

INJURY TO THE RETROPERITONEUM

NORDIC FORUM FOR TRAUMA RADIOLOGY 2024

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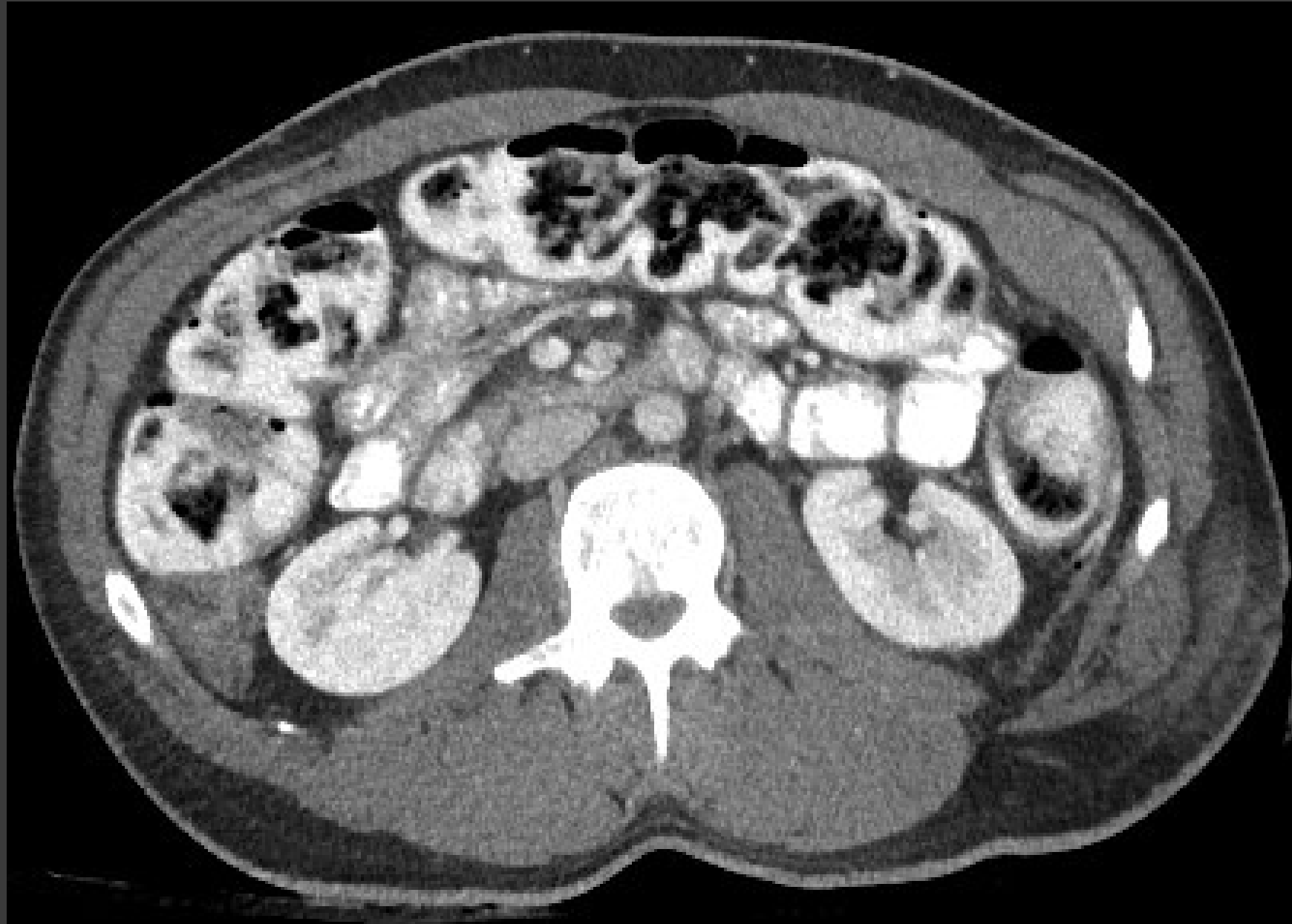
Thanks to:

Claire K Sandstrom, MD, FASER
UW Medicine Harborview Radiology
Seattle, WA

Case: 27 yom stab wound left flank

What zone of the retroperitoneum is injured?

- A. Zone 1
- B. Zone 2
- C. Zone 3
- D. Zone 4
- E. Don't know

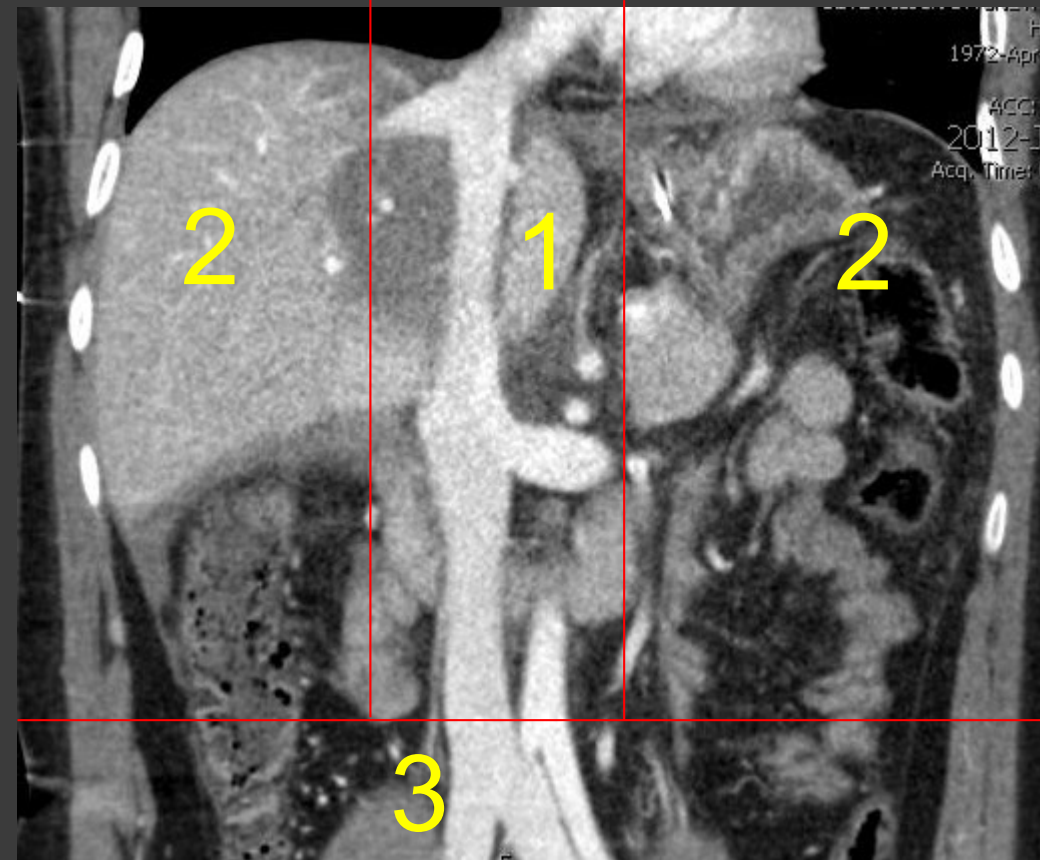


RETROPERITONEUM (RP)

- Prevalence of injury to RP: poor data
 - about 2.5% of trauma admissions
 - 20-80% of all laparotomies
- Injuries usually in combination with intraperitoneal organ damage
 - Anatomic location just anterior
- Mortality from RP bleeding: 18%
 - Highest for blunt trauma, lowest for stab wounds
 - Highest for zone 3, lowest for zone 2

RETROPERITONEUM ZONES (SURGEONS)

- Zone 1: Center. Contains:
 - Aorta, IVC, origin of renal vessels
 - Portion of duodenum and pancreas as they cross spine
- Zone 2: Lateral, Contains:
 - Kidneys, ureters, adrenals
 - Ascending and descending colon
- Zone 3: Below aortic bifurcation: Contains:
 - Iliac vessels bilateral
 - Distal bilateral ureters, bladder
 - Sigmoid and rectum
- Zone 4: more than one zone affected



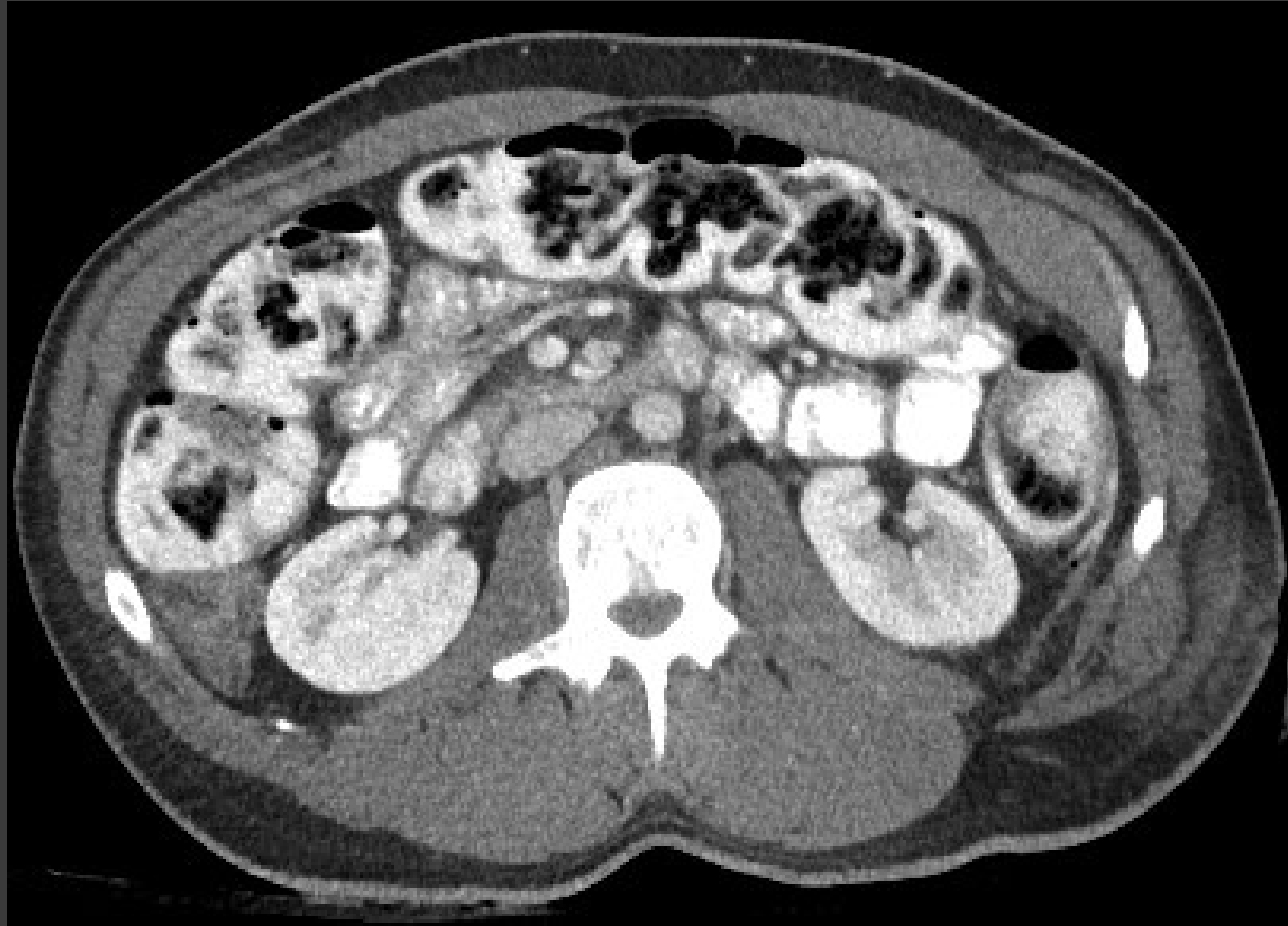
RETROPERITONEUM (RP) - EVALUATION

- Evaluation follows ATLS principles
- FAST does not include retroperitoneum
 - Hematoma will look like muscle of RP
 - However: negative FAST and hypotension without explanation should raise suspicion of RP bleeding
- CT with contrast
 - Consider delayed phase (urinoma)

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FASCIAL PLANES AND SPACES IN THE ABDOMEN

SPACES

FASCIAS

Properitoneal space

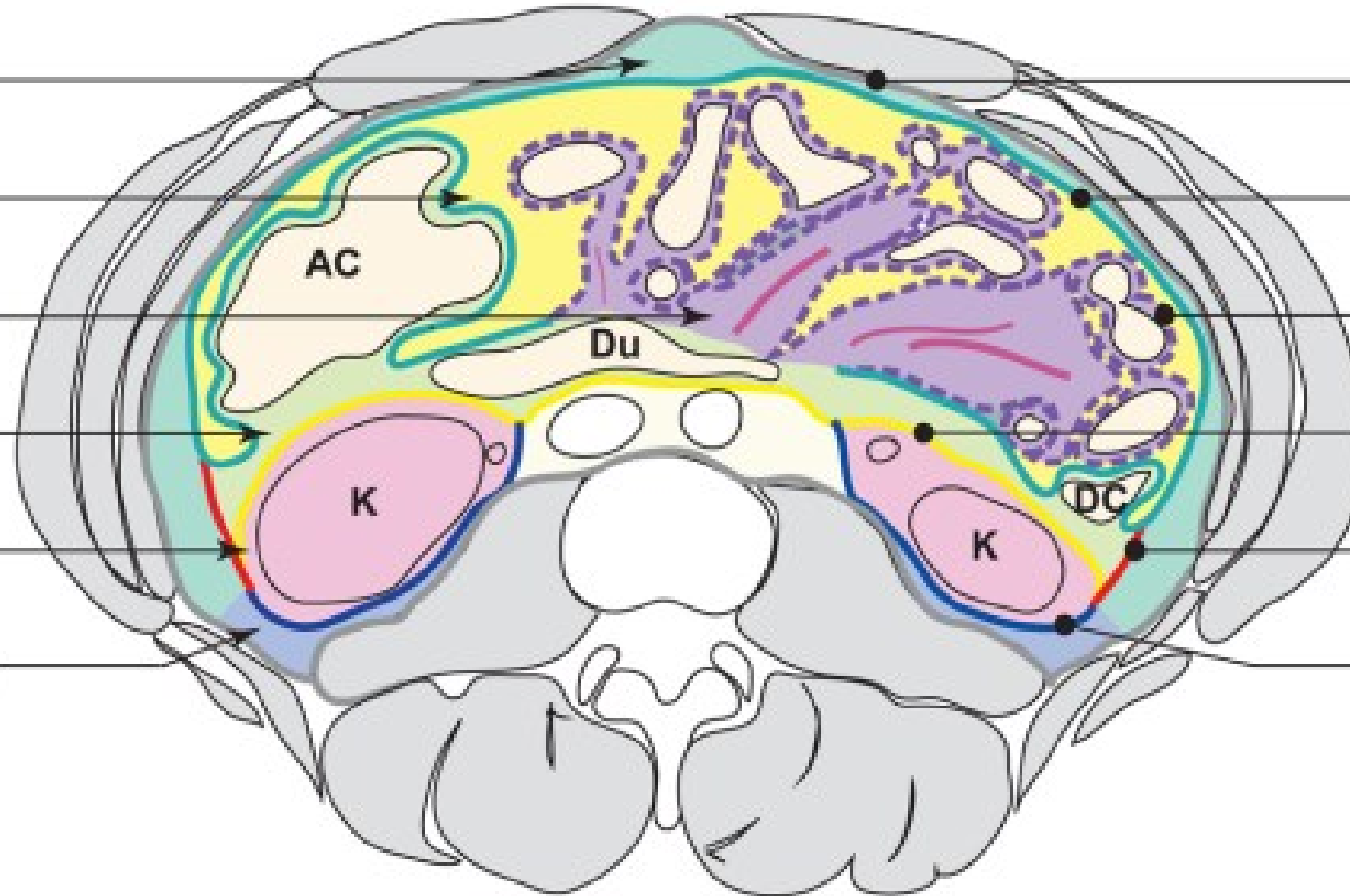
Peritoneal space

Perivascular space

Anterior pararenal space

Perirenal space

Posterior pararenal space



Transversalis fascia

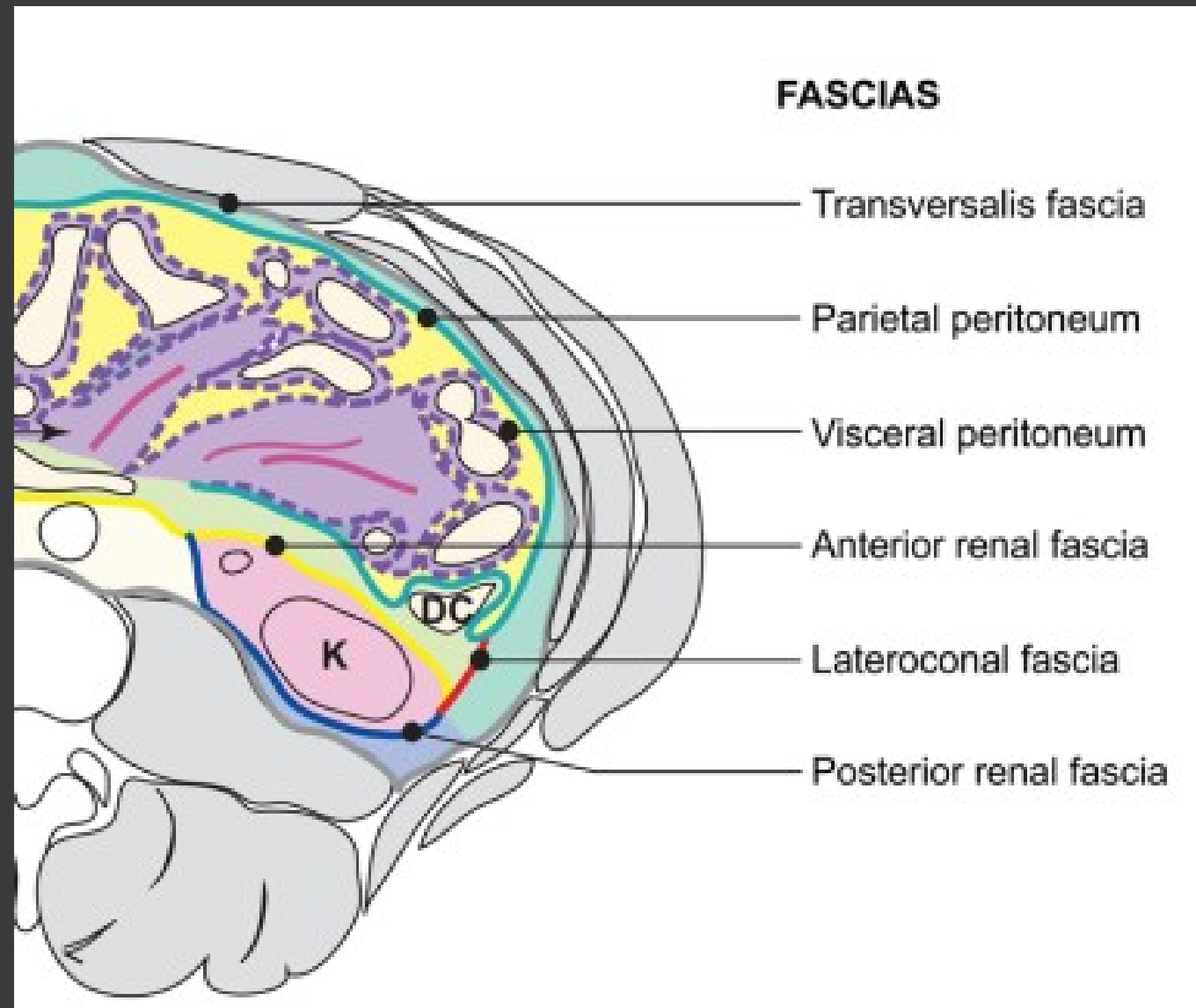
Parietal peritoneum

Visceral peritoneum

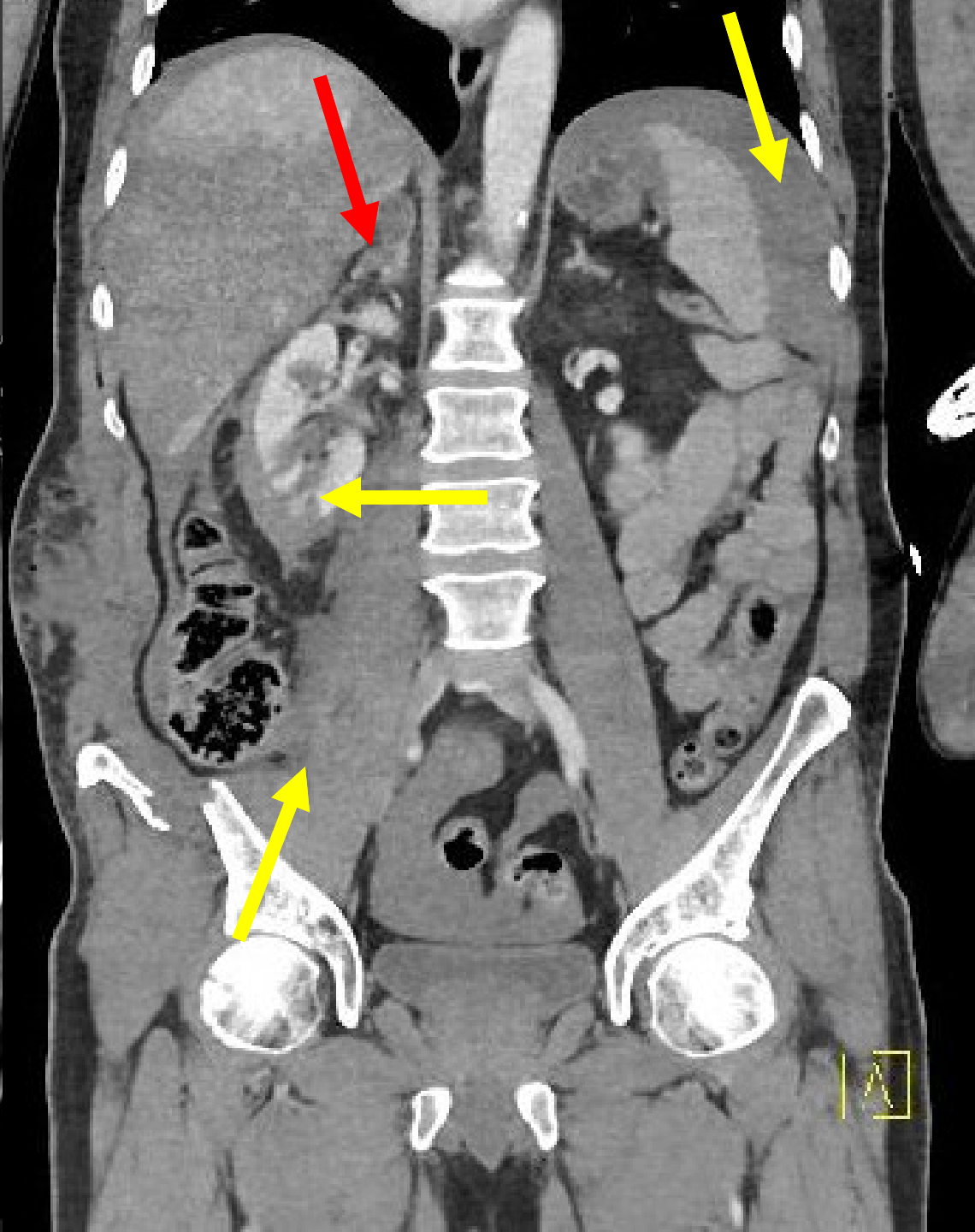
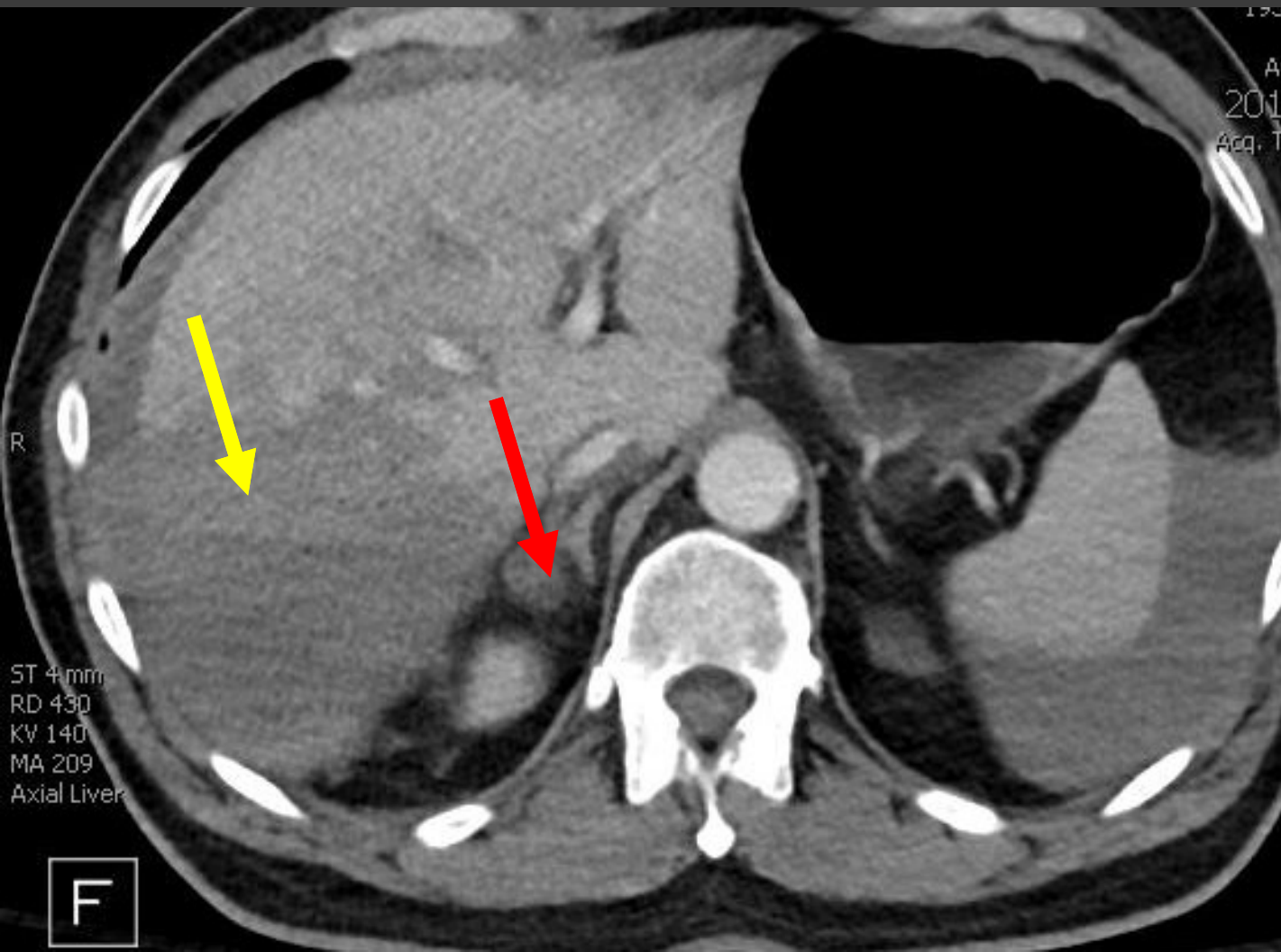
Anterior renal fascia

Lateroconal fascia

Posterior renal fascia



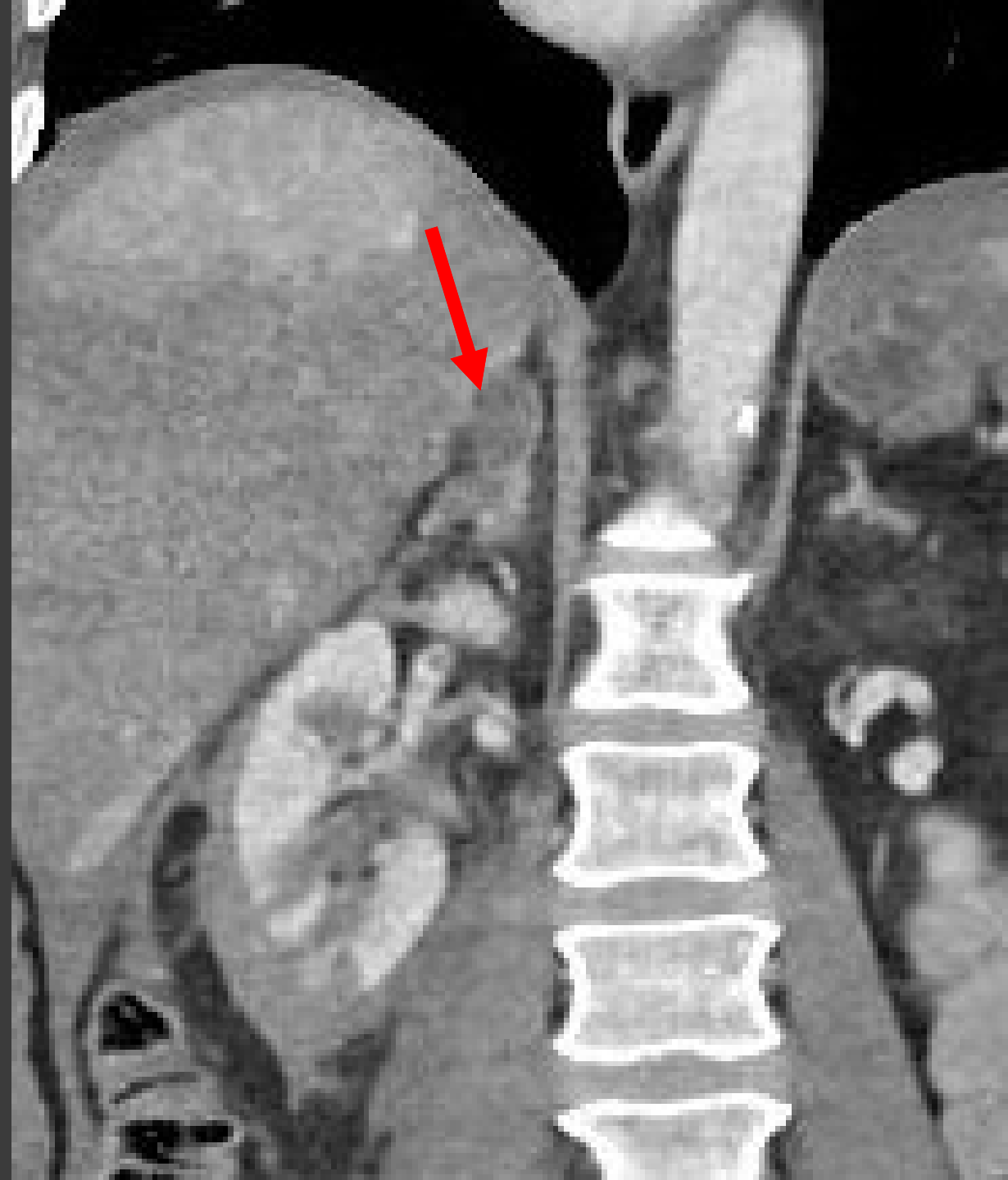
60 YOM MCC



60 YOM MCC

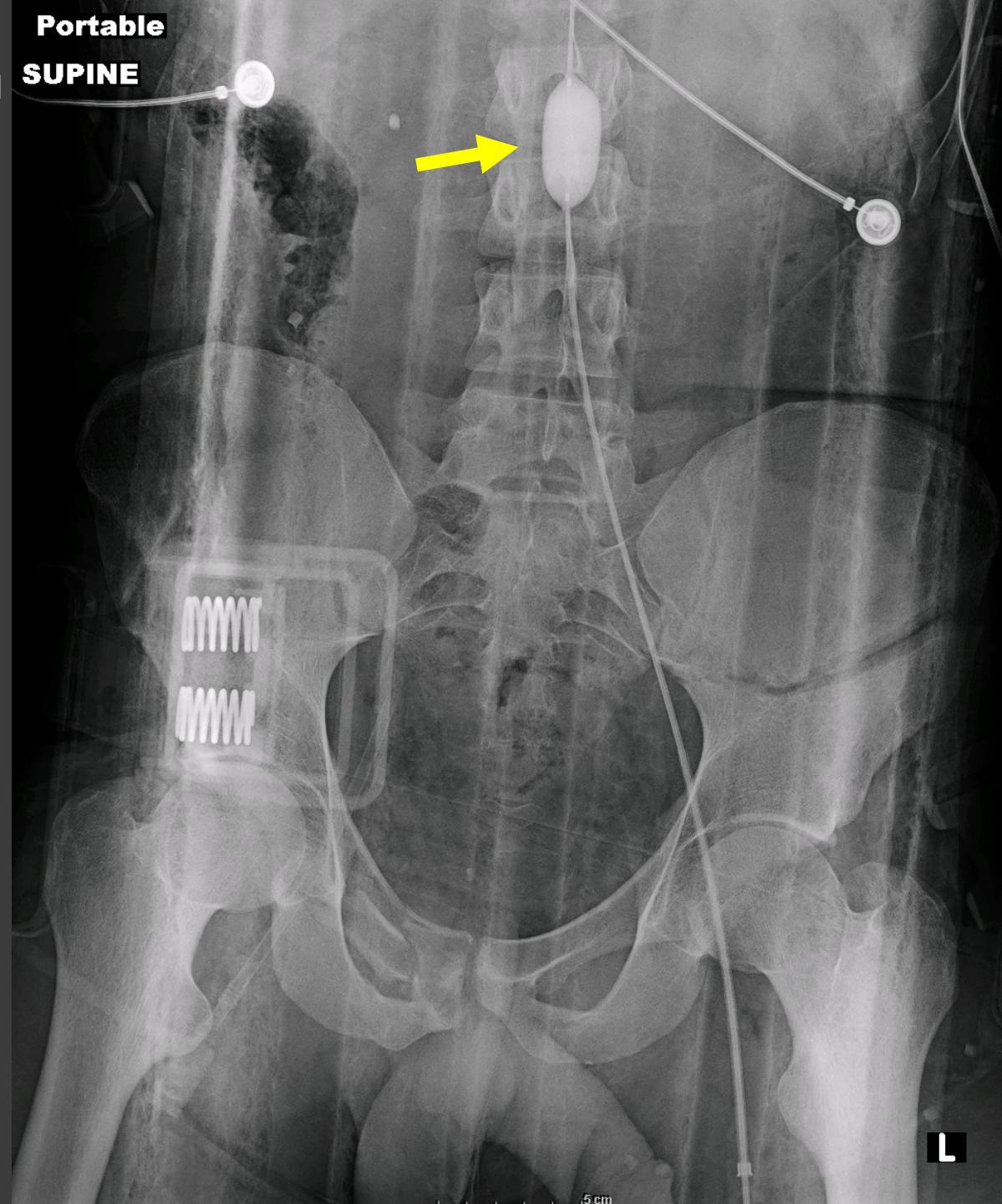
Adrenal injury (zone 2):

- Uncommon, 1% of trauma patients
- Minor hematoma from blunt trauma
 - Silent injury
 - Uncommonly isolated injury
 - Right > Left
- Complications:
 - Persistent bleeding: embolization
 - Adrenal crisis
 - Abscess



Case: Hypotensive man hit by train

- Resuscitative endovascular balloon occlusion of the aorta (REBOA)
- Temporize severe subdiaphragmatic non-compressible torso hemorrhage
 - 45% mortality
- Alternative to thoracotomy with aortic cross clamping in the retroperitoneum
 - Decrease downstream bleeding
 - Increase coronary and cerebral flow
- Infrarenal aorta occluded
- Retroperitoneal zone 1 and 3



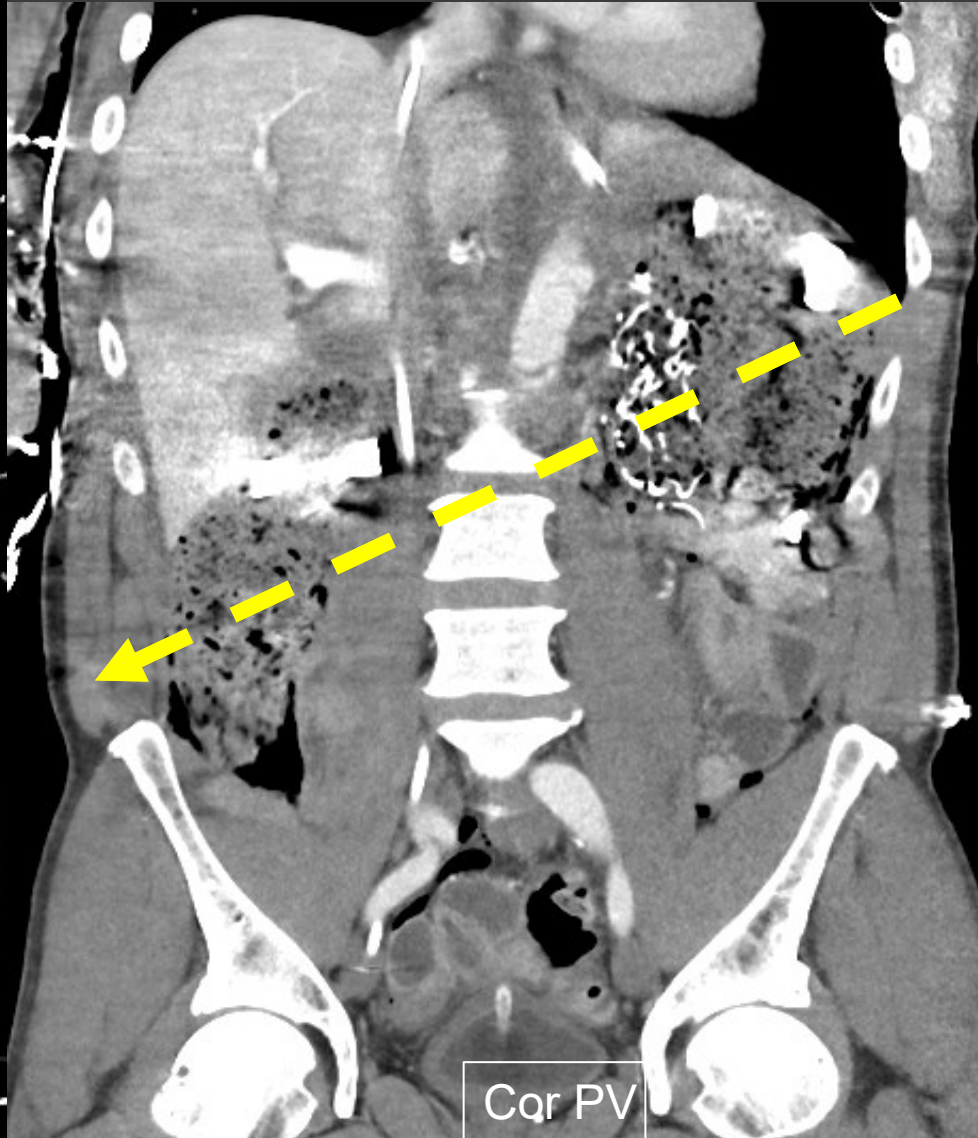
DAMAGE CONTROL LAPAROTOMY AND OPEN ABDOMEN

- Surgery that aims to keep a patient alive
 - US Navy teams: to keep ships afloat
 - Permanent treatment after resuscitative effort.
- Indicated in multisystem trauma
 - Massive transfusions: > 10 units
 - Severe physiological insult: shock, hypothermia, coagulopathy
 - Severe patterns of injury (e,g, large liver lac)
- Midline incision, pack and explore
 - Resect non-essential, damaged organs, ligate
 - Control contamination

49 YOM GSW, S/P DAMAGE CONTROL SURGERY



What finding is likely unknown to the surgeons?



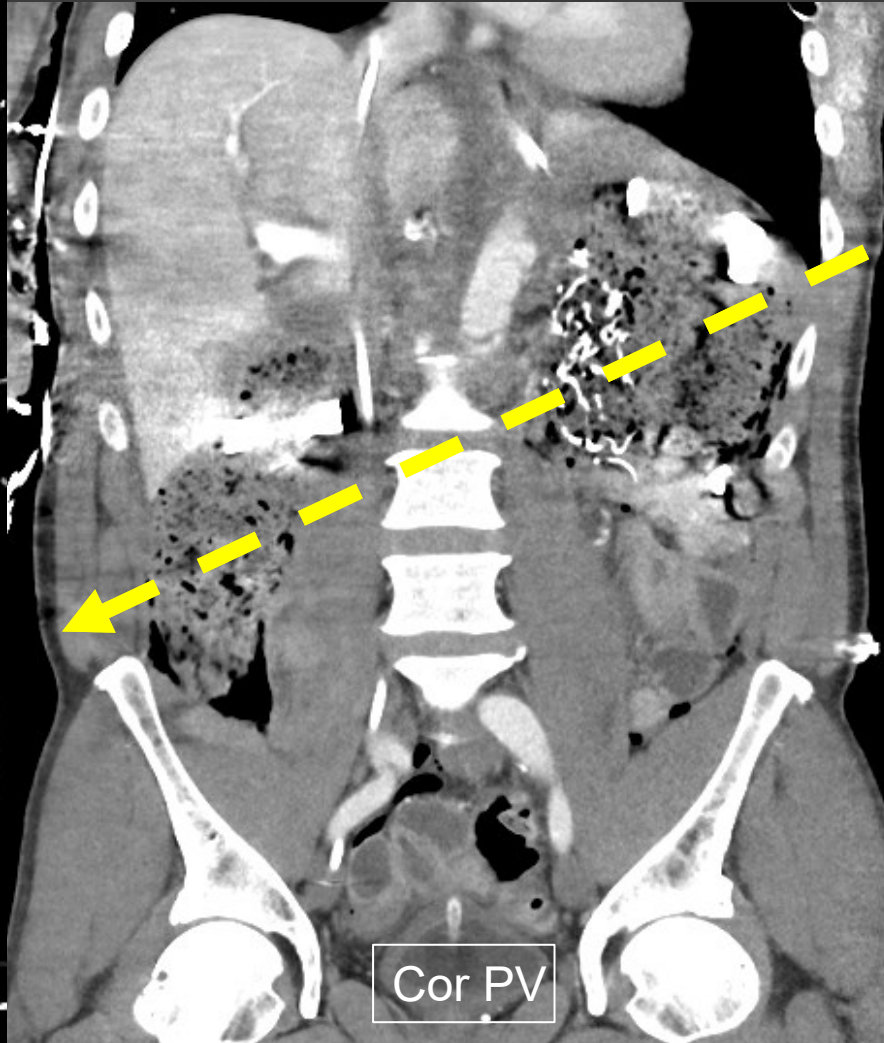
49 YOM GSW, S/P DAMAGE CONTROL SURGERY



Axial art



Axial PV

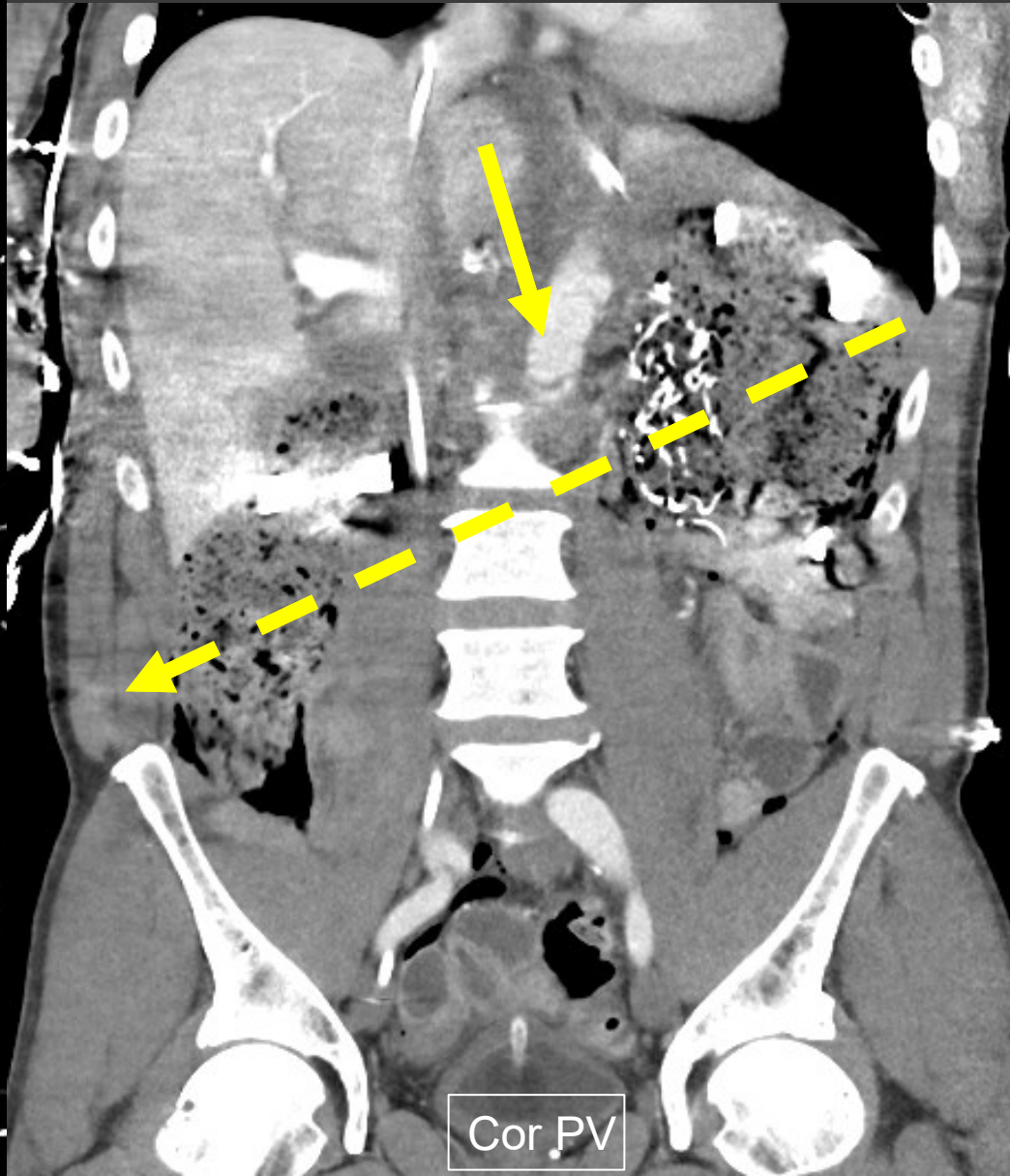
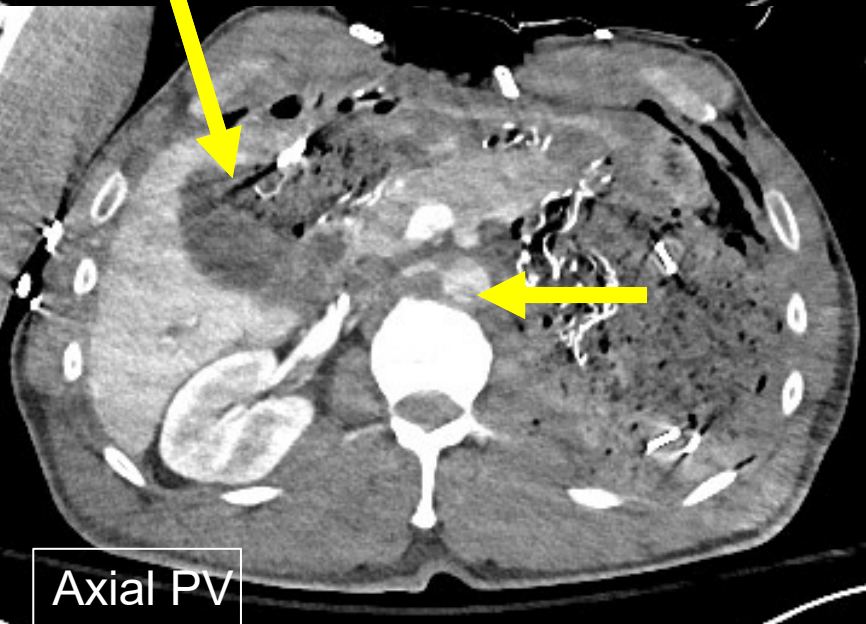
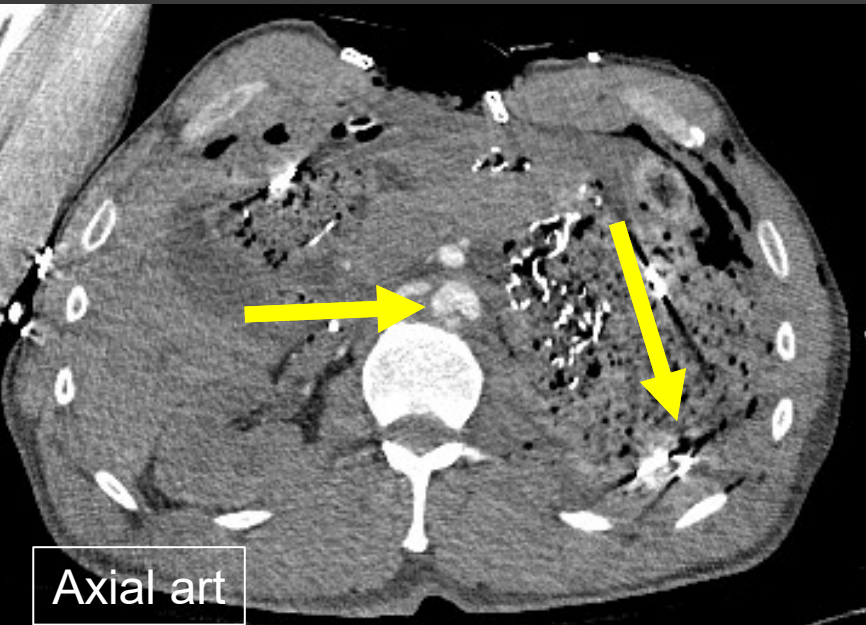


Cor PV

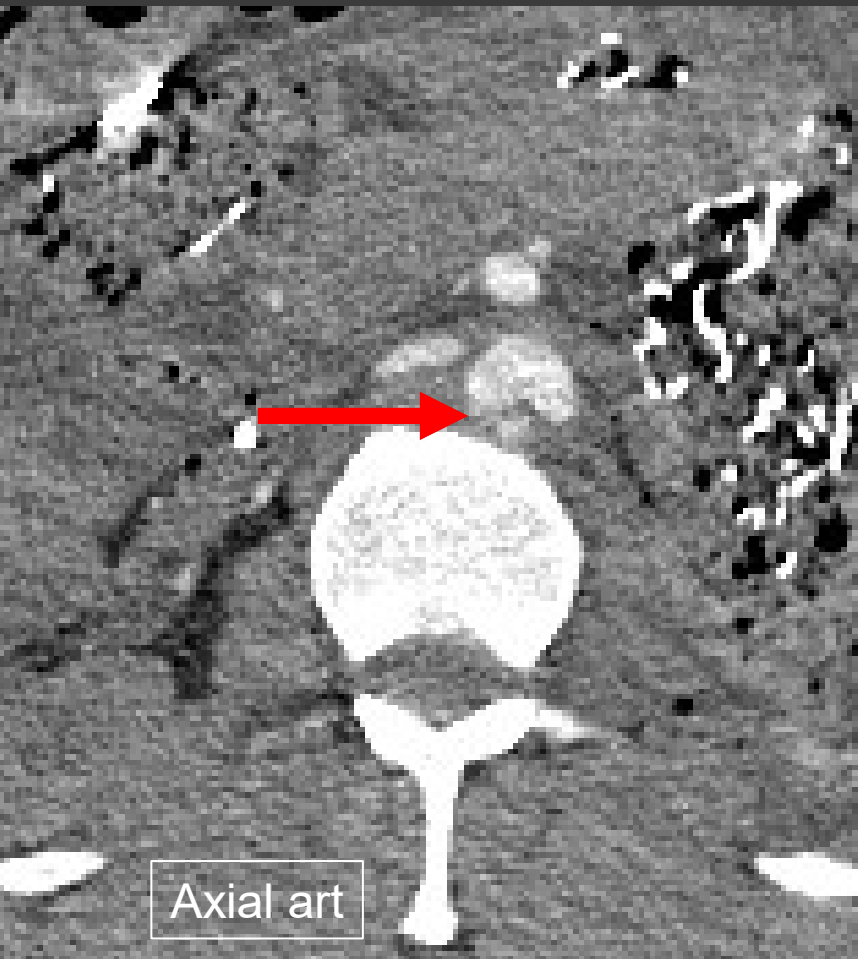
What finding is likely unknown to the surgeons?

- A. Packing material in peritoneal cavity
- B. Absent spleen
- C. Vascular injury
- D. Abnormal bowel enhancement
- E. Malposition of drain

49 YOM GSW, S/P DAMAGE CONTROL SURGERY



49 YOM GSW, S/P DAMAGE CONTROL SURGERY



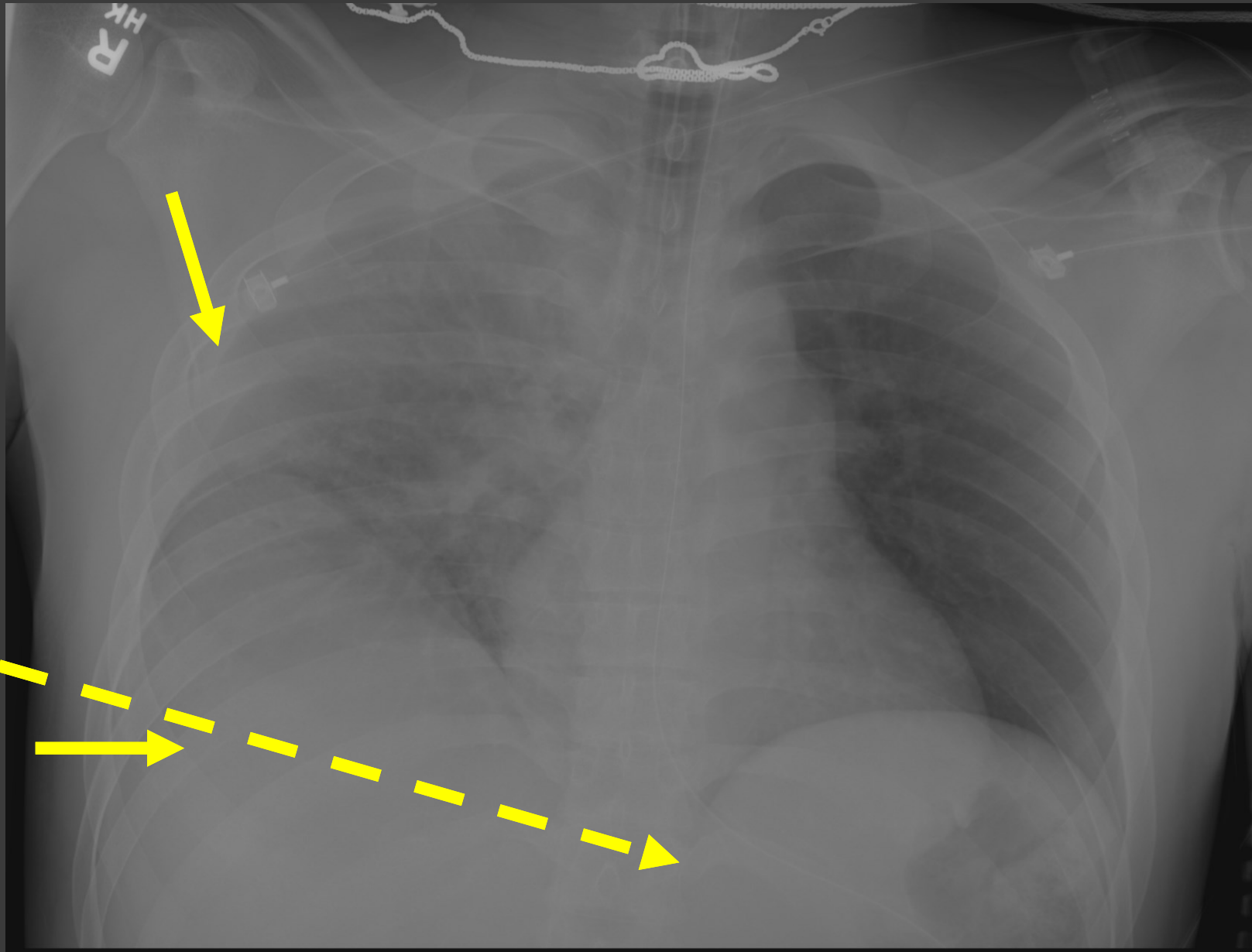
Abdominal aortic injury due to GSW



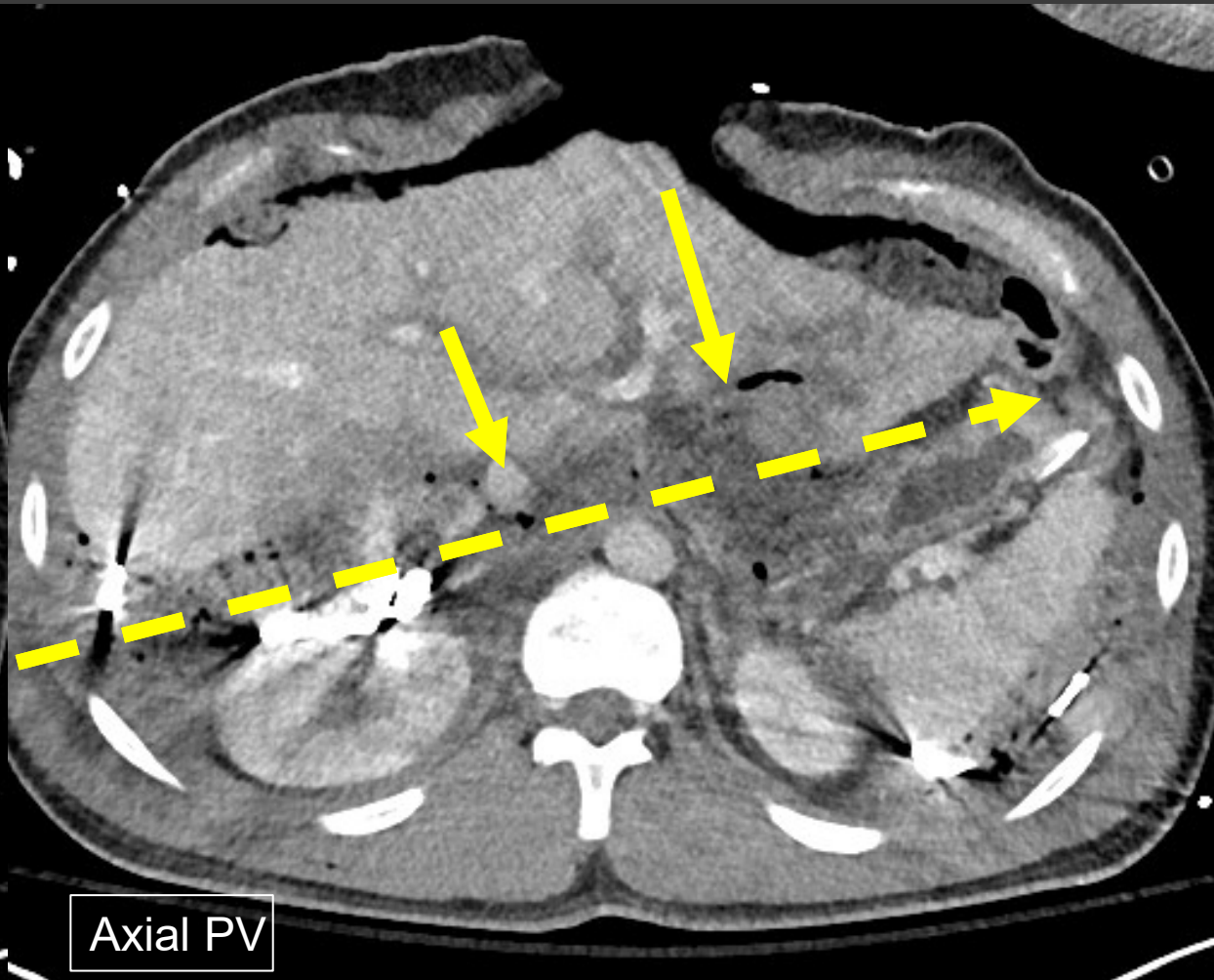
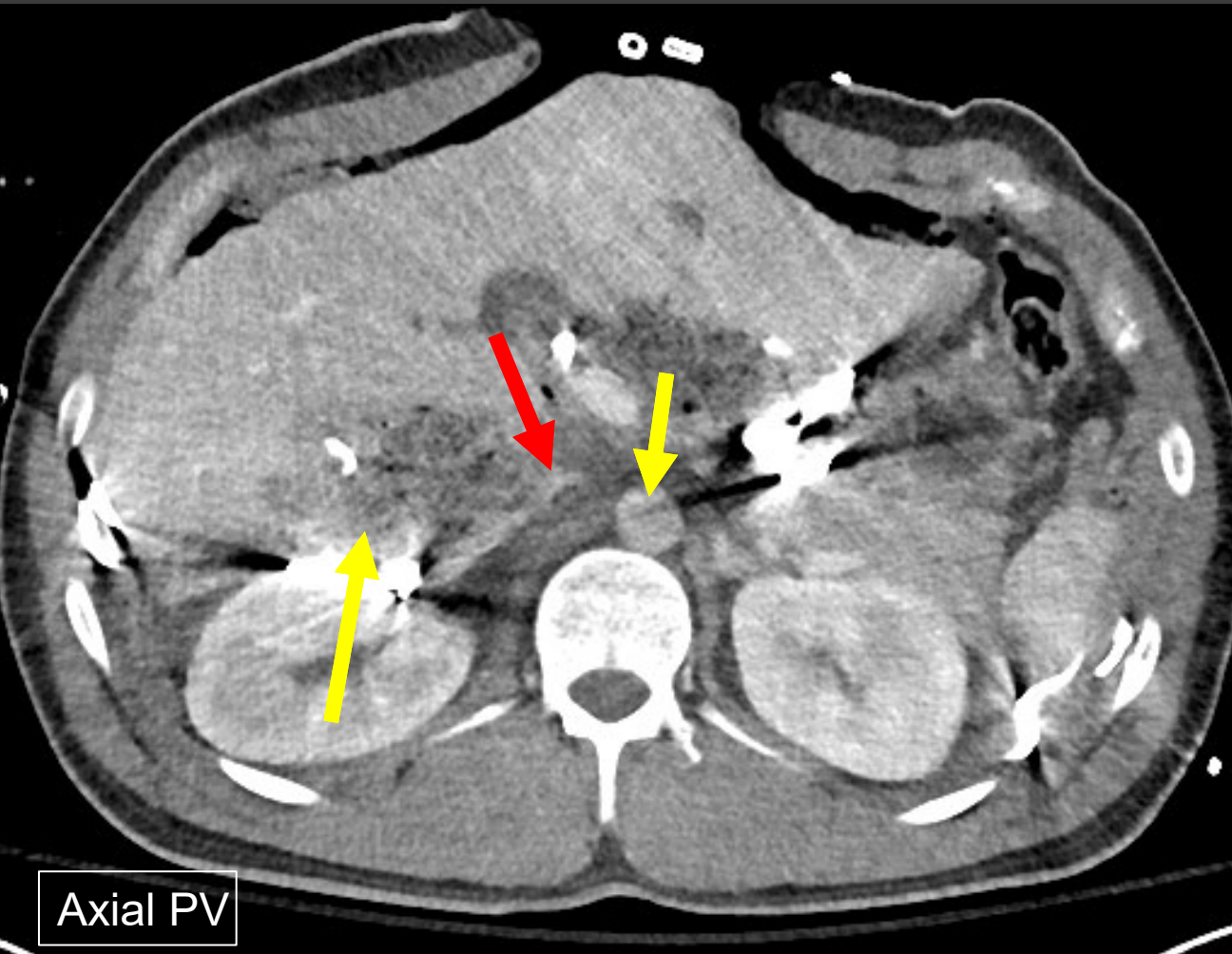
WHAT IS THE TRAJECTORY OF THE BULLET?

- **Trajectory identifies organs at risk**
 - **Think across anatomic compartments**
- **Allows to adjust search pattern on CT**

Case: 25 yom GSW to chest



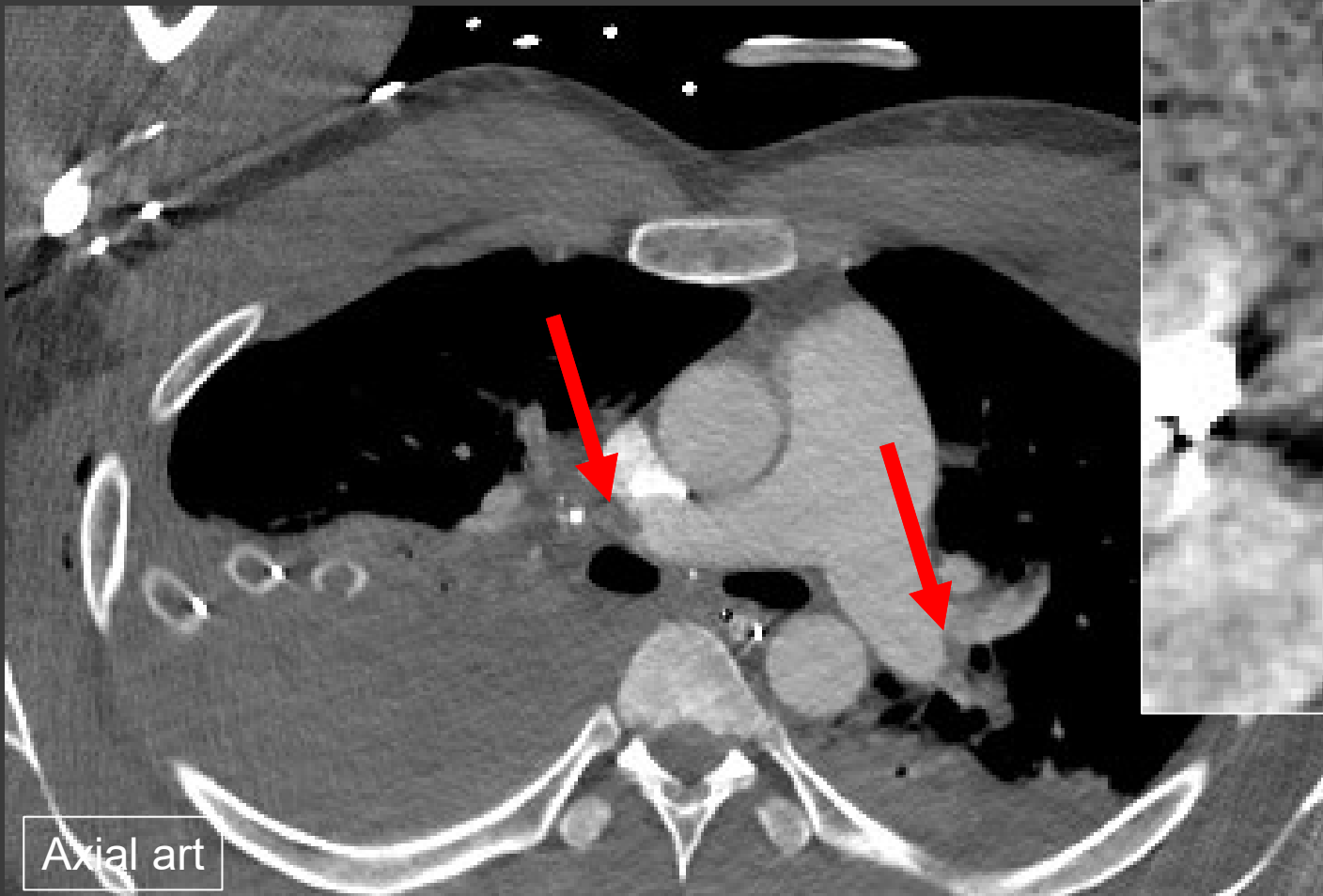
Case: 25 yom GSW to chest



Case: 25 yom GSW to chest

Post-traumatic pulmonary embolism

IVC injury with thrombus (zone 1)

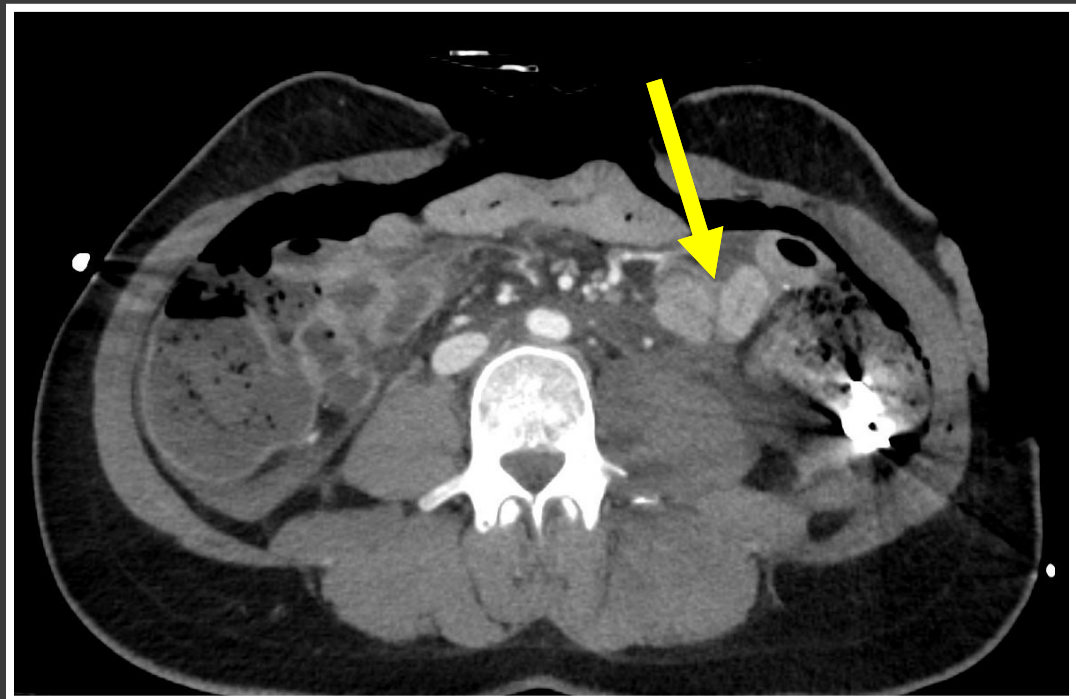
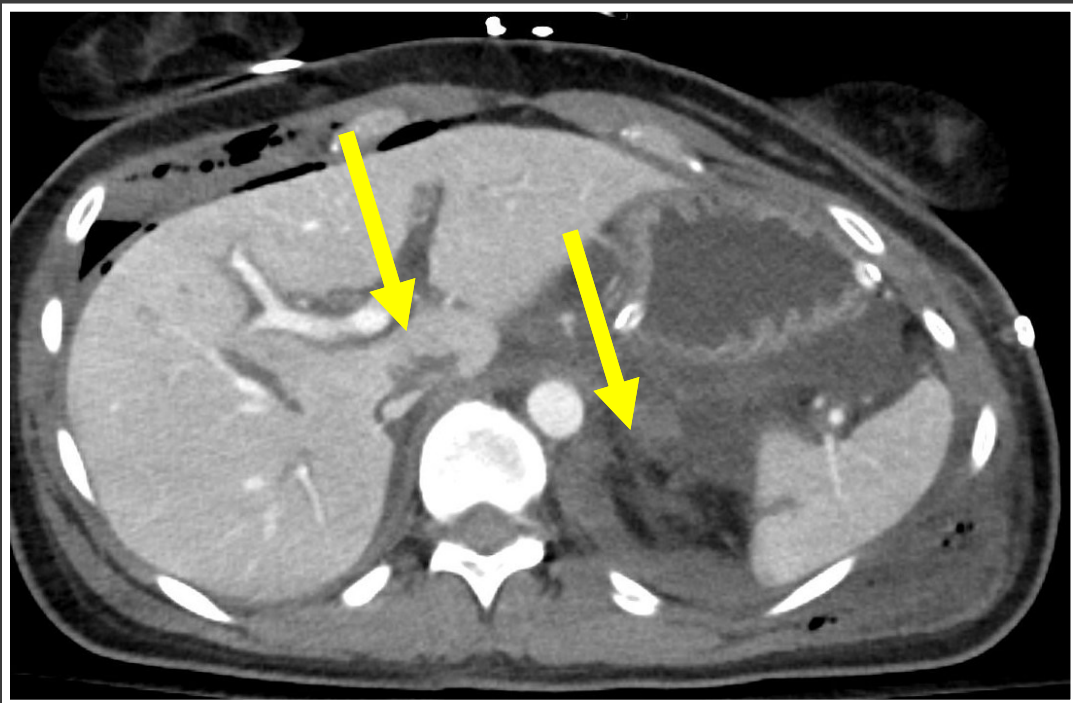
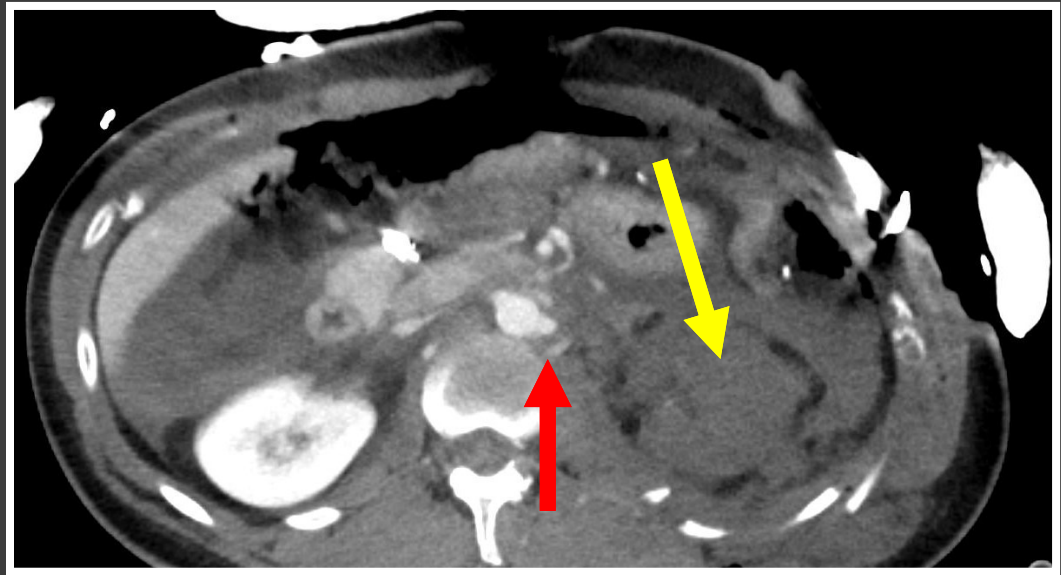
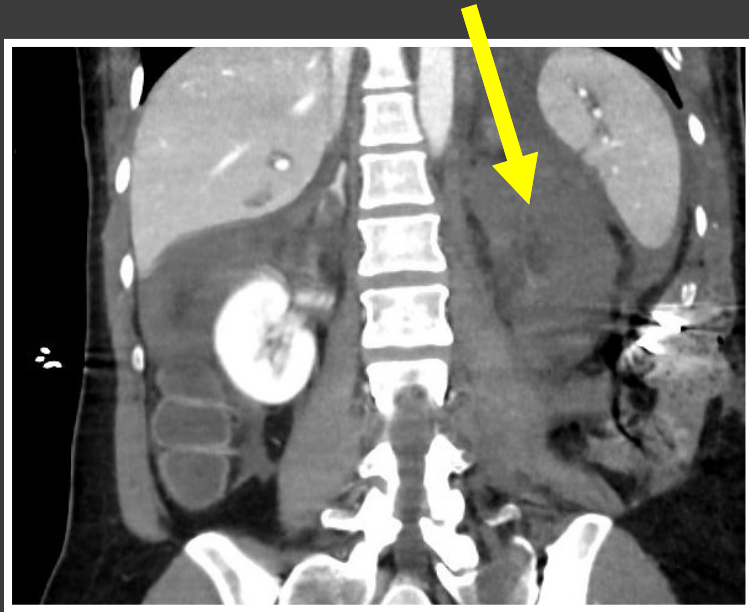


IVC INJURIES

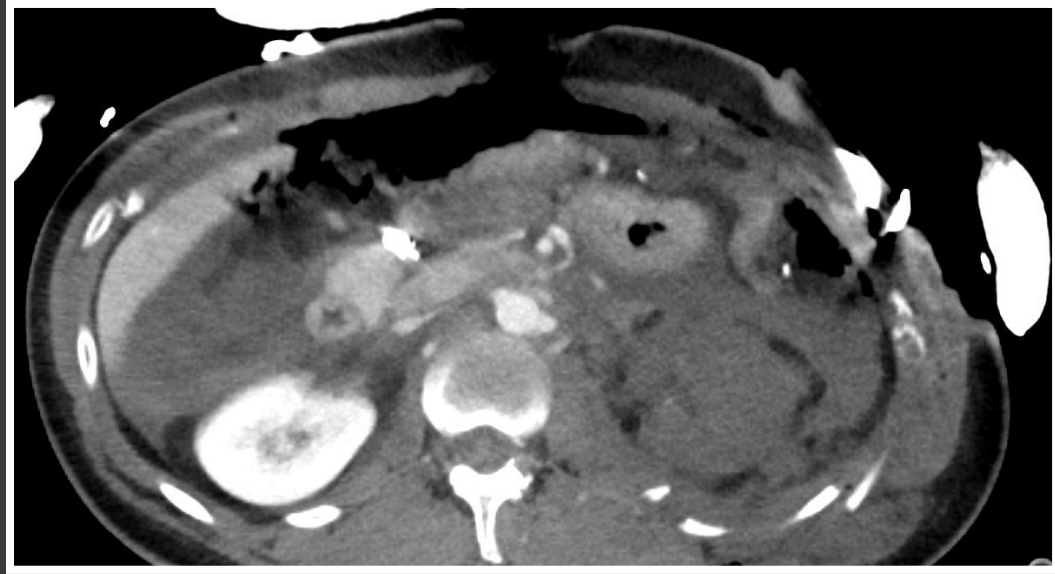
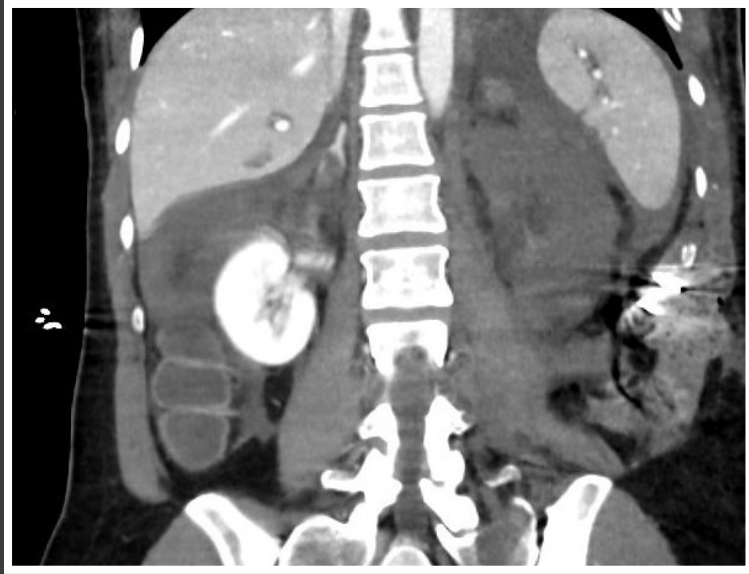
- Major veins of RP may be repaired.
 - IVC, SMV, iliac veins
 - Venous plexus in pelvis are NOT.
 - Kocher maneuver, right medial visceral rotation
- Exploration of retroperitoneum may be forgone
 - Low pressure system
 - Tamponade stops bleeding



40YOF
MVC



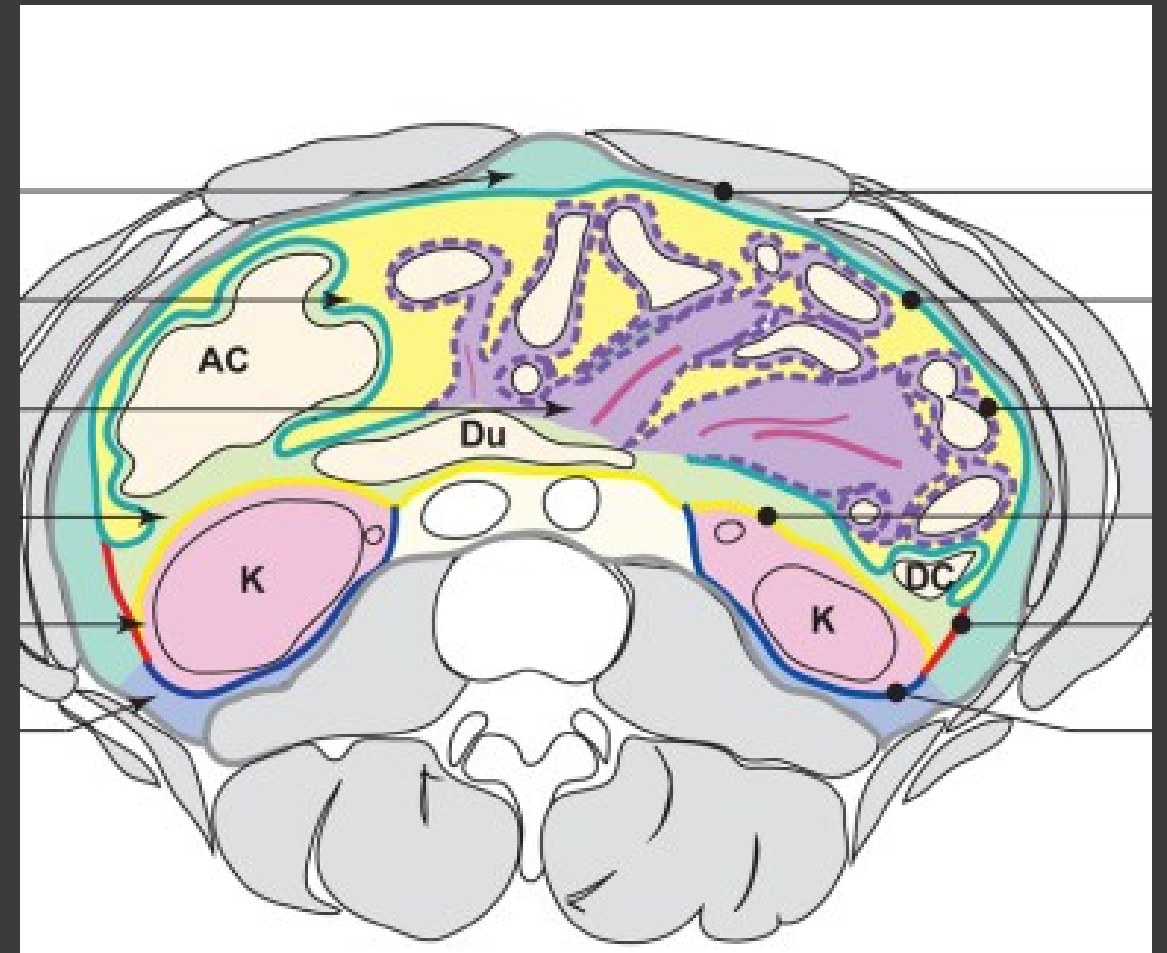
40YOF
MVC



- Most renal injuries are managed non-operatively
- Surgical intervention at exploration for organ salvage
- Renal embolization if renal parenchymal hemorrhage
- Consider stent of renal artery origin if dissection (salvage)

RETROPERITONEUM DAMAGE CONTROL SUMMARY

- CT after laparotomy can be confusing
- Focus on compartments which surgeon may not see on laparotomy
- Zones 1,2,3
- Fascial anatomy and spaces
- Vascular structures



Thank you!

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