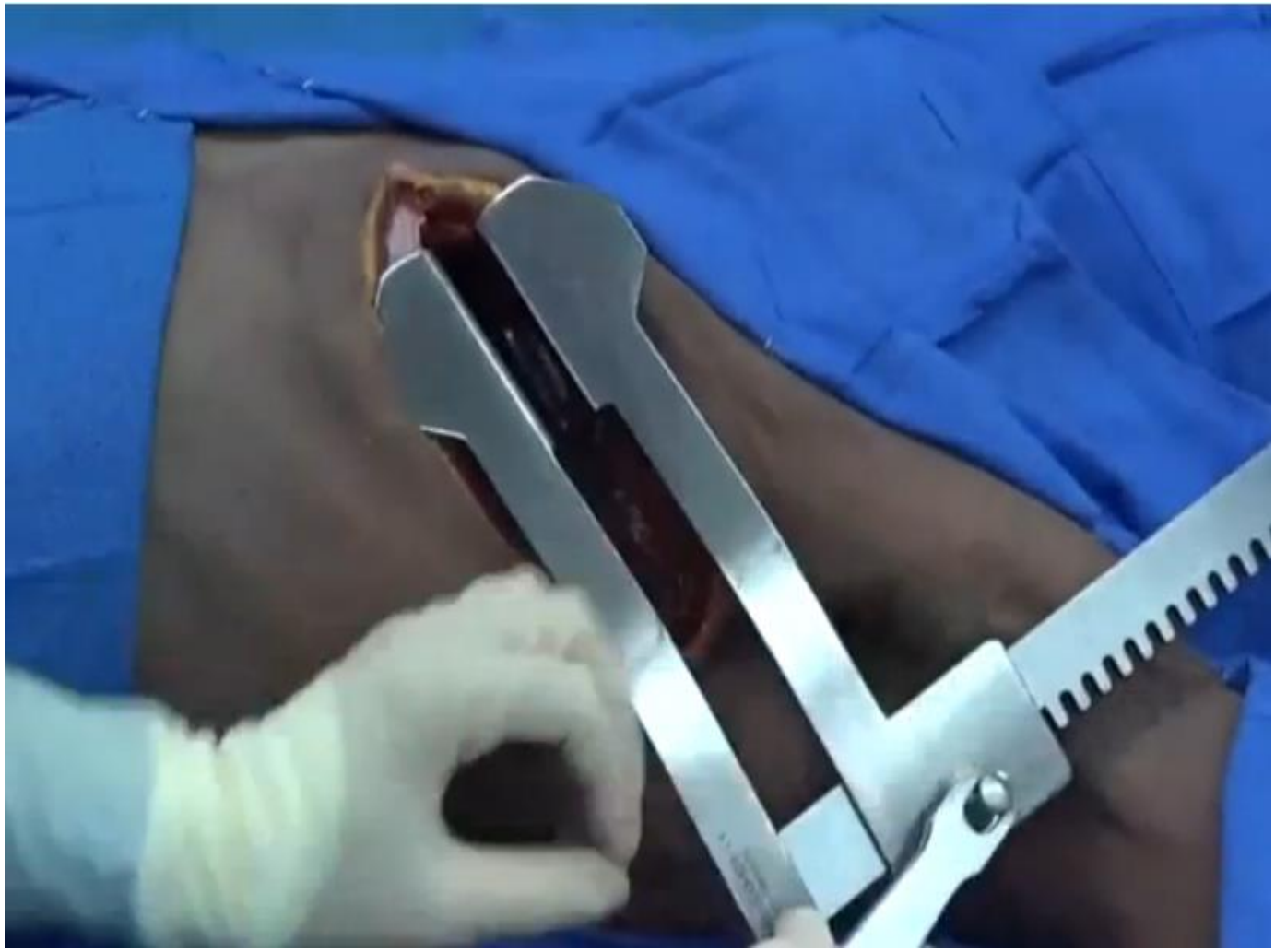
2. **Persistent severe post-injury hypotension (SBP <60 mmHg)**
   - Cardiac tamponade
   - Hemorrhage (thorax, abdomen)
   - Air embolism

Equipment for ER thoracotomy

ER thoracotomy

- 4th intercostal space anterolateral thoracotomy

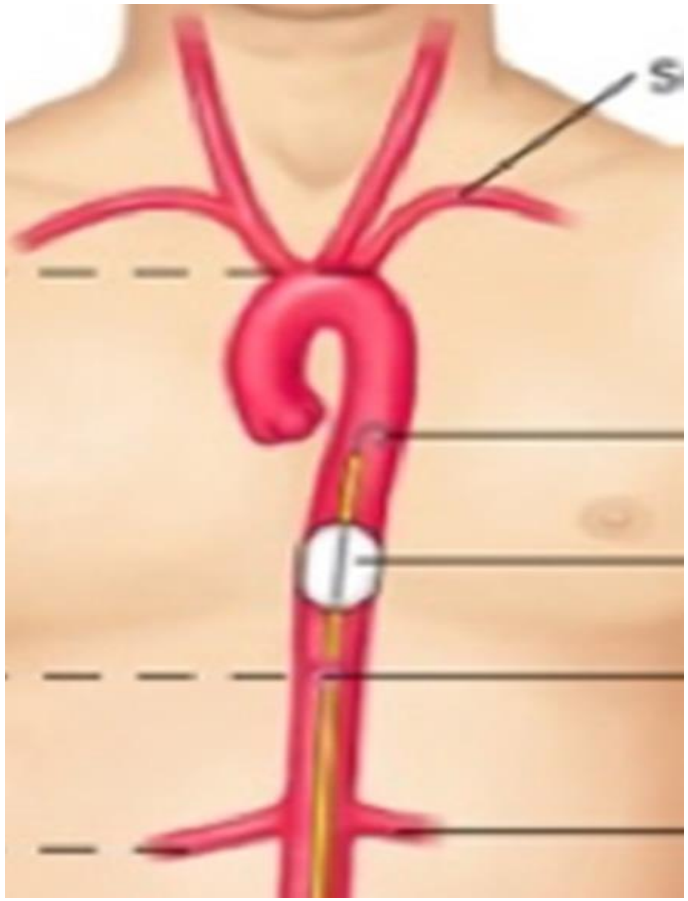




Benefit of ER Thoracotomy

- Internal cardiac massage
- Relieve cardiac tamponade
- Repair cardiac wound
- Aortic cross clamp

Resuscitative endovascular balloon occlusion of the aorta(REBOA)

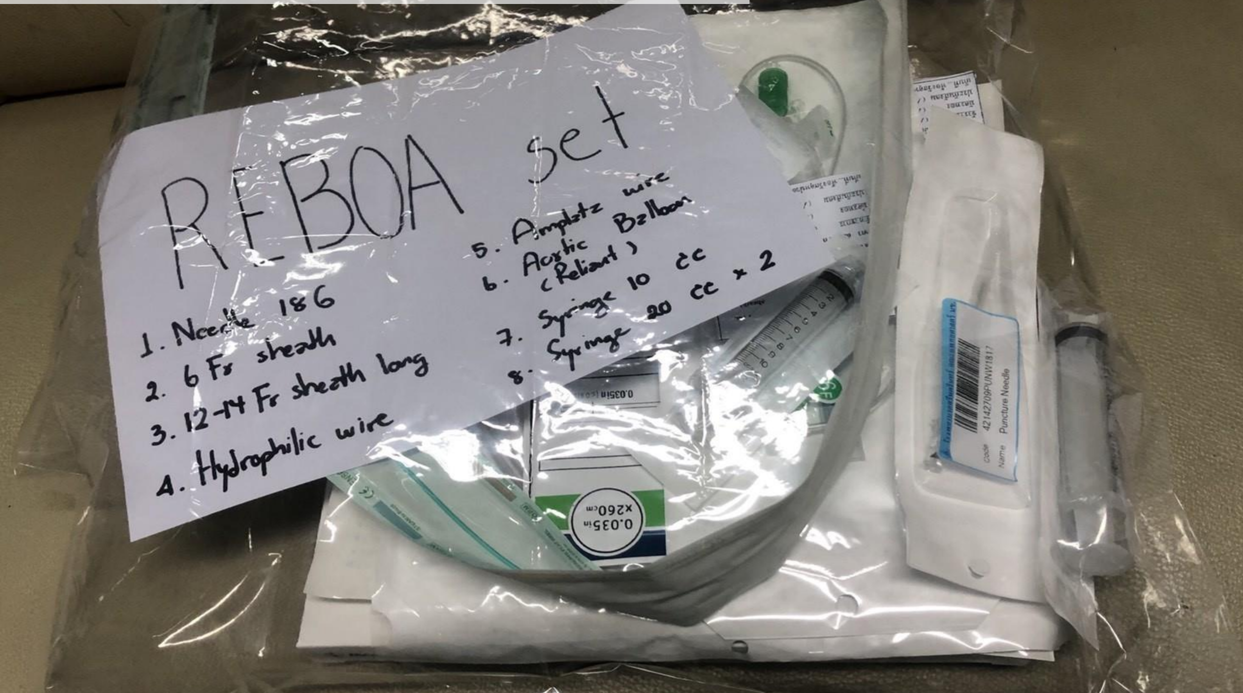


Indication for REBOA

1. **Post-injury cardiac arrest**
   - Penetrating trauma <15 minutes
   - Blunt trauma <5 minutes

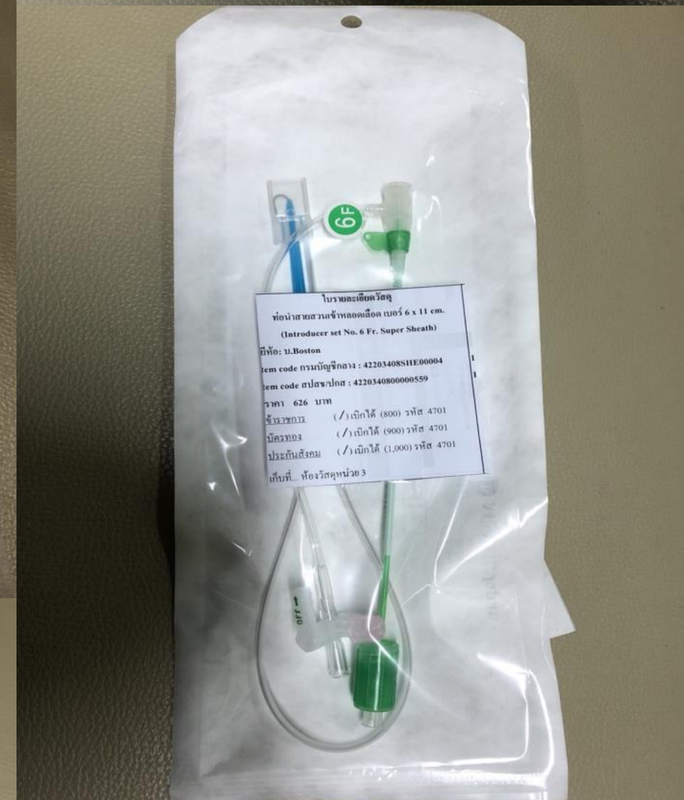
2. **Persistent severe post-injury hypotension (SBP <60 mmHg)**
   - Hemorrhage (abdomen, pelvis)

Equipments



REBOA set
1. Needle 18G
2. 6 Fr sheath
3. 12-14 Fr sheath long
4. Hydrophilic wire
5. Amplatz wire
6. Aortic Balloon (Reliant)
7. Syringe 10 cc
8. Syringe 20 cc x 2

Code 42142709PUNW1817
Name Puncture Needle

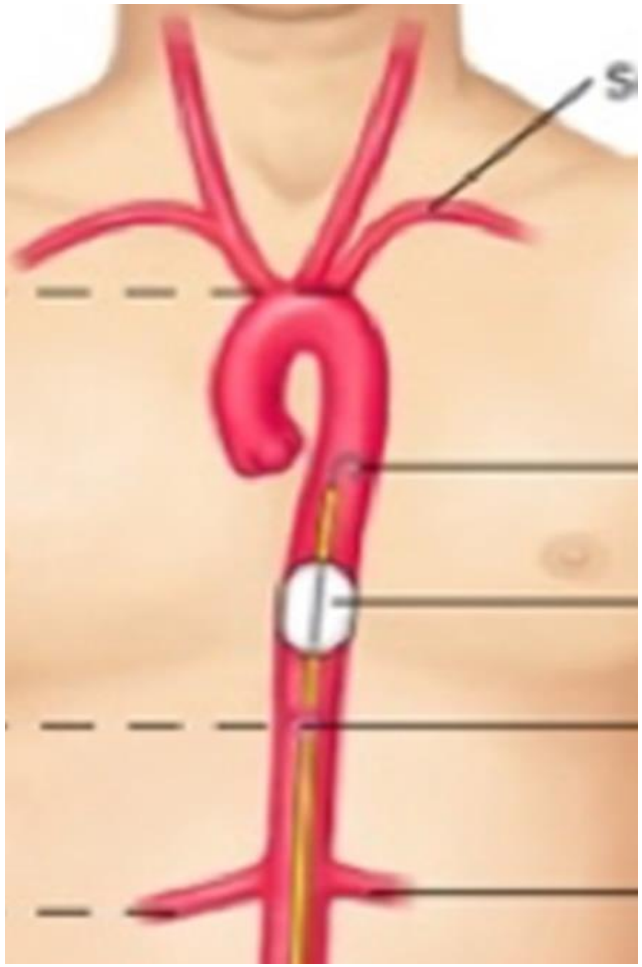


6F
(Introducer set No. 6 Fr. Super Sheath)

RELIANT
Stent Graft Balloon Catheter
Medtronic
RELIANT
Stent Graft Balloon Catheter

Boston Scientific
0.035in x260cm
Amplatz Super Stiff™
J-TIP
Guidewire
260cm
3mm
7cm
0.035in
GTIN 08714729741350
LOT 20637365
REF M00146502 0
2020-05-11

REBOA operation



- Open groin >> Access Common femoral artery
- Insert sheath 6 Fr
- Hydrophilic wire
- Change to sheath 14 Fr for insert balloon over wire
- Supra celiac area inflate balloon (mid sternal point)

Complication

ER Thoracotomy ,REBOA

- Bowel ischemia
- Renal failure
- Lower limb ischemia

Trauma case presentation

Patient identification

- ผู้ป่วยชาย 27 ปี
- EMS นำส่ง อุบัติเหตุรถยนต์ชนต้นไม้ ผู้ป่วยติดอยู่ในรถ

Chief complaint

- Case EMS นำส่ง ผู้ป่วยติดอยู่ในรถ หมดสติ ระหว่างนำส่งโรงพยาบาล cardiac arrest ที่หน้ารพ (4.16 น)

At ER

- Start CPR 4.16 – 04.36
- Primary survey
  - A: On ET tube, on hard collar
  - B : Decrease breath sound both lung
- Right ICD : Hemo-pneumothorax : 150 ml
- Left ICD : Pneumothorax

At ER

- Primary survey
  - C :Distended abdomen
    - Access peripheral line IV no 18 * 2
    - Activate massive blood transfusion protocol
    - **Push gr o low titer PRC 2 u**
    - **FAST >> positive at hepatorenal & spleonorenal pouch**

At ER

- Start REBOA operation (4.25- 4.40)
- D: E1VtM1 , pupil 4 mm slightly RTLBE
- E: Deformity at right leg, deformity of right arm >> on splint

- AT 4.36 >> EKG sinus tachycardia rate 150
  - CPR (30 min)
  - BP 60/40 mmhg
  - ER to OR
  - PRC 6 u FFP 4 u Plt 6 u

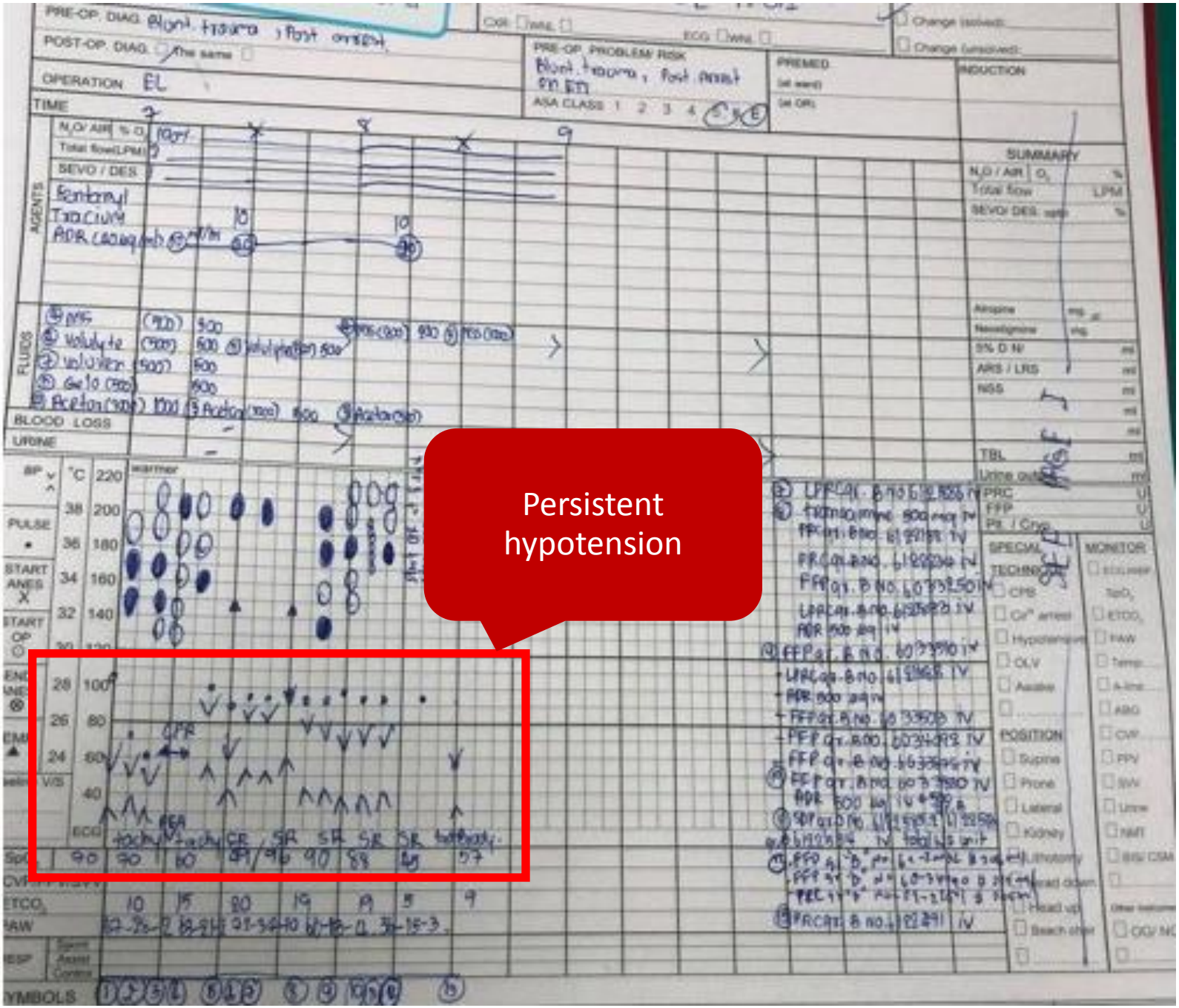

Question

Operation

- ลงมีด 4.45 (BP 60/40 PR 150 t/m)
- Long midline incision (Xiphoid – pubic symphysis)
- Blood clot 3000 ml
- 4 quadrant Abdominal packing
- Blood oozing from RUQ >> Deep Liver laceration 10 cm at posterior lobe of right liver (Segment 7)

Summary case

- Case ผู้ป่วยชายไทย อายุ 27 ปี
- Diagnosis
  - Blunt abdominal injury with liver laceration
  - Blunt chest injury with massive right heamothorax with multiple right lung laceration
  - Fracture Right leg , Fracture Right arm
  - Cardiac arrest


Persistent hypotension

Right ICD

Bleeding at Right ICD
2000 ML

- Right anterolateral thoracotomy
- Blood clot 2000 ml