Gut Punch: Pediatric Abdominal Trauma

Disclosures

None

FACTS ABOUT PEDIATRIC TRAUMA

More info: chnkeyclub.org

90% of these unintentional injuries CAN be prevented

Among children ages 14 and under, it is estimated that 40% of deaths and 50% of nonfatal unintentional injuries occur in and around the home.

Everyday, 39,000+ children are injured seriously enough to require medical care

Equalling to roughly 14 million children per year

Unintentional injury kills more children than any other cause

including disease, homicide, suicide, and more

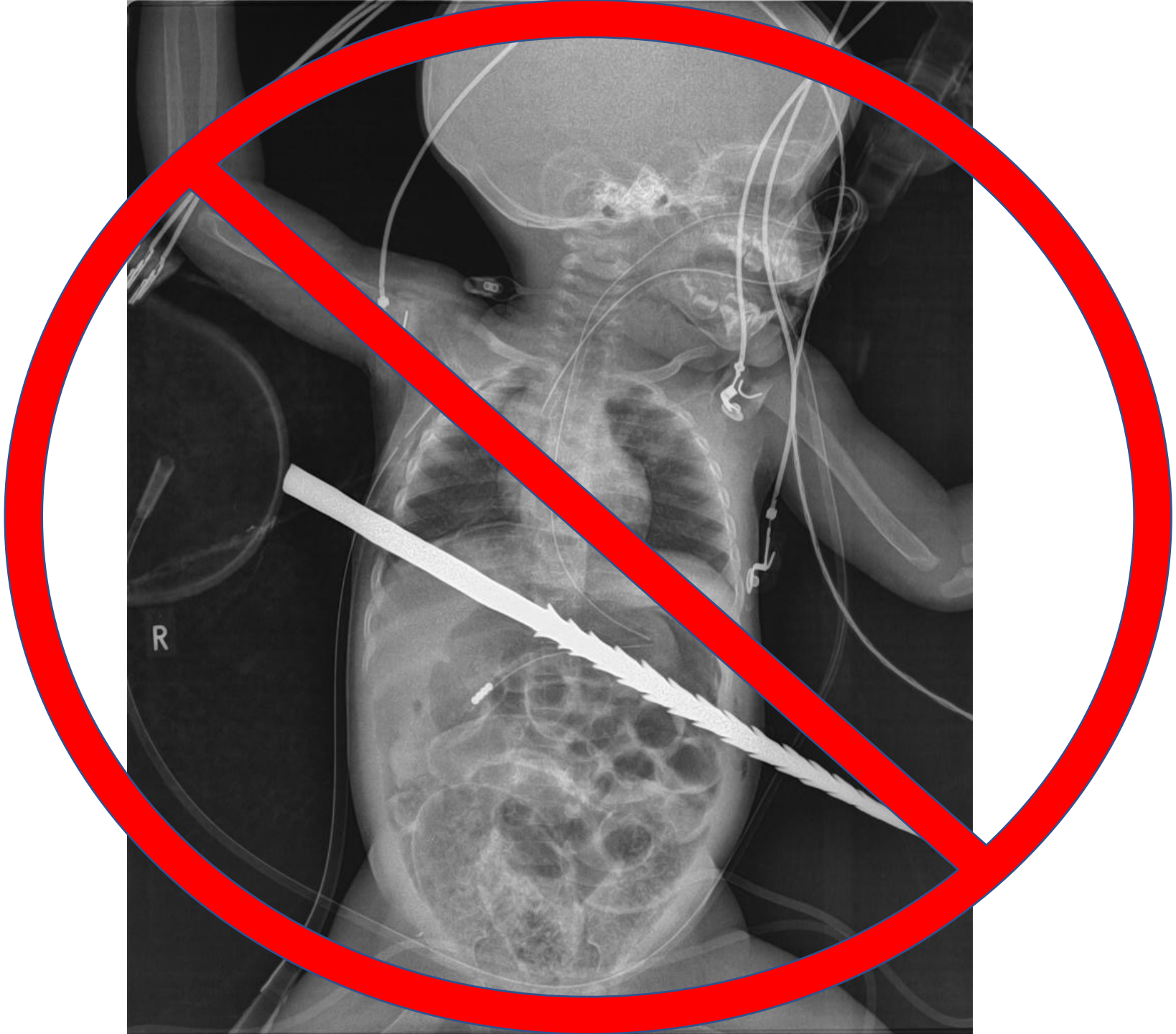
Children ages 4 and under are at greater risk, accounting for 45% of death among ages 14 and under

Majority of childhood injuries occur between

May and August

Mechanisms of Injury

- Motor vehicle crashes
- Falls
- Lap belt complex
- Sport injuries
- NAT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The NEW ENGLAND JOURNAL of MEDICINE

CORRESPONDENCE

Current Causes of Death in Children and Adolescents in the United States

April 20, 2022
DOI: 10.1056/NEJMc2201761

Guns Became Leading Cause of Death for Children and Teens in 2020

An analysis of CDC data found that gun-related injuries rose to the leading cause of death in the early days of the coronavirus pandemic.

Primary Survey – Early Life Threats

TheAlfred

Airway

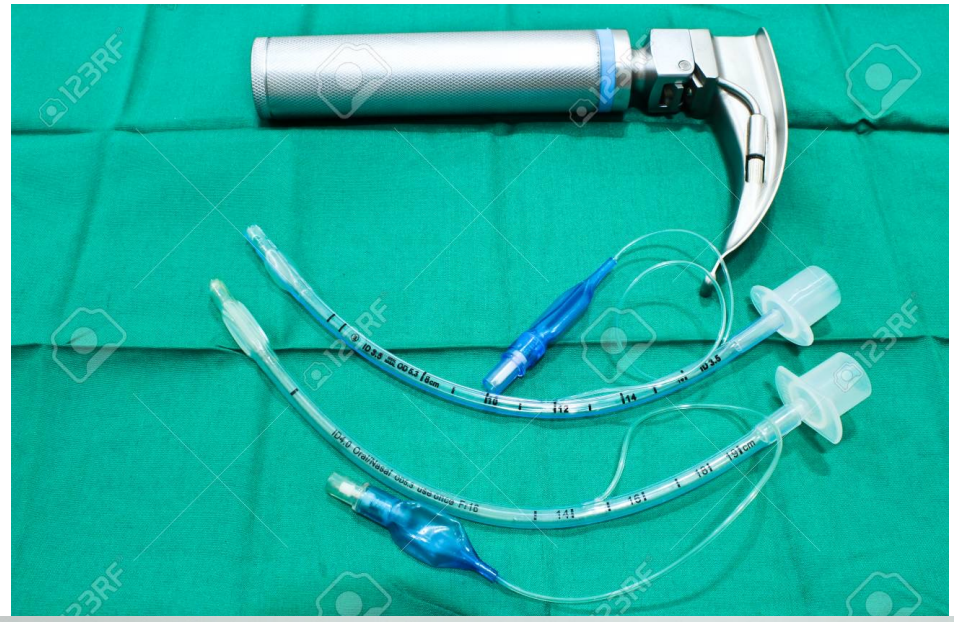
- Obstruction
- ↓GCS
- Airway injury

Breathing

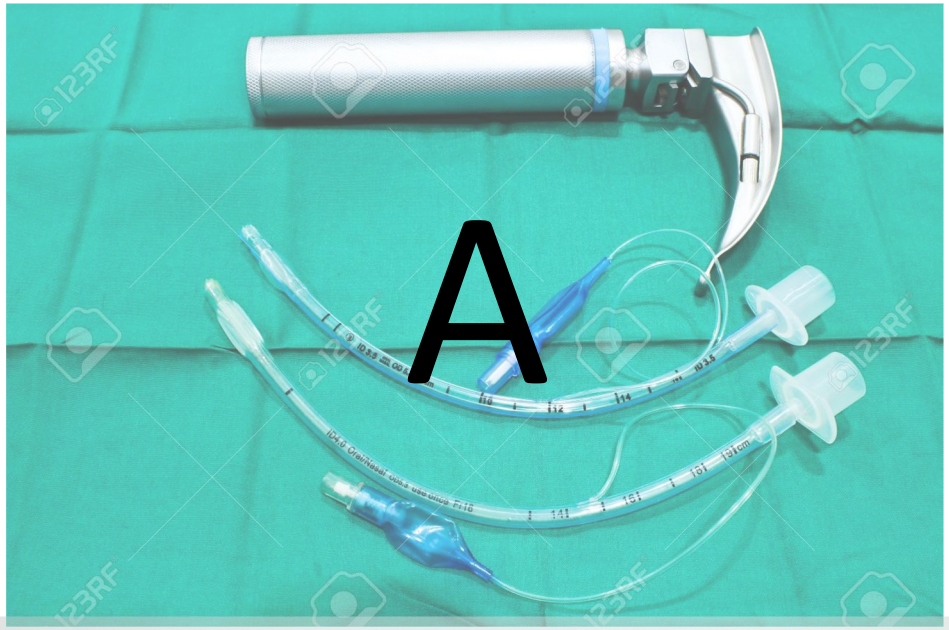
- Tension PTx
- Open PTx
- Flail
- Diaphragm rupture
- Ventilation failure

Circulation

- Haemorrhage
  - External
  - Concealed
- Tamponade
- Anaphylaxis
- Neurogenic shock




Video Courtesy of
UCSF Fresno, CA
EM:RAP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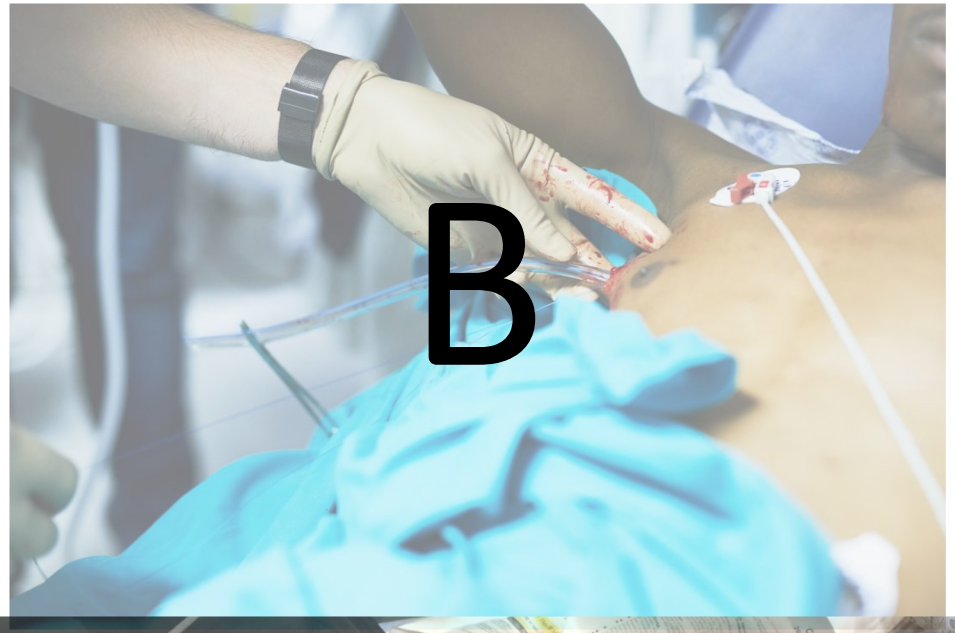
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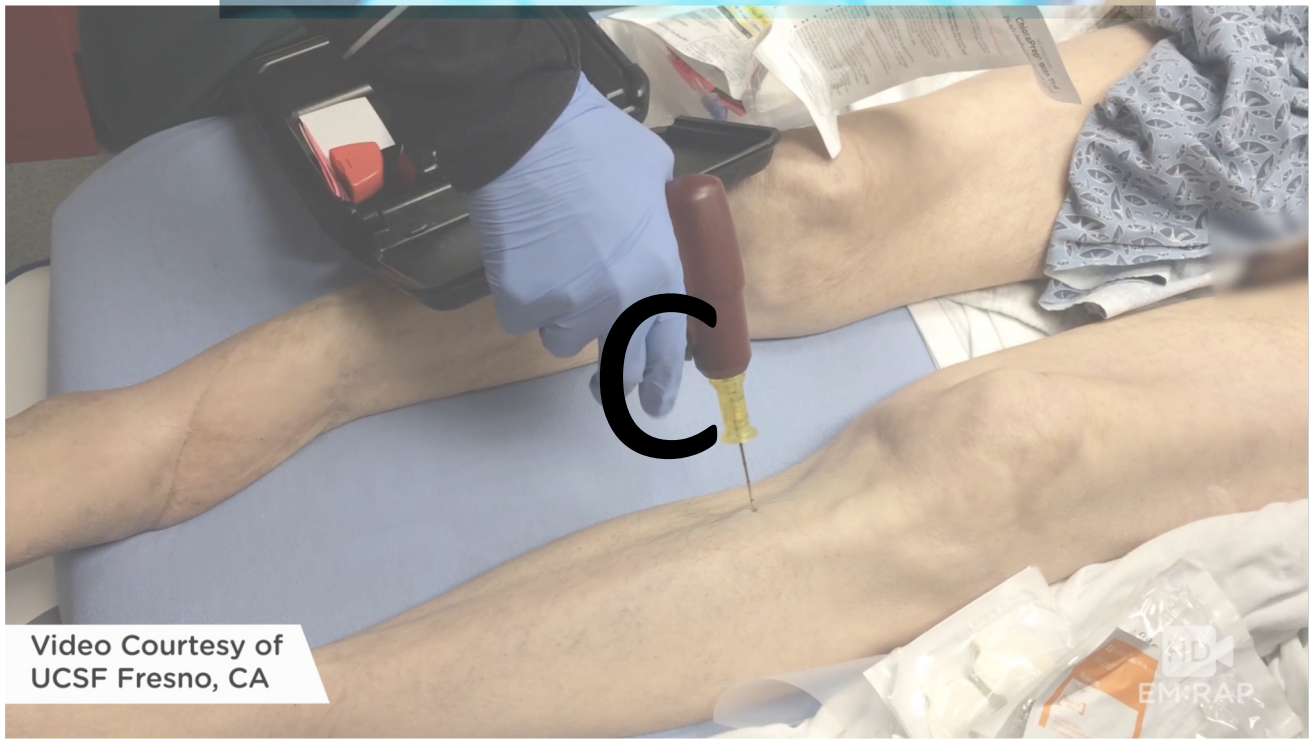

C
Video Courtesy of
UCSF Fresno, CA

Mythical reasons to CT prior to transfer

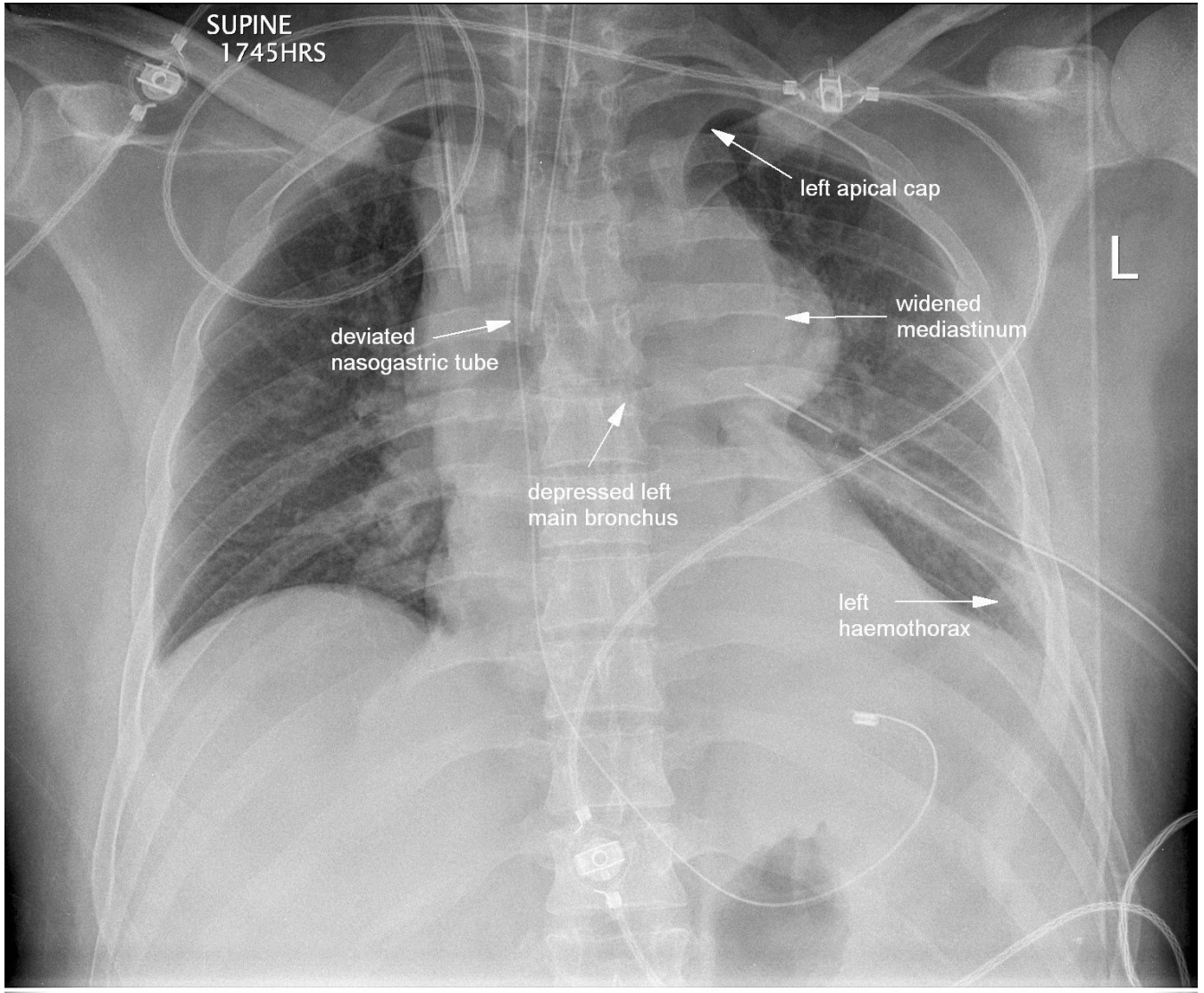
- The information will help me continue to manage the patient
- I should not transfer a patient without knowing all of the injuries involved
- It will make transfer safer
- It will help the receiving center care for the patient
- It will speed up the care at the receiving center

According to ATLS what is the only mandatory imaging necessary prior to transfer for ANY trauma patient?

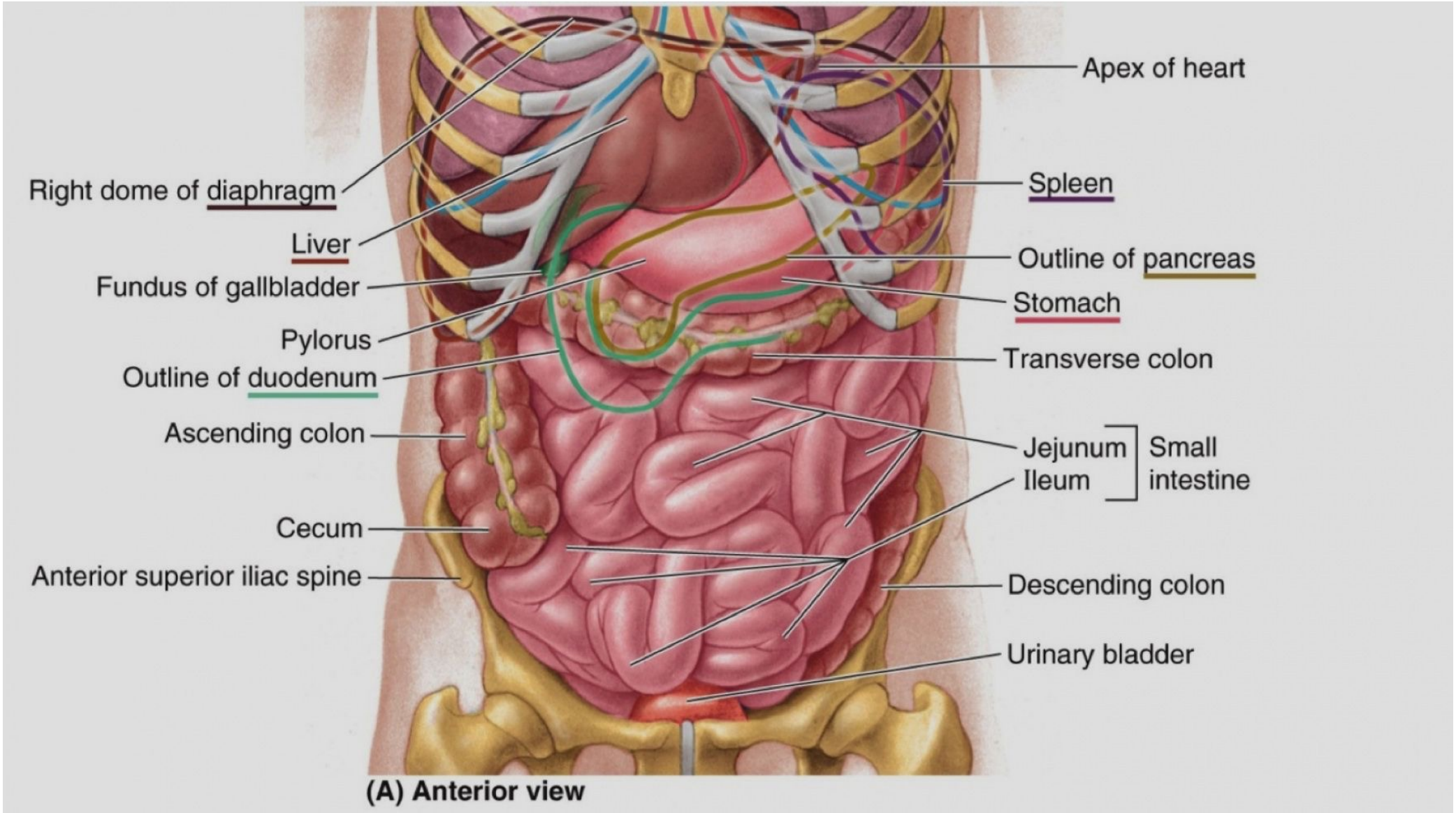
1. CT of the Head
2. CT of the chest and abdomen
3. Plain cervical spine films
4. Plain films of the pelvis
5. Plain AP chest x-ray

According to ATLS what is the only mandatory imaging necessary prior to transfer for ANY trauma patient?

5. Plain AP chest x-ray

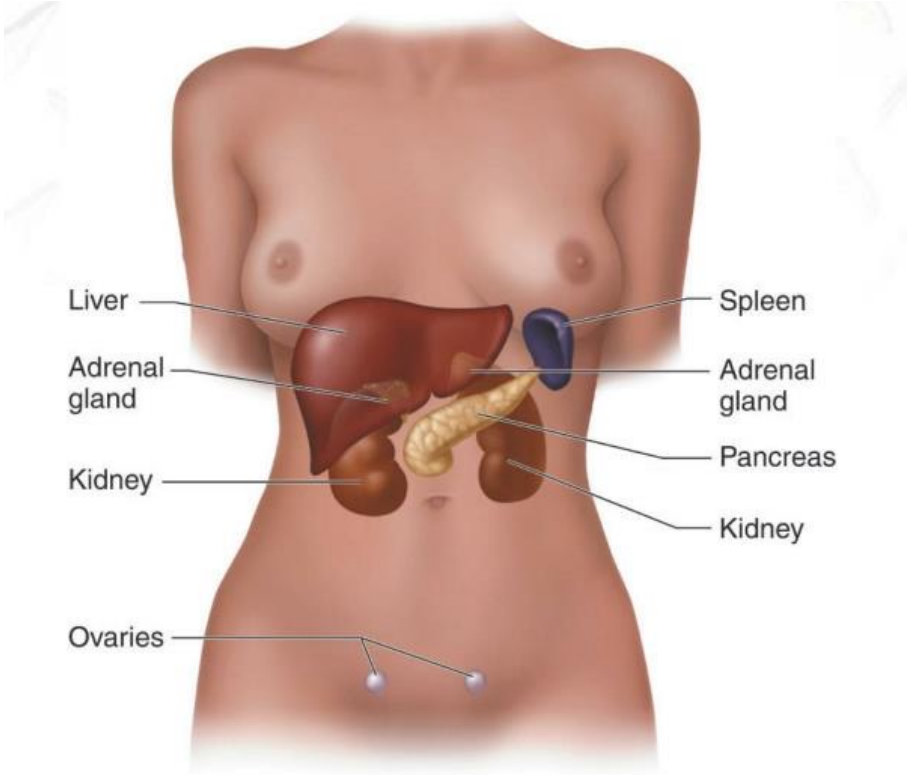


What could be injured?

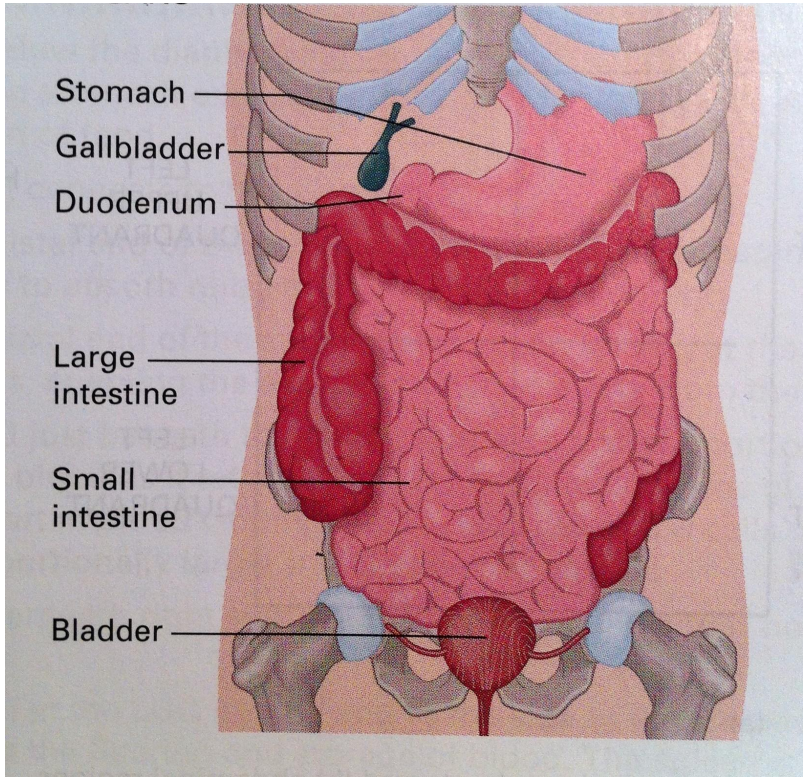


What could be injured?

Solid organs



Hollow organs

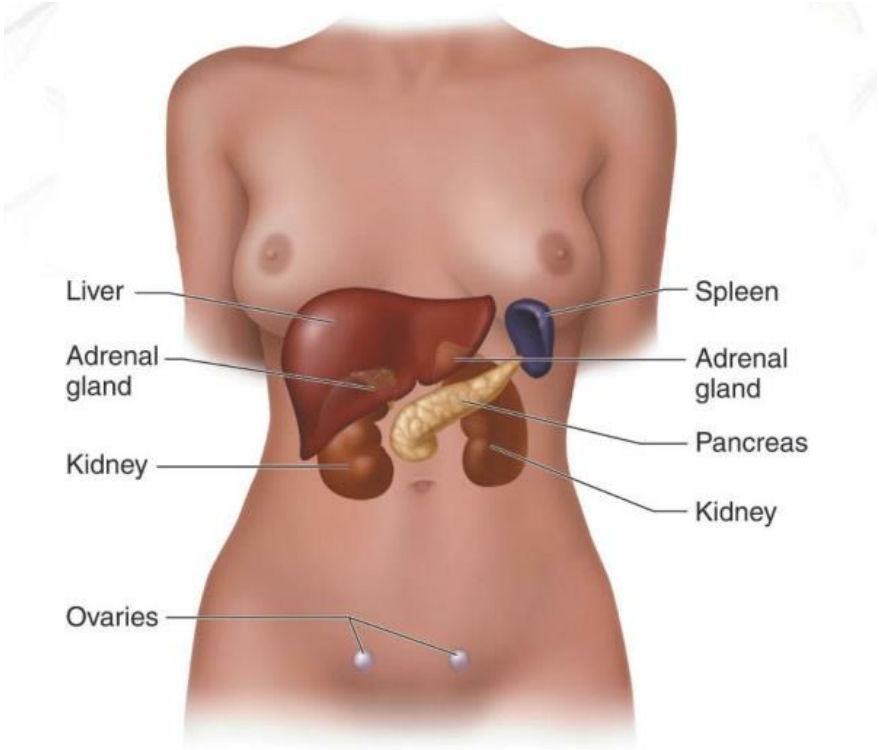


What could be injured?

Solid organs

Far More *Commonly* injured

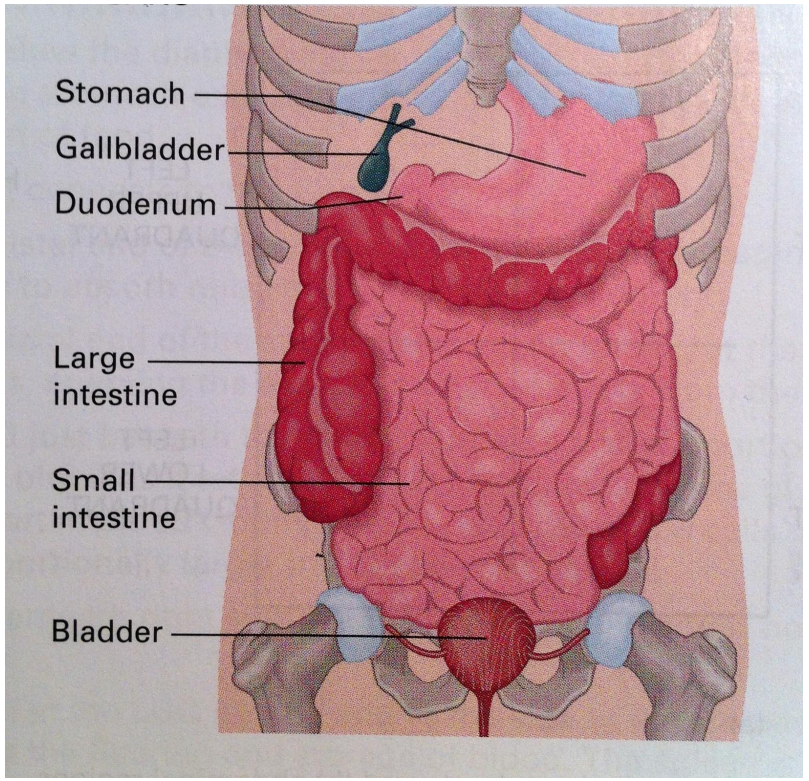
Potential early threat



Hollow organs

***Uncommonly* injured**

Usually a delayed threat

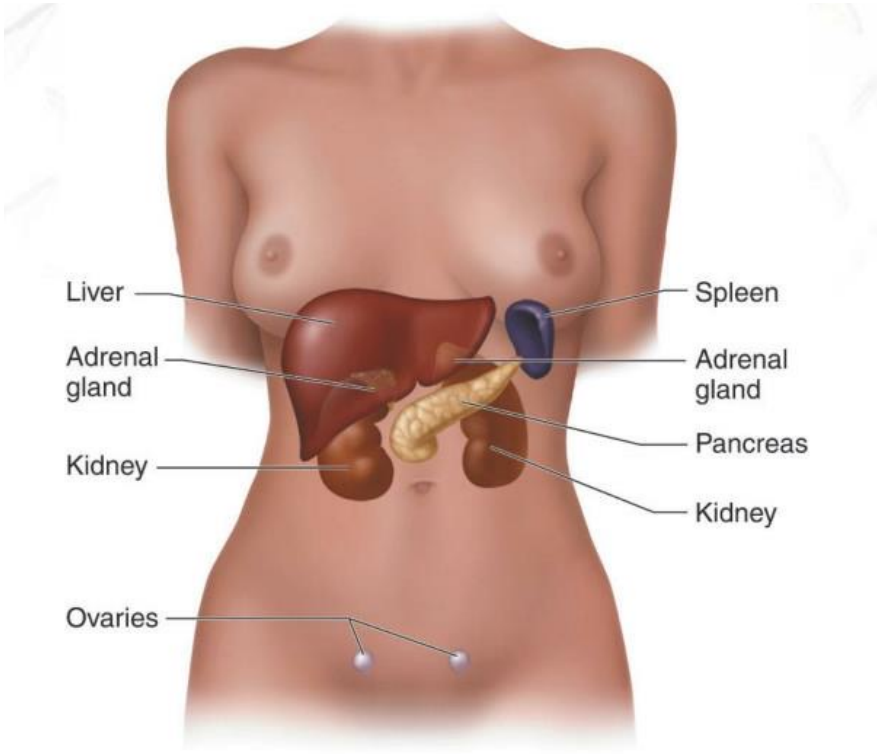


What could be injured?

Solid organs

Can be immediately identified by CT (Pancreas excepted)

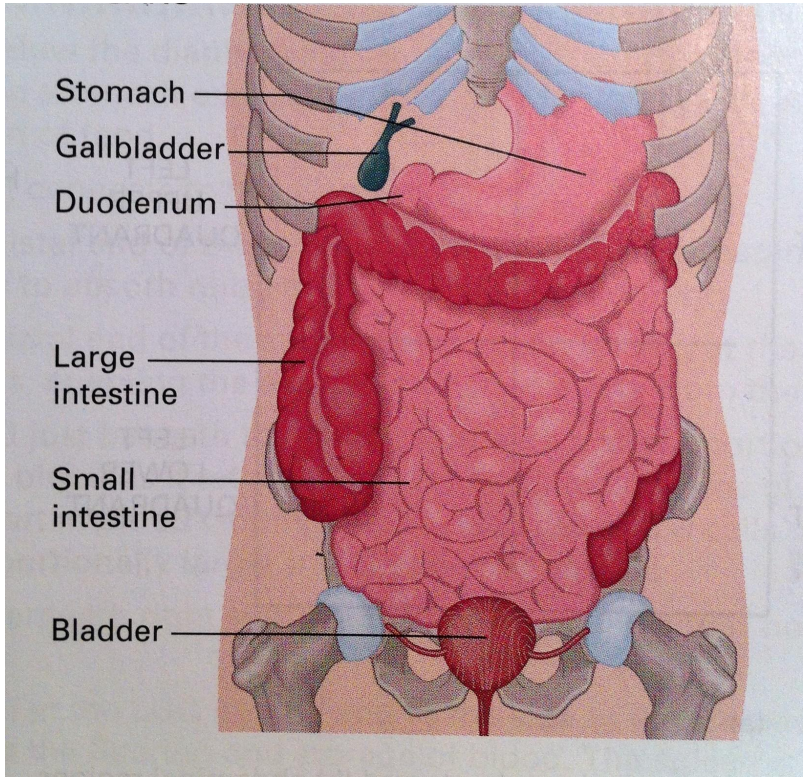
Rarely requires operation



Hollow organs

Challenging Imaging diagnosis. (false negatives common)

Almost always requires operation



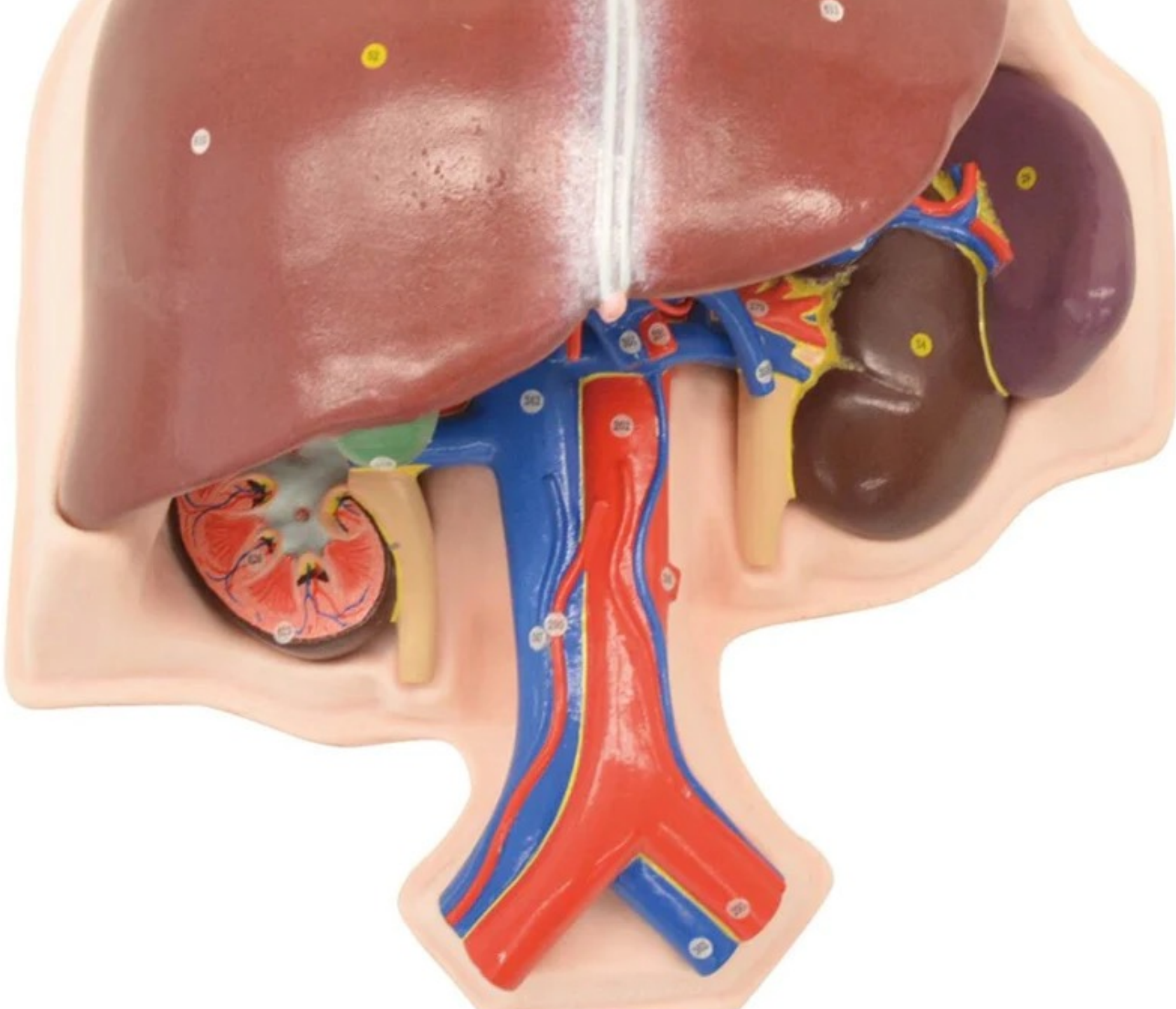
Immediate issue with solid organ injury

- Bleeding*

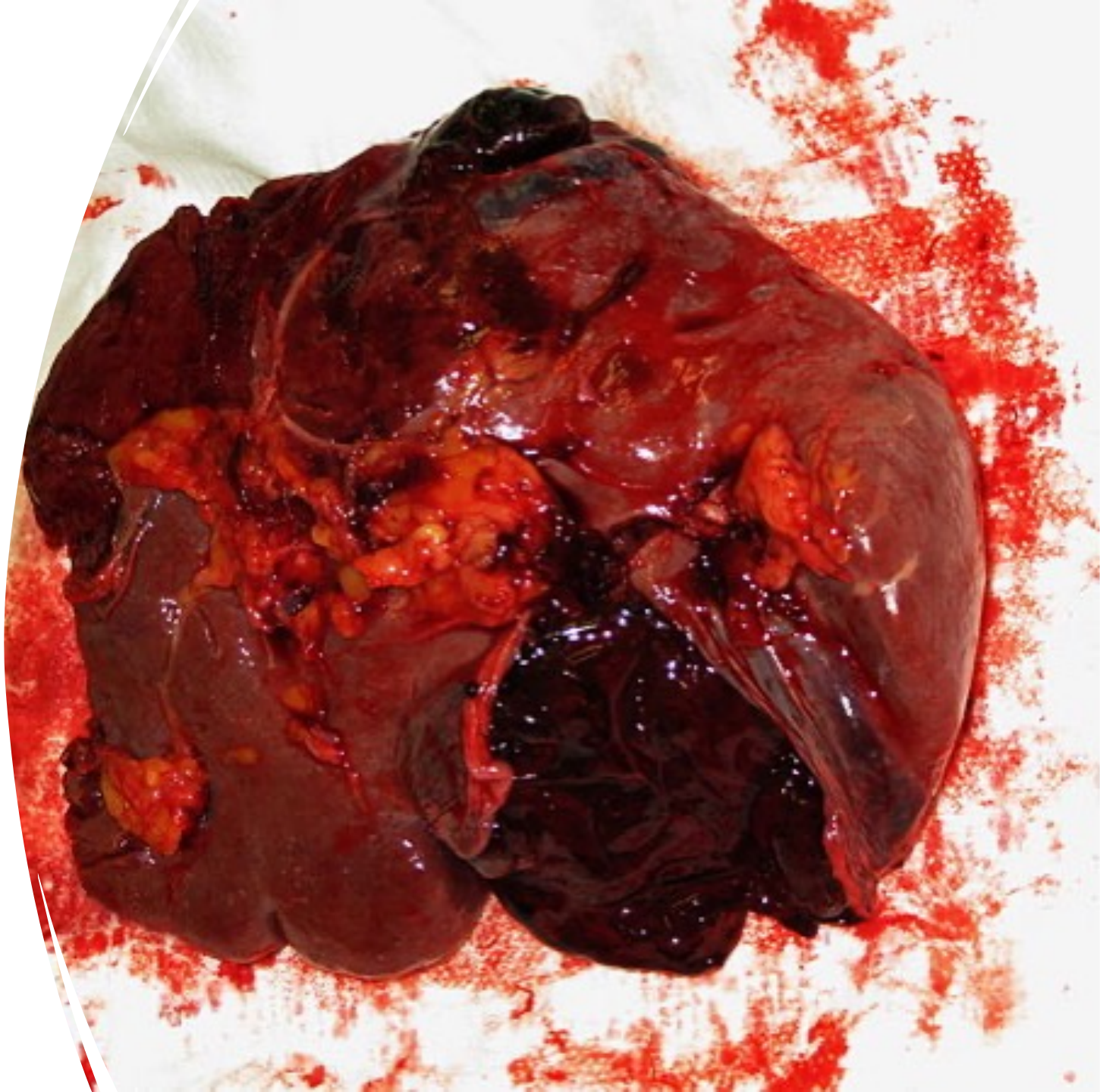
*Pancreas is exception


KEEP
CALM
AND
REMEMBER
ATLS

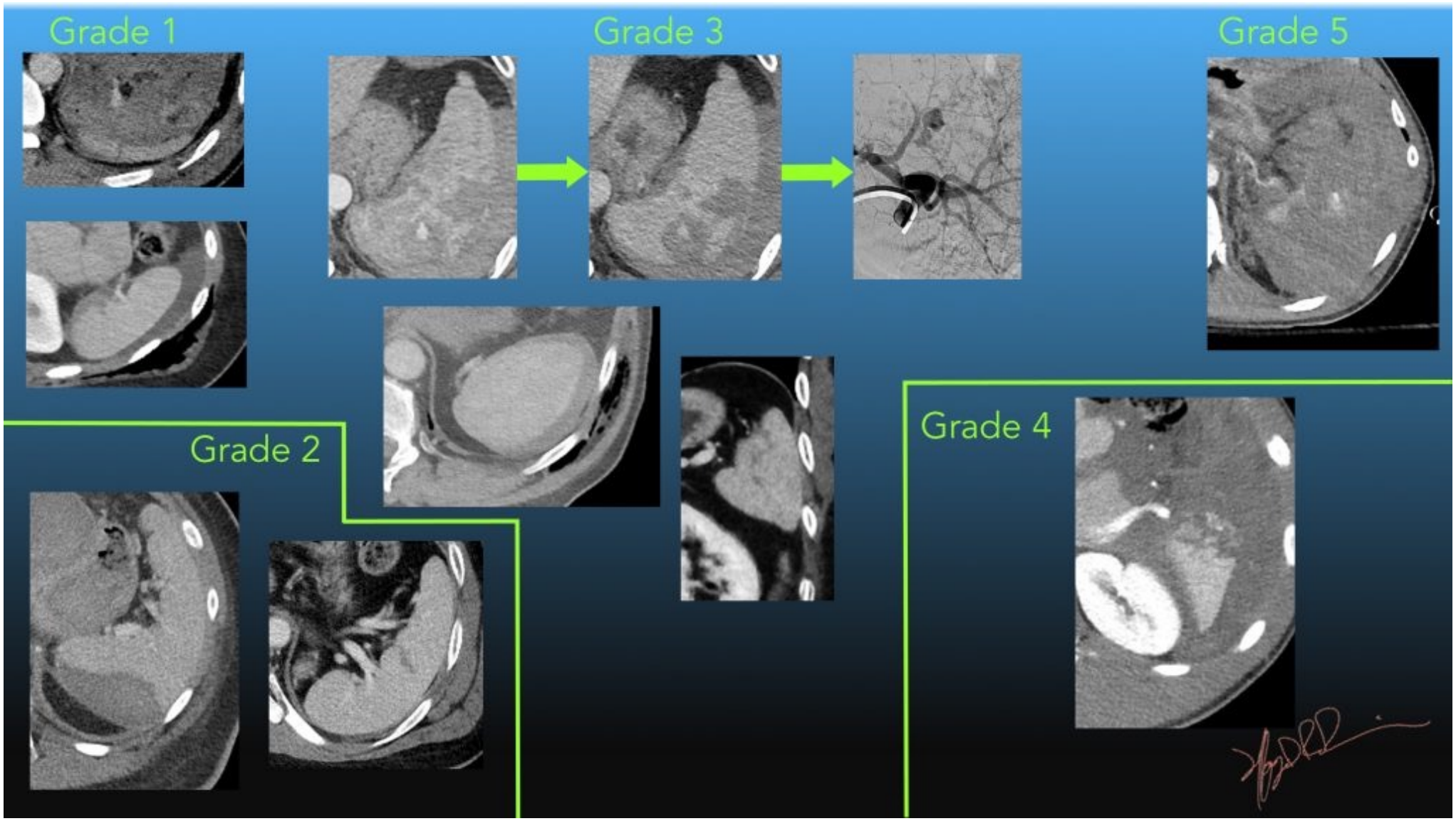
Liver, Spleen, and Kidney



Splenic Laceration



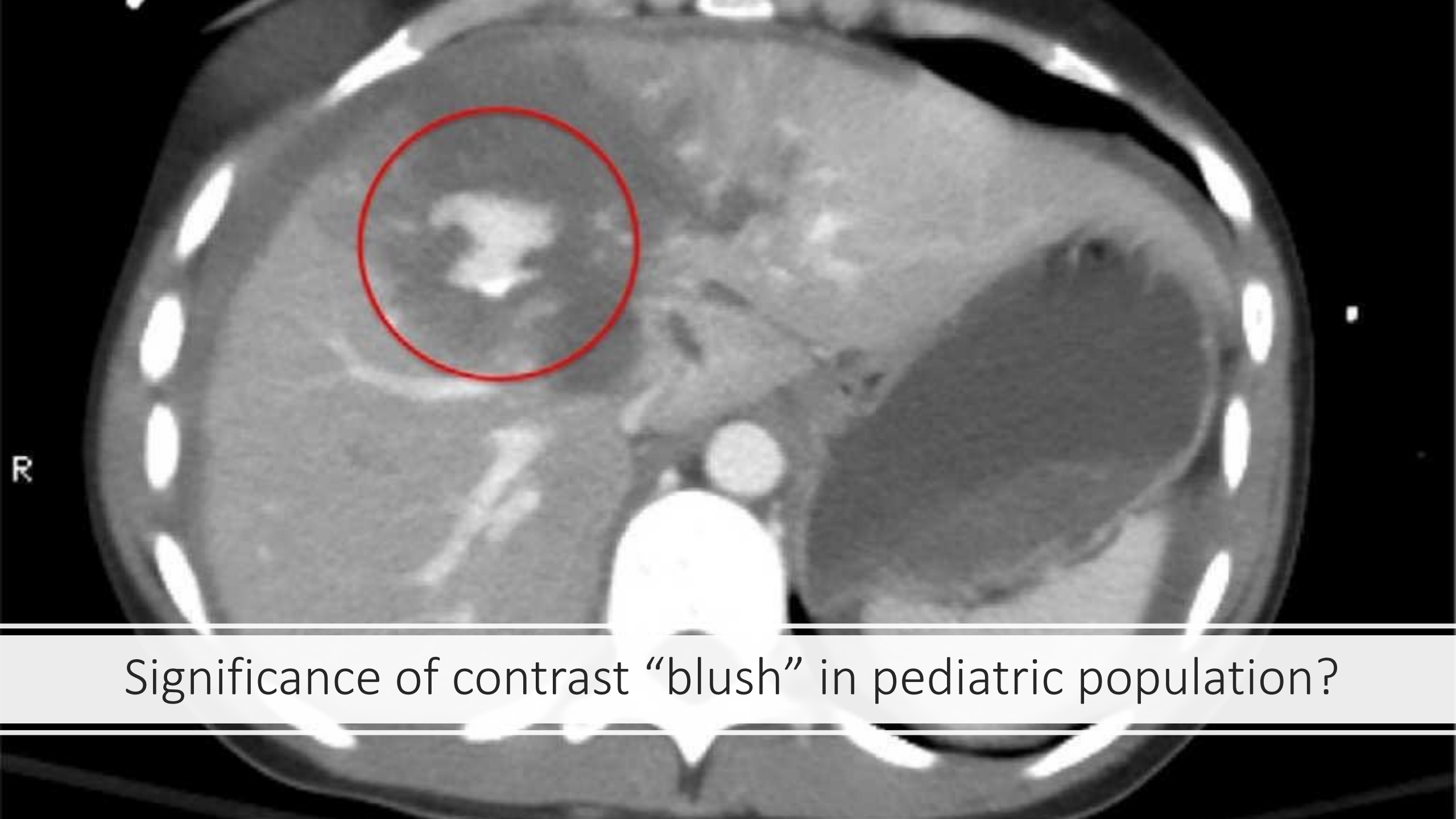
Spectrum of Splenic Injuries



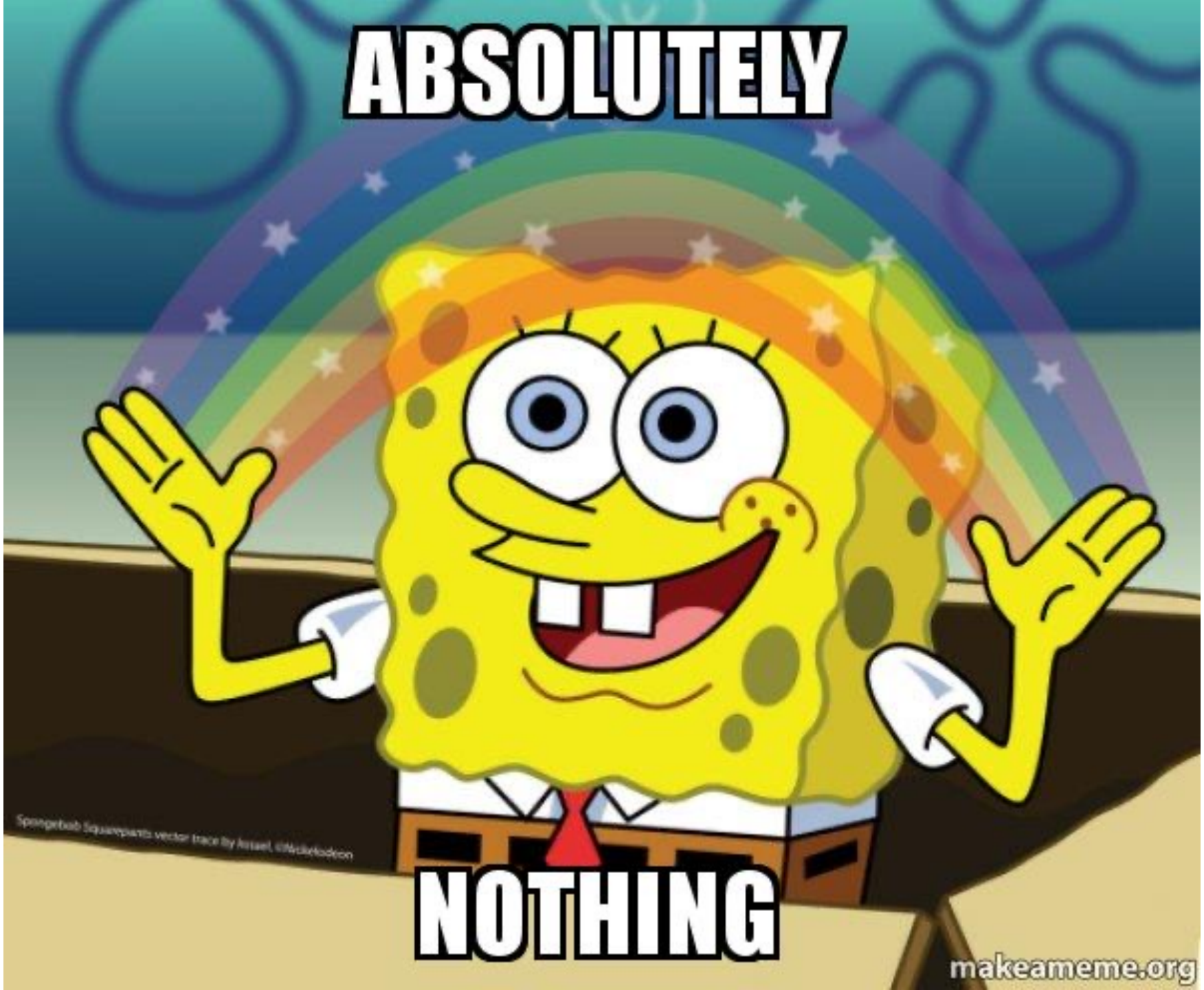
Grade[a]	Type	Description of Injury
1	Hematoma	Subcapsular, < 10% surface area
	Laceration	Capsular tear, < 1 cm parenchymal depth
2	Hematoma	Subcapsular, 10–50% surface area
		Intraparenchymal, < 5 cm in diameter
	Laceration	1–3 cm parenchymal depth; does not involve a trabecular vessel
3	Hematoma	Subcapsular, > 50% surface area or expanding; ruptured subcapsular or parenchymal hematoma
	Laceration	> 3 cm parenchymal depth or involved trabecular vessels
4	Laceration	Laceration involving segmental or hilar vessels and producing major devascularization (> 25% of spleen)
5	Laceration	Completely shattered spleen
	Vascular	Hilar vascular injury that devascularizes spleen

Note—Adapted with permission from [2].

[a]Advance one grade for multiple injuries up to grade 3. The American Association for the Surgery of Trauma uses roman numerals.



Significance of contrast “blush” in pediatric population?


ABSOLUTELY
NOTHING
makeameme.org

Splenectomy, or removal of the spleen, is commonly necessary for the management of splenic injury in children?

1. True
2. False

Splenectomy, or removal of the spleen, is commonly necessary for the management of splenic injury in children?

2. False

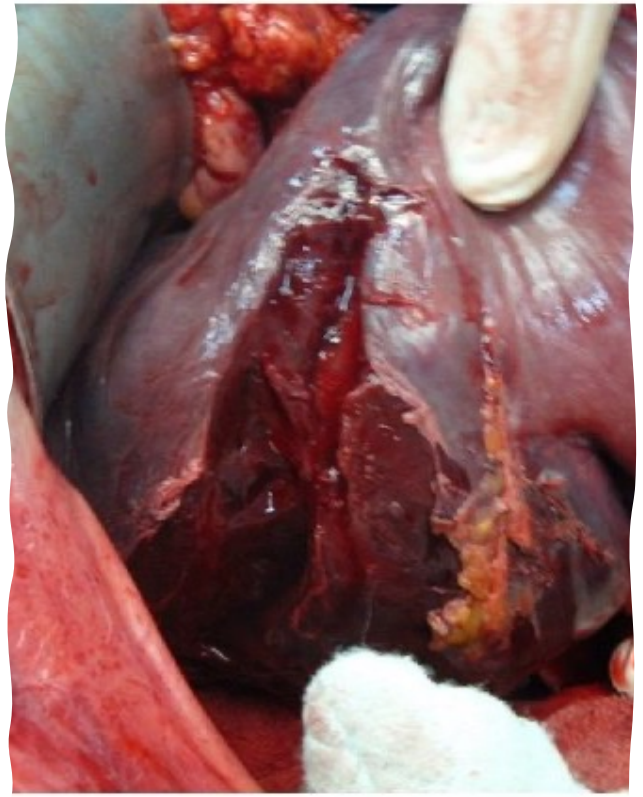
Solid Organ Solution

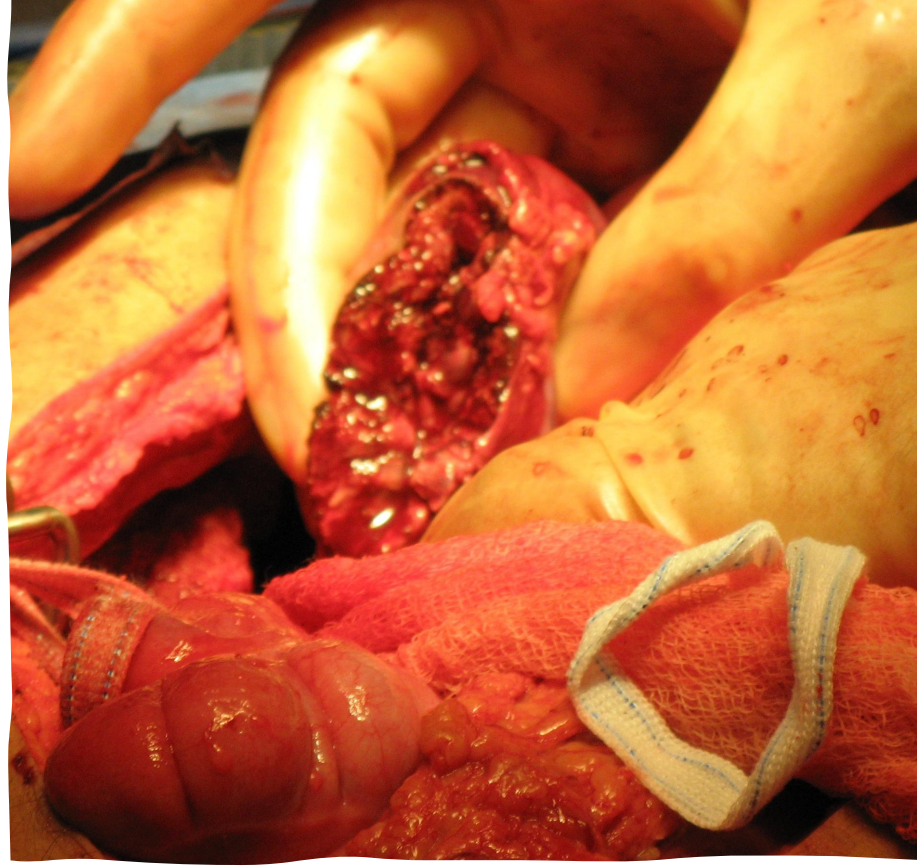
- Transfusion

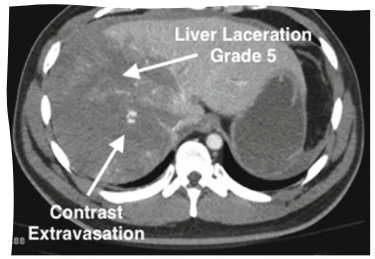
Late Sequelae of Splenic Laceration

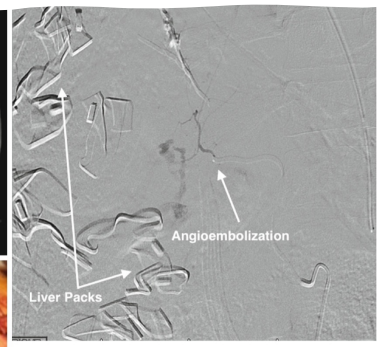
- Very Few
  - *If splenectomy not performed*
  - *Rare splenic cyst*

Liver Laceration





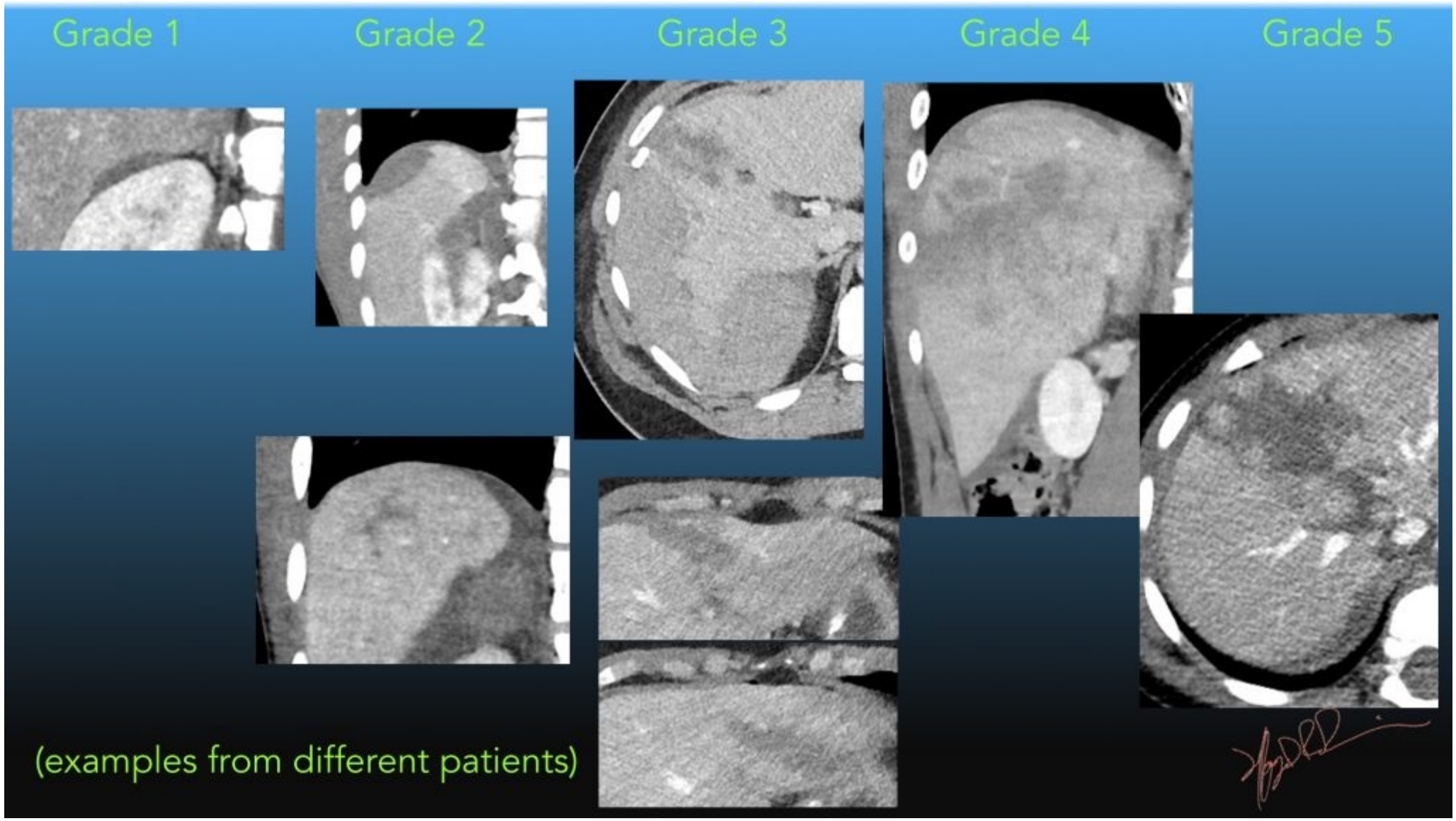




Grade	Injury type	Injury description
I	Haematoma	Subcapsular <10 % surface
	Laceration	Capsular tear <1 cm parenchymal depth
II	Haematoma	Subcapsular 10–50 % surface area; intraprenchymal, <10 cm diameter
	Laceration	1–3 cm parenchymal depth, <10 cm in length
III	Haematoma	Subcapsular >50 % surface area or expanding, ruptured subcapsular or parenchymal haematoma. Intraprenchymal haematoma >10 cm
	Laceration	>3 cm parenchymal depth
IV	Laceration	Parenchymal disruption 25–75 % of hepatic lobe
	Vascular	Juxtavenous hepatic injuries i.e. retrohepatic vena cava/centrl major hepatic veins
VI	Vascular	Hepatic avulsion

Advance one grade for multiple injuries up to grade III
AAST liver injury scale (1994 revision)

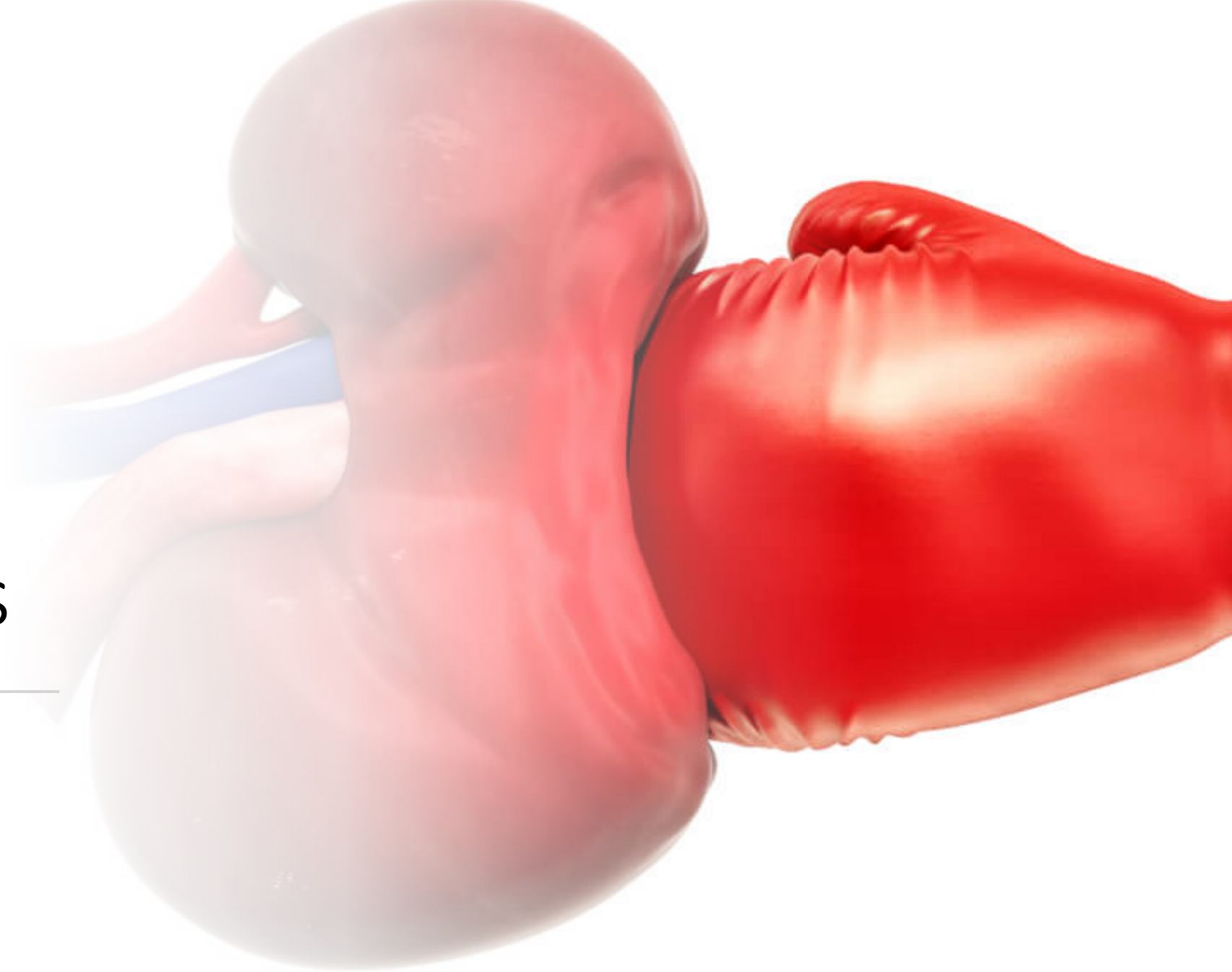
Spectrum of Liver Injuries

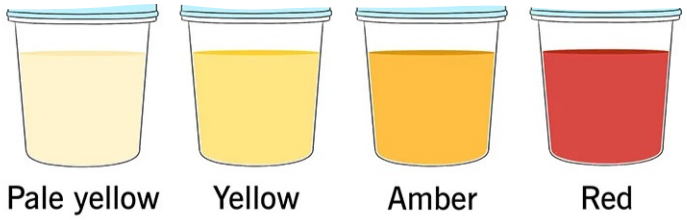


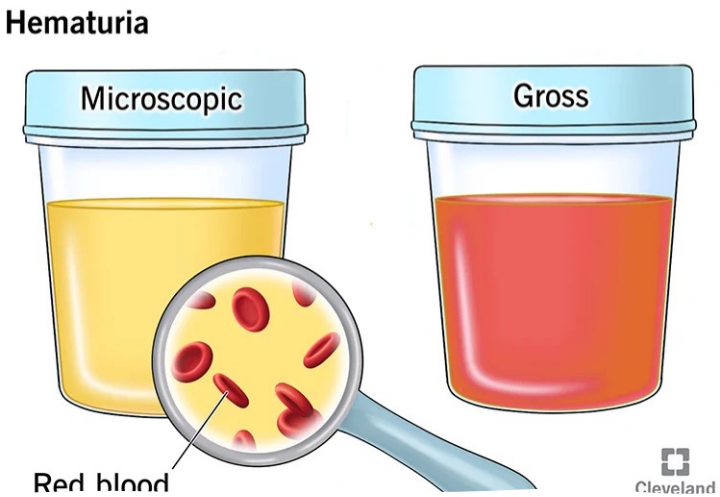
Liver injuries-special considerations

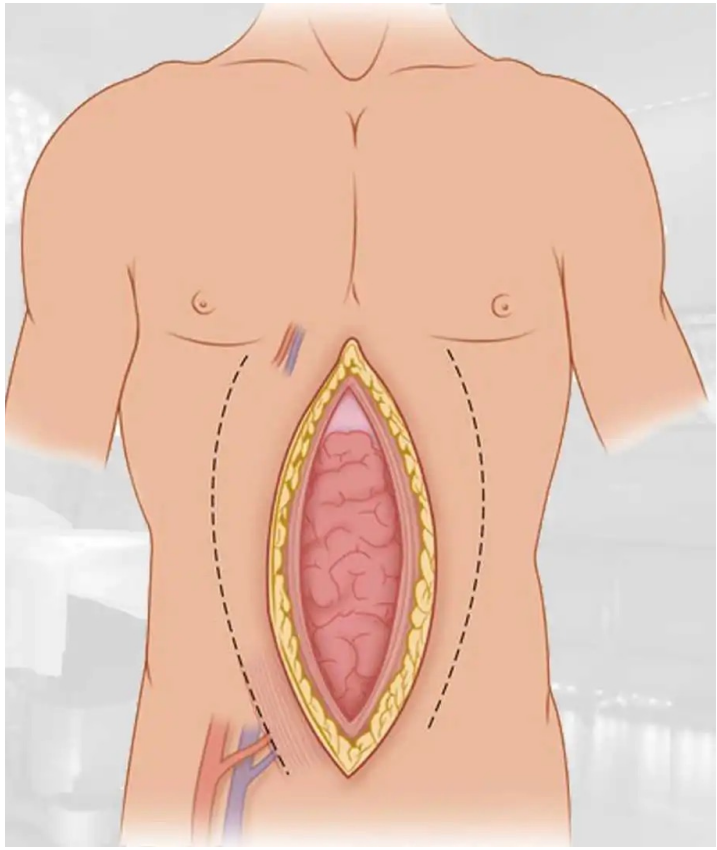
- Possible ductal injury – Common bile duct
- Prolonged bile leak
- Hepatic necrosis
  - Common after embolization procedures
- Hemobilia
  - arterio-biliary or porto-biliary fistula
    - ➢Presents as a GI bleed with jaundice and RUQ pain

Kidney injuries



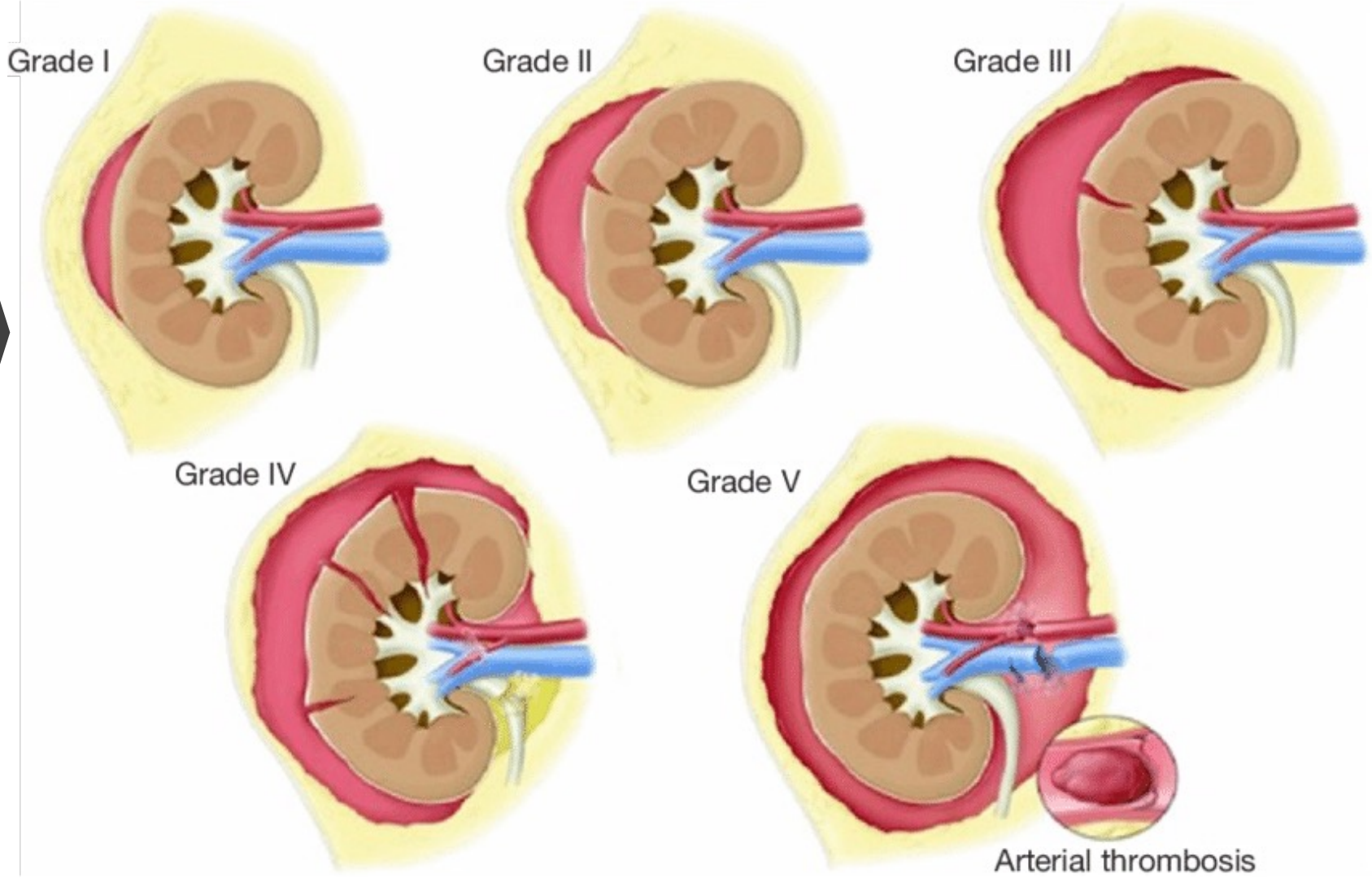

Pale yellow
Yellow
Amber
Red


Hematuria
Microscopic
Gross
Red blood
Cleveland

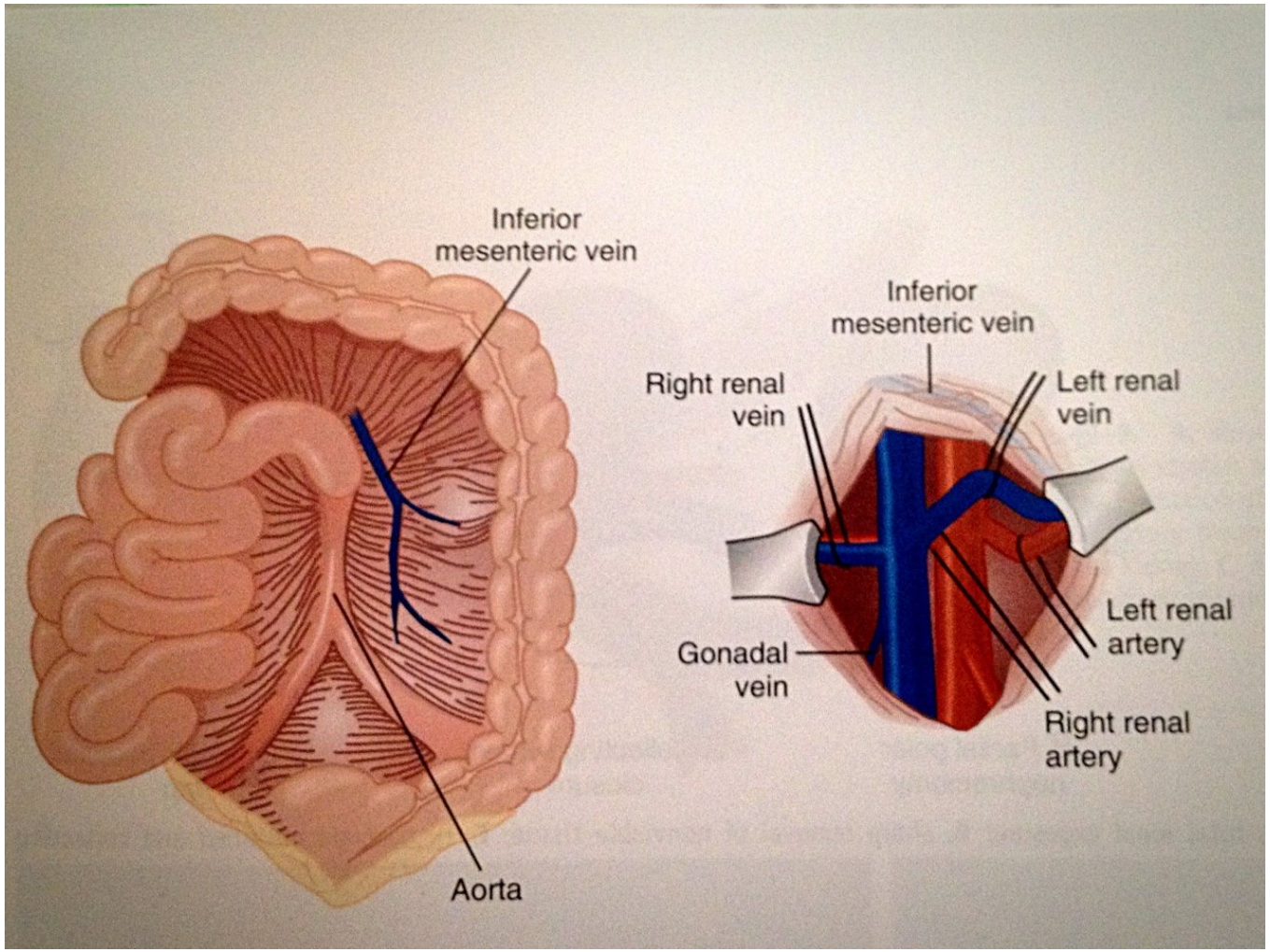


Diagnosis

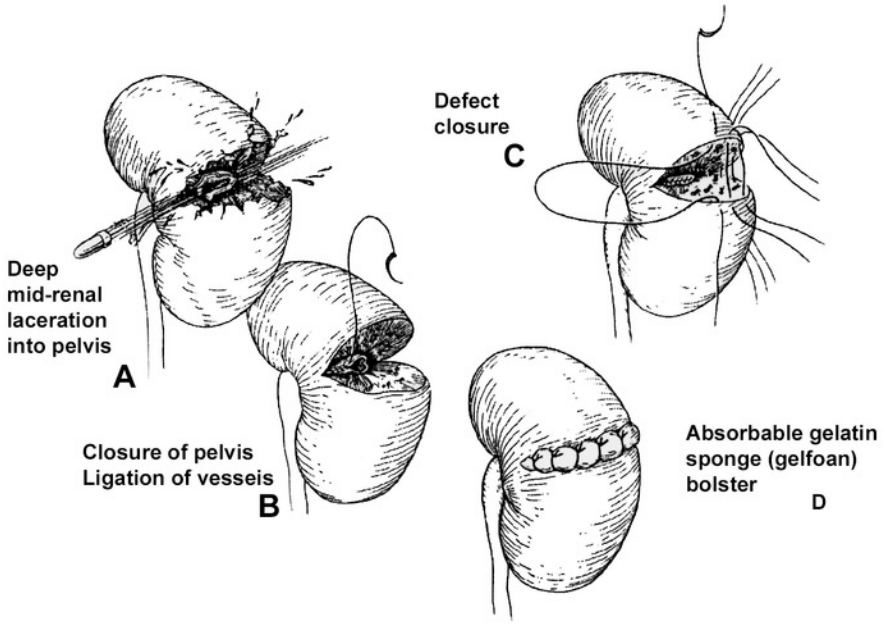
Kidney injury Grading



Vascular injury = attempt at revascularization



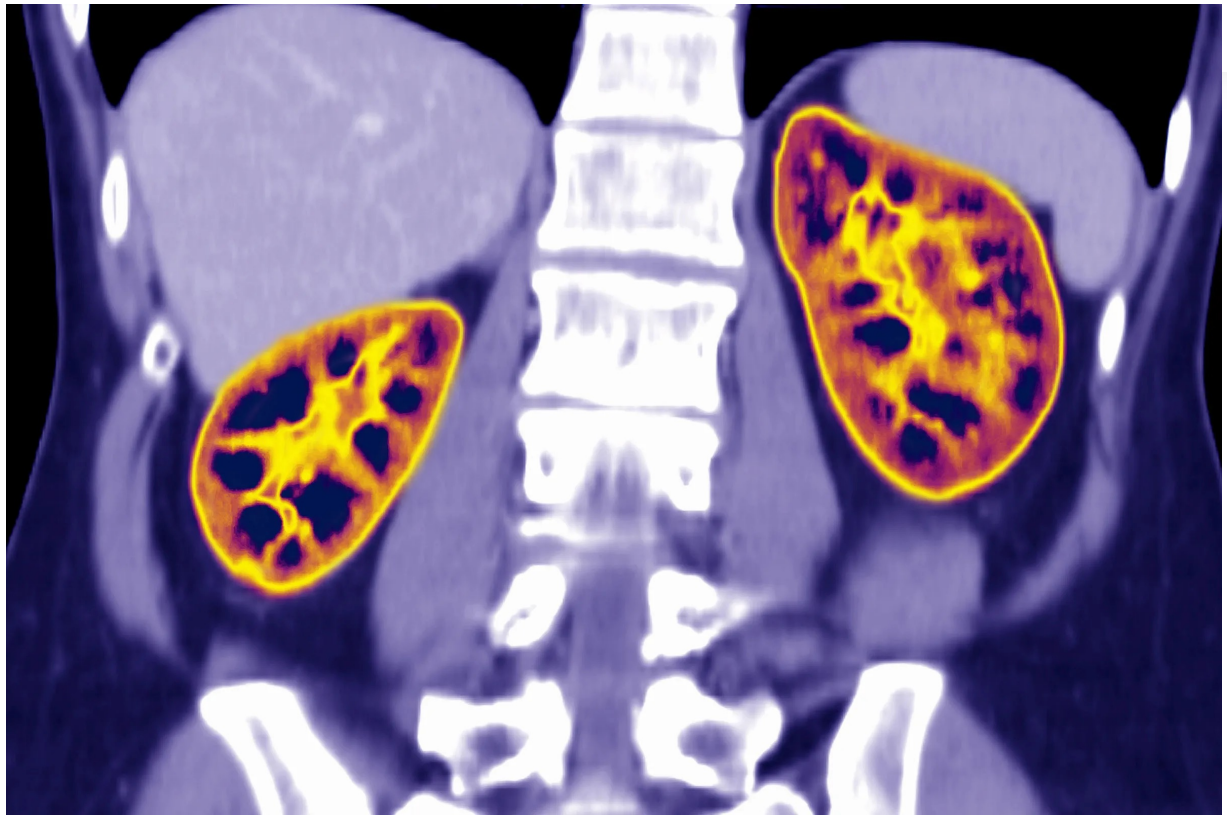
Warm ischemia time gives about 4 hours for potential salavage



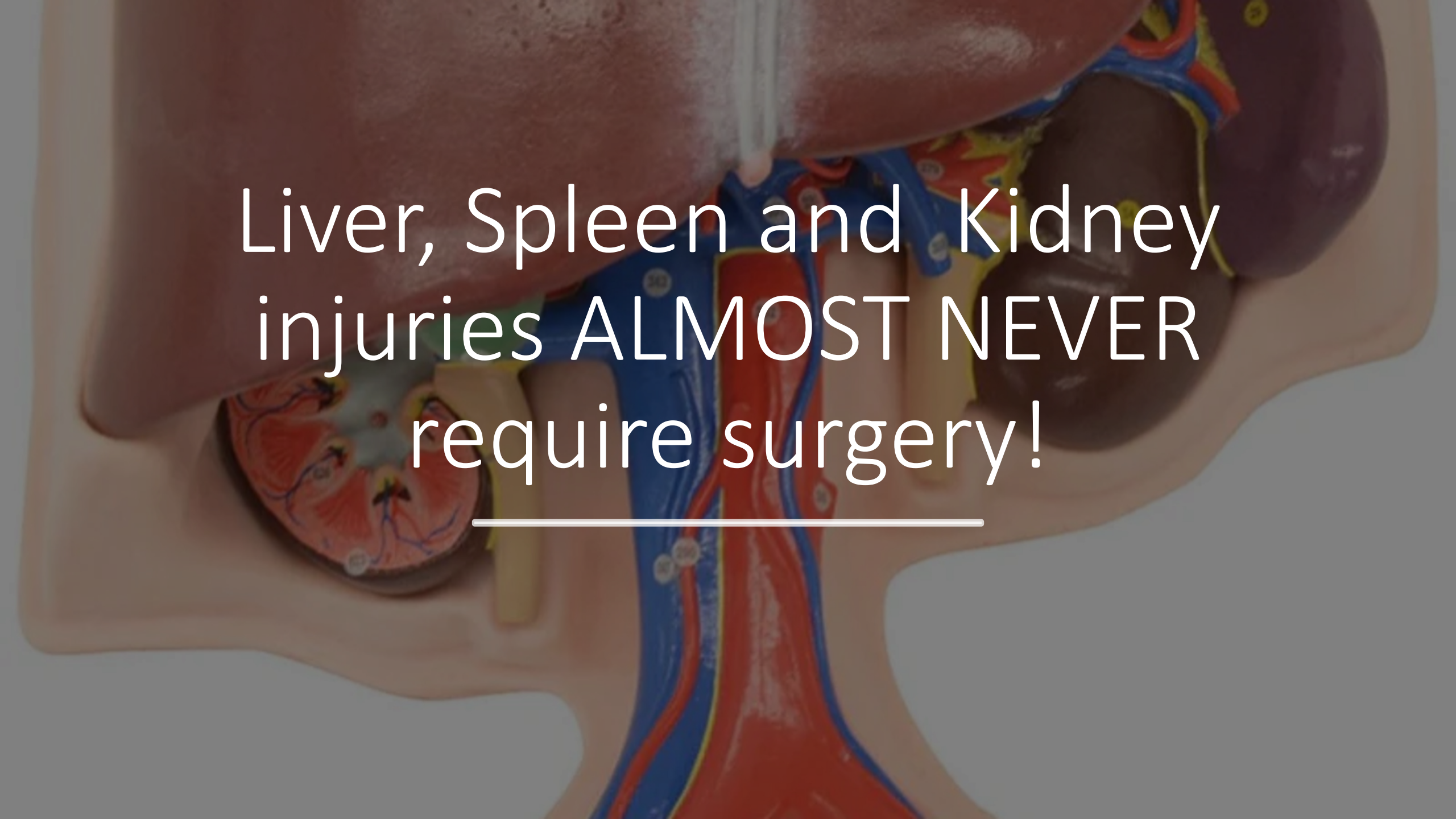
Treatment

- Almost all NON-operative
- Partial nephrectomy/closure of laceration
- Nephrectomy

Late consequences

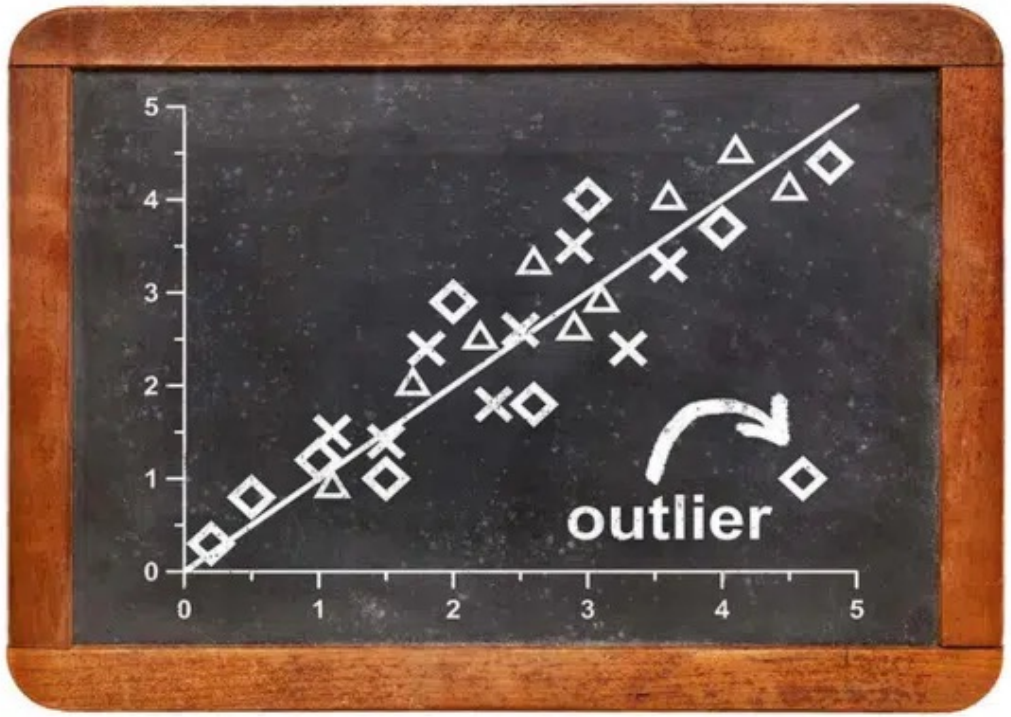


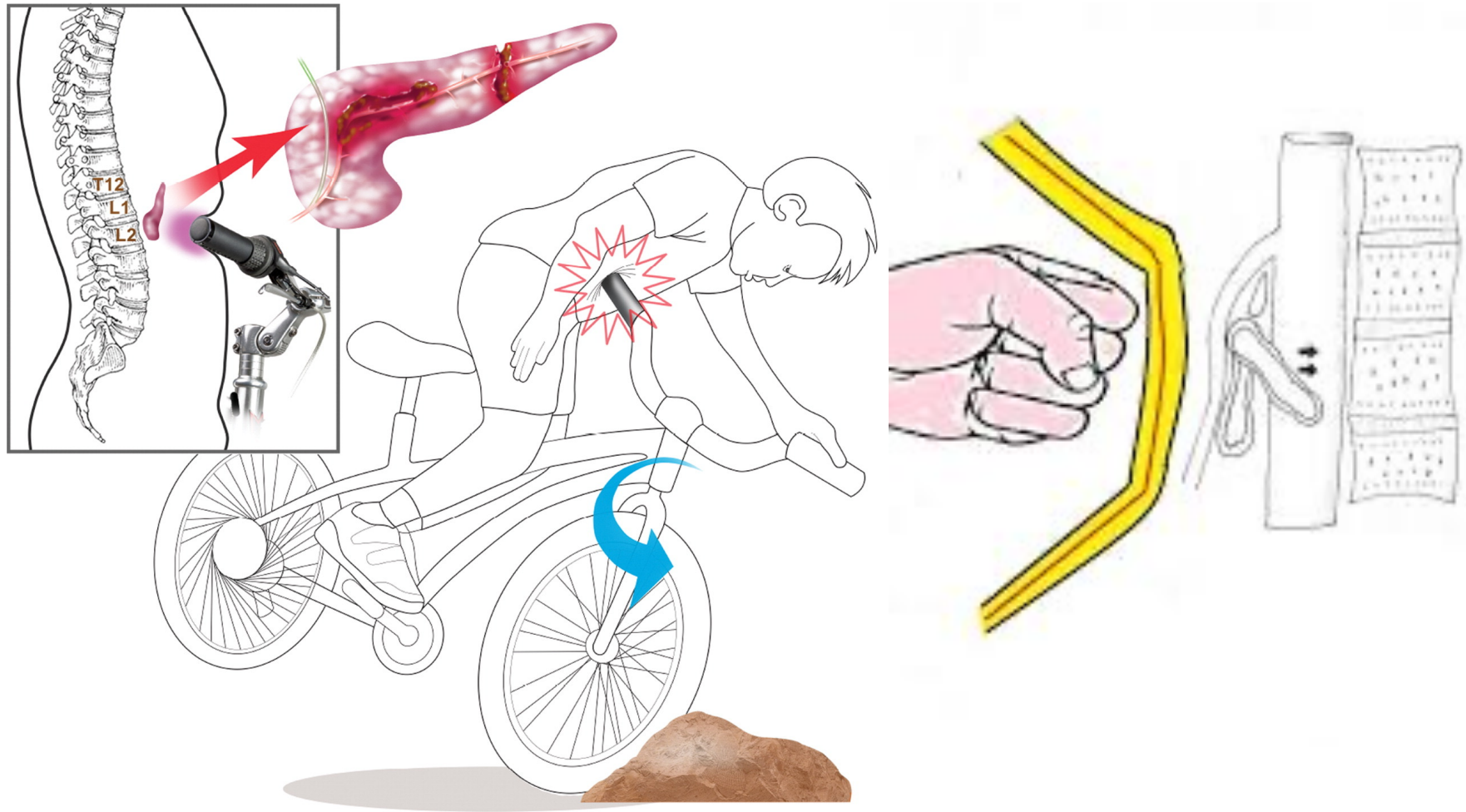
- Hydronephrosis
- AV fistula
- Urine leak/Urinoma
- Pyelonephritis
- Calculus formation
- Hypertension



Liver, Spleen and Kidney injuries ALMOST NEVER require surgery!

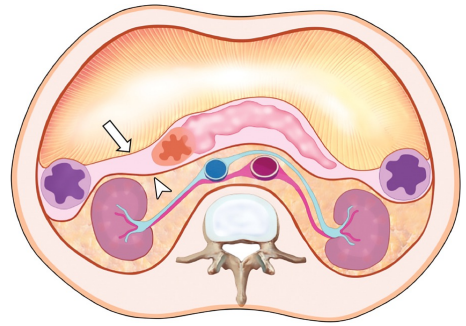
The Solid Organ Outlier

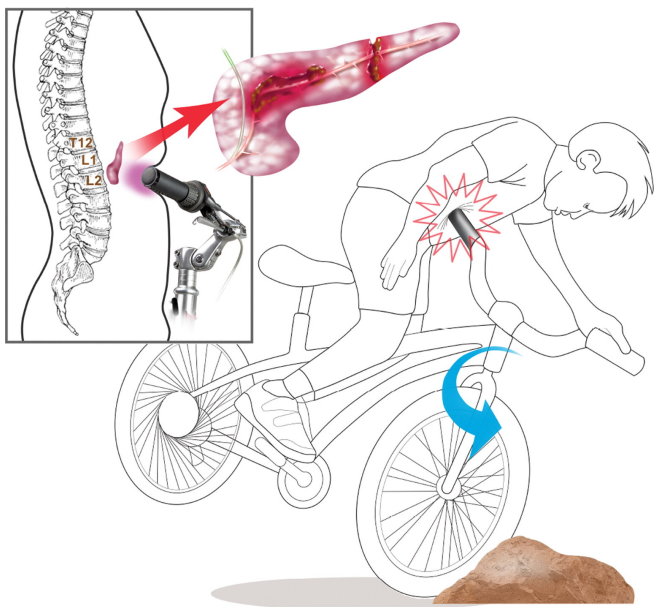


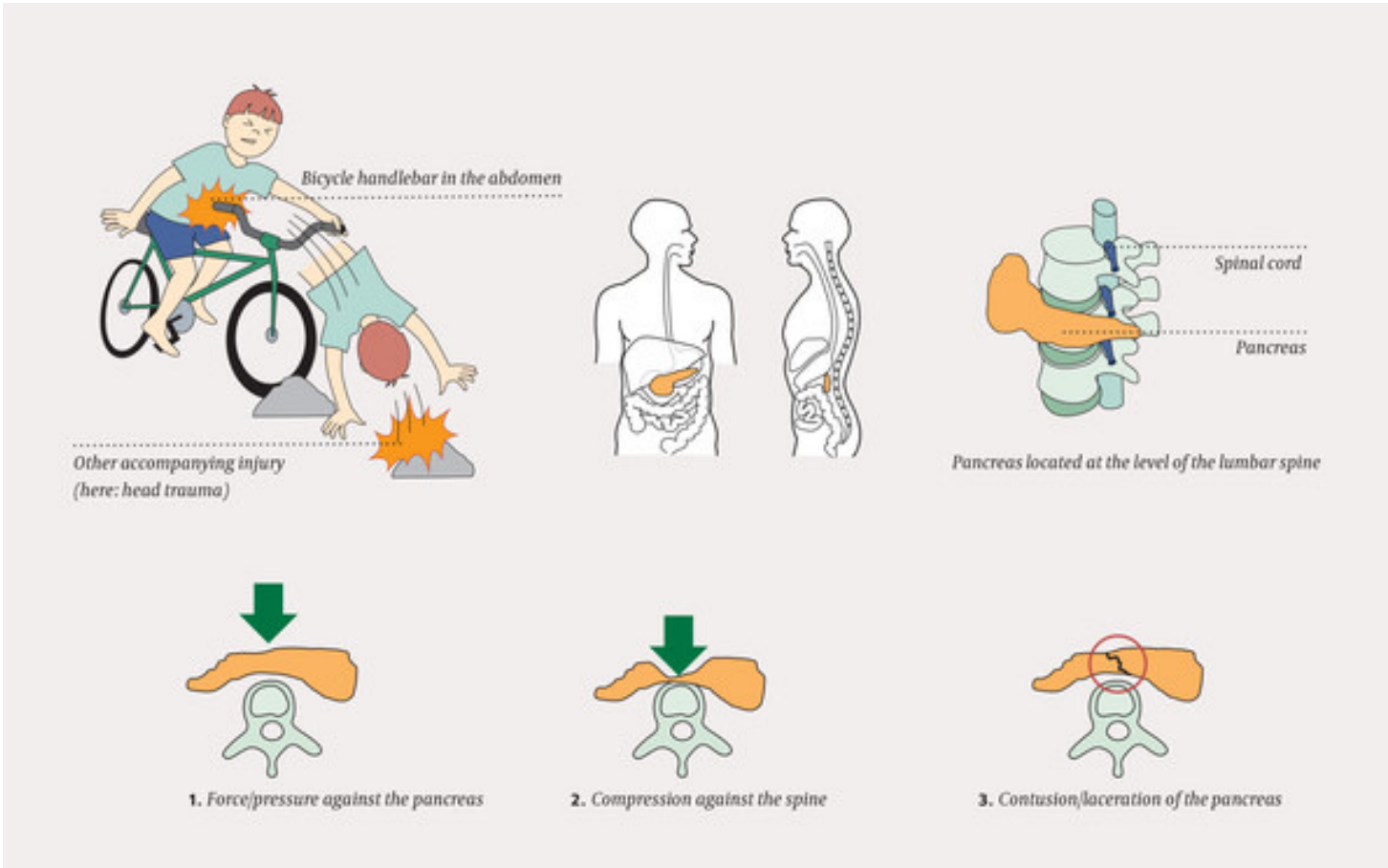


Focused Blow

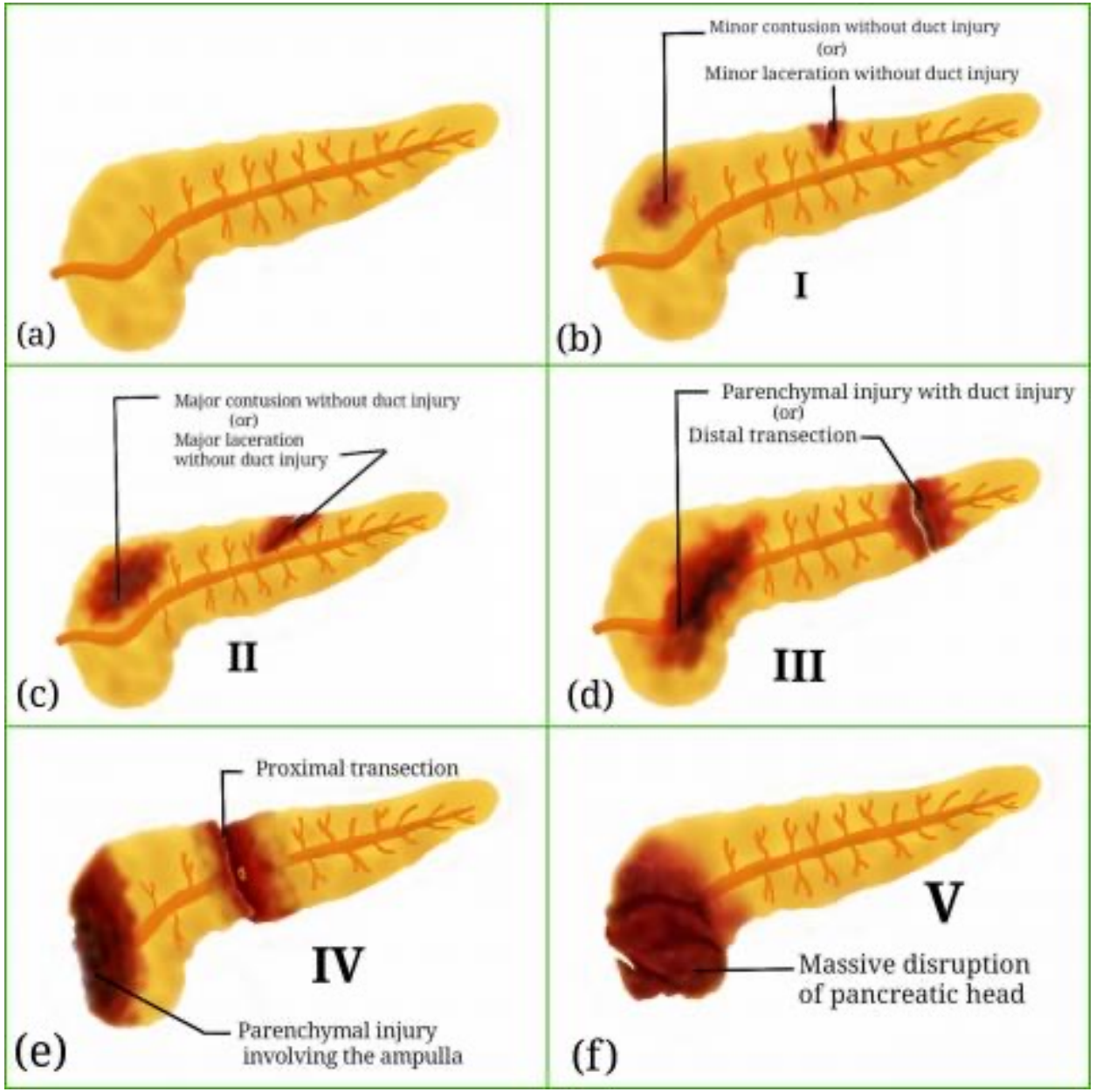
Focused impact



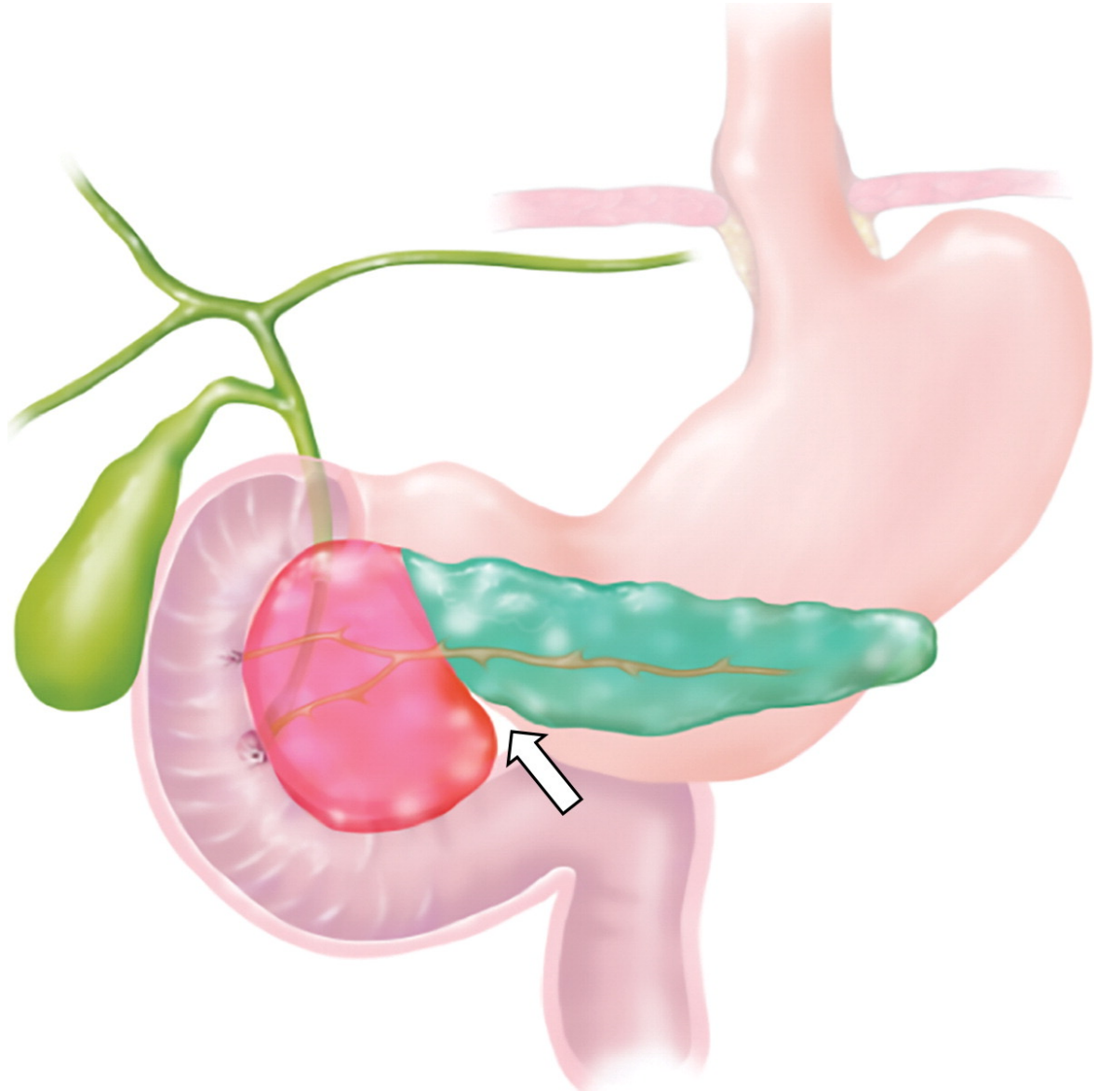




The Pancreas

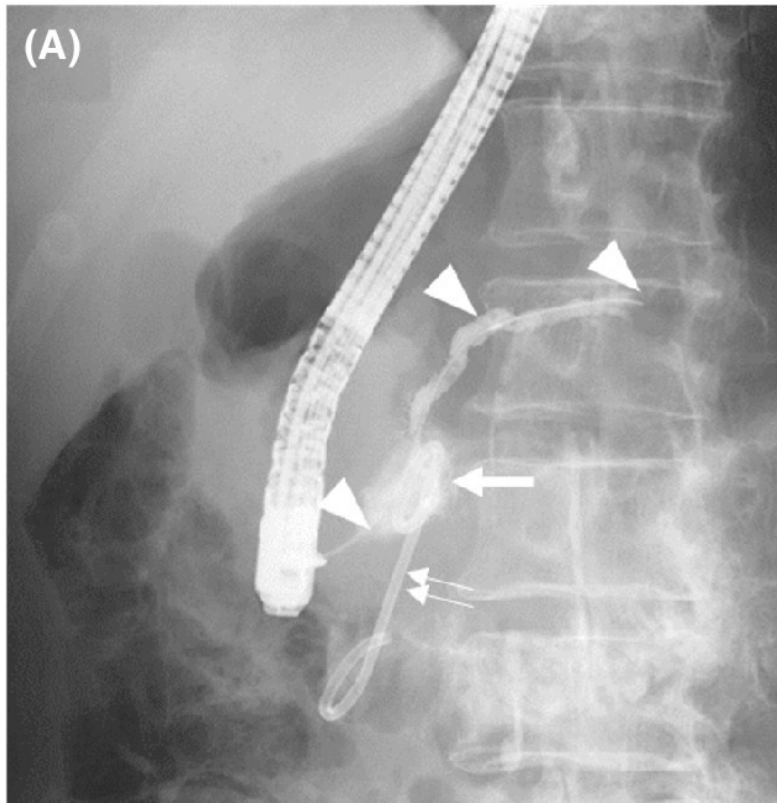


Fractured Pancreas

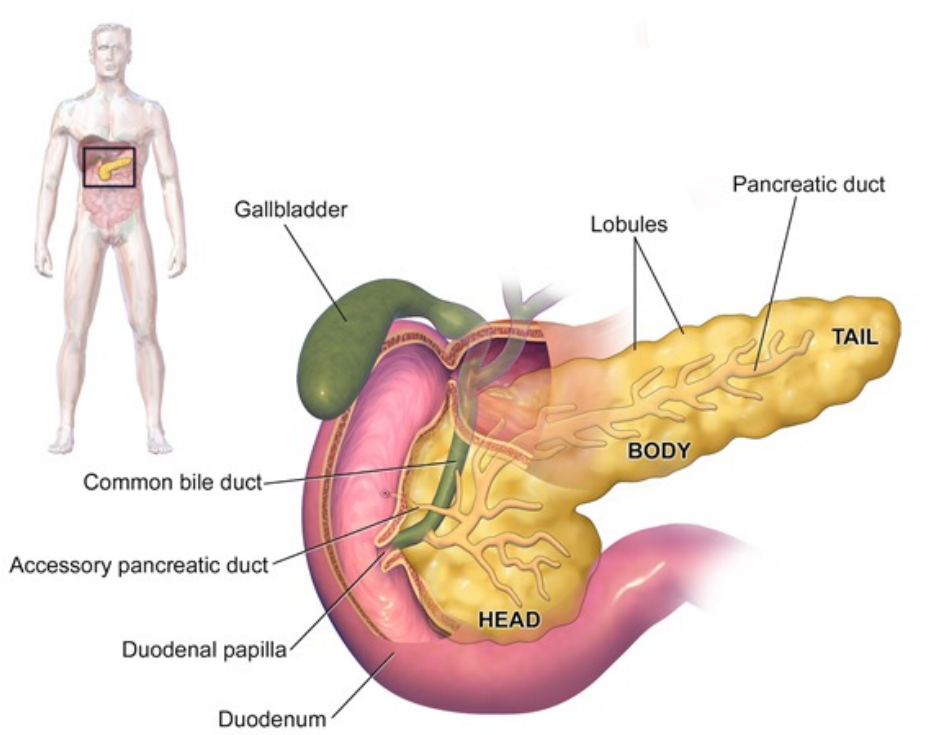


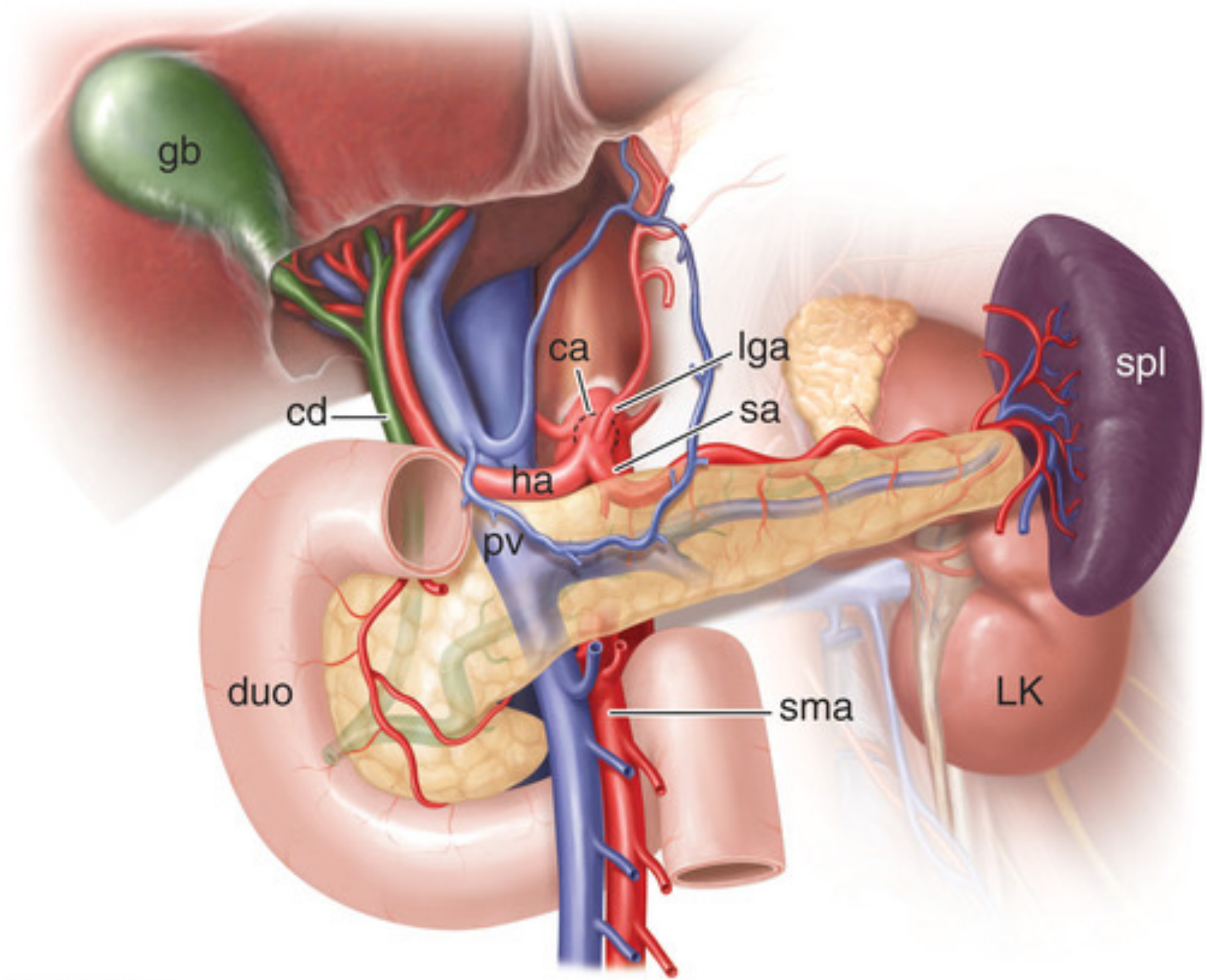
The Duct is the important thing

ERCP



Ductal Injury can = surgery

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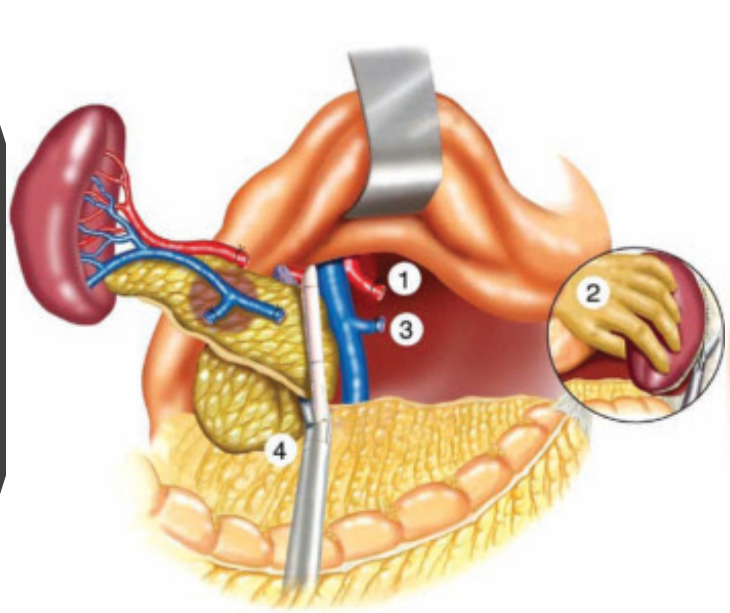
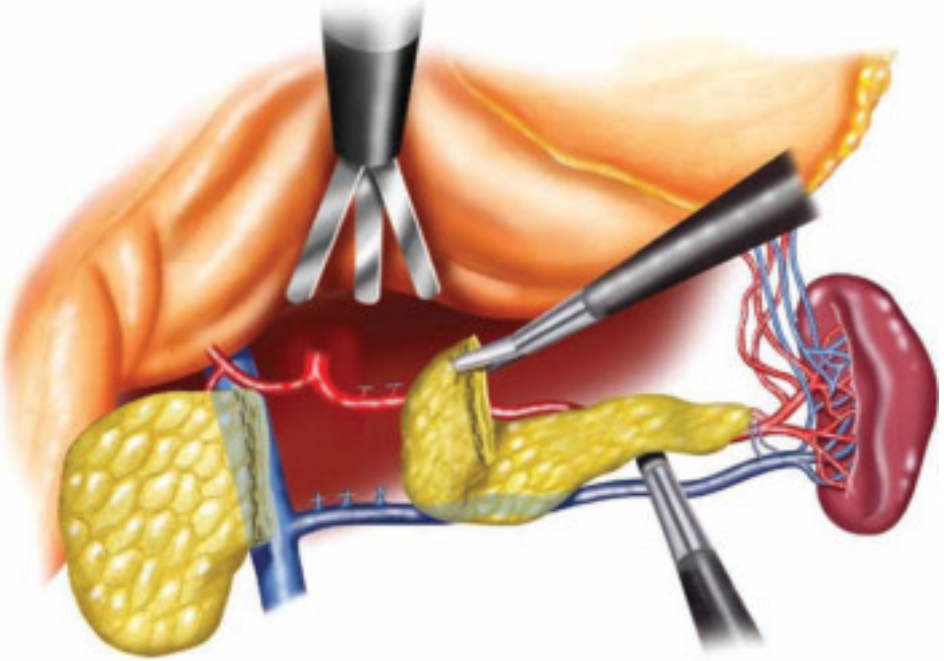
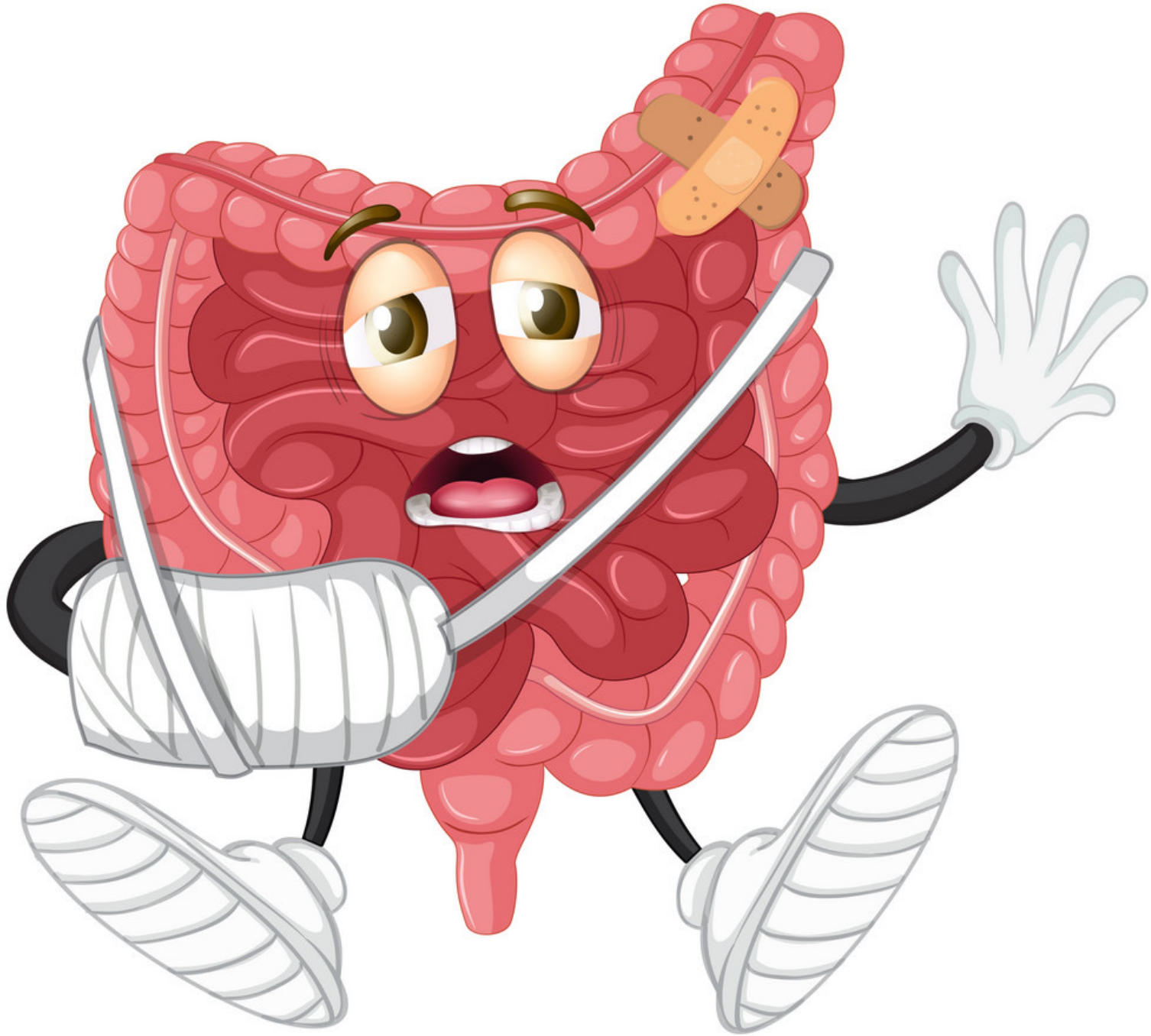
Most common procedure is distal pancreatectomy

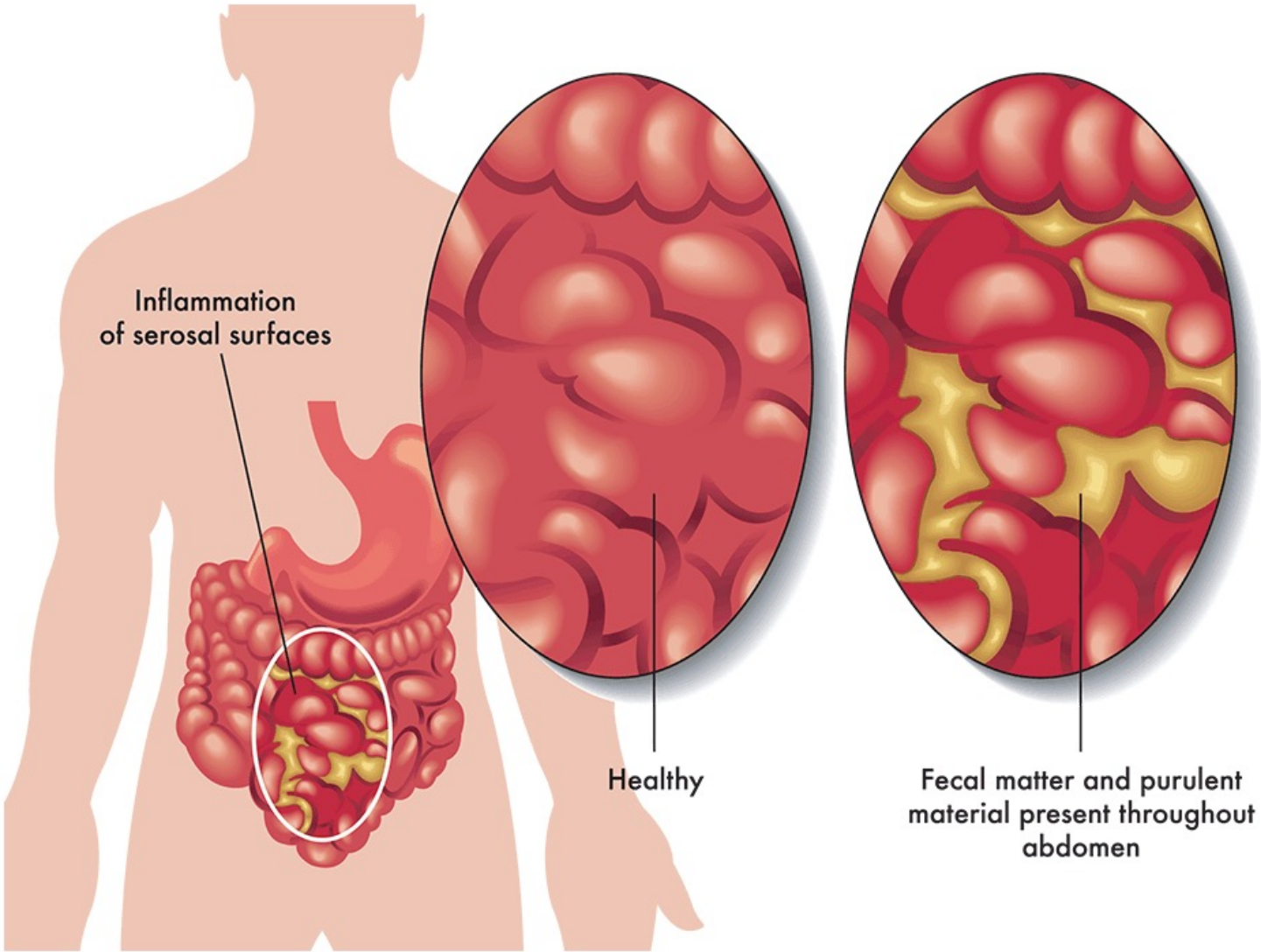


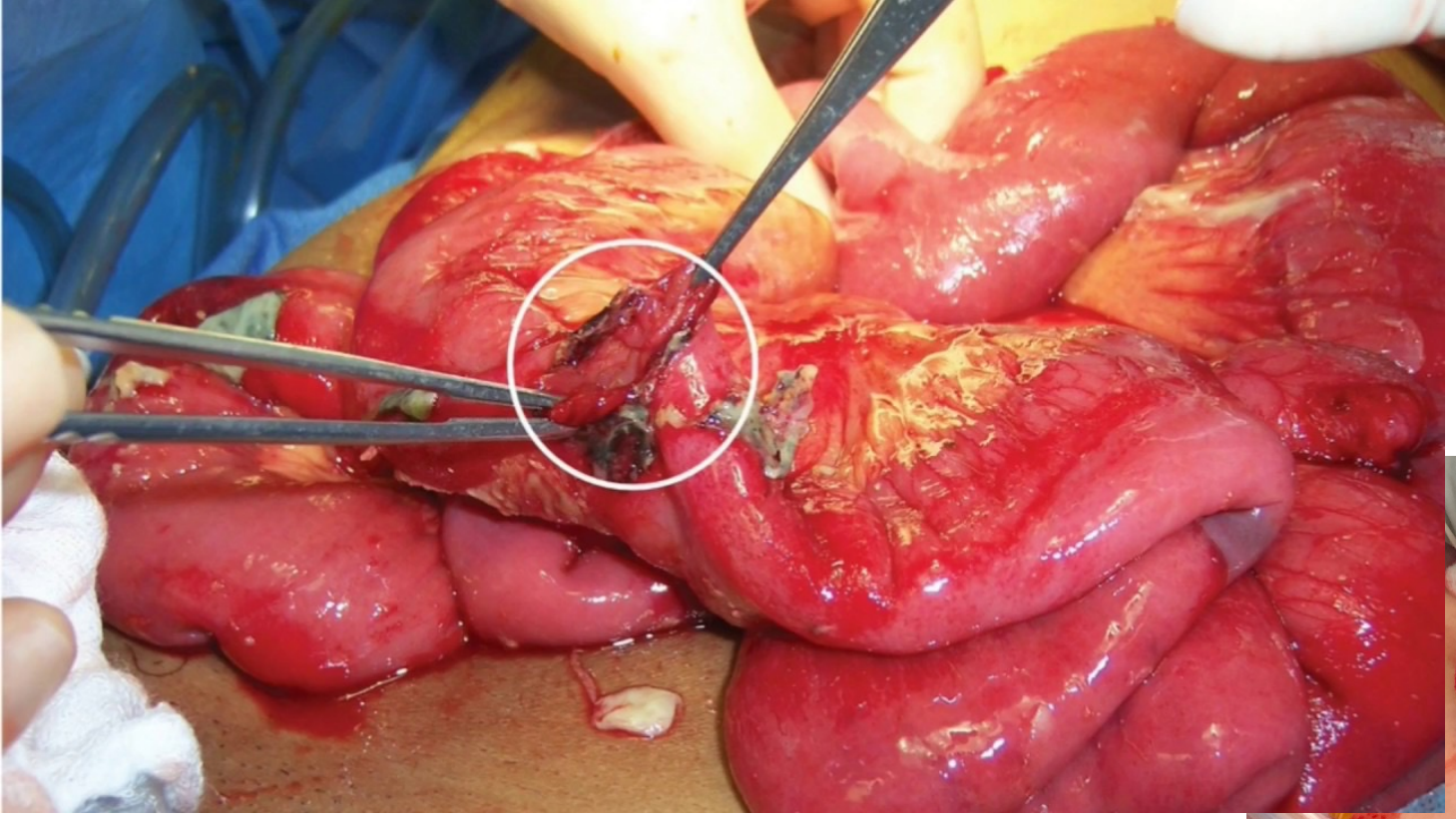


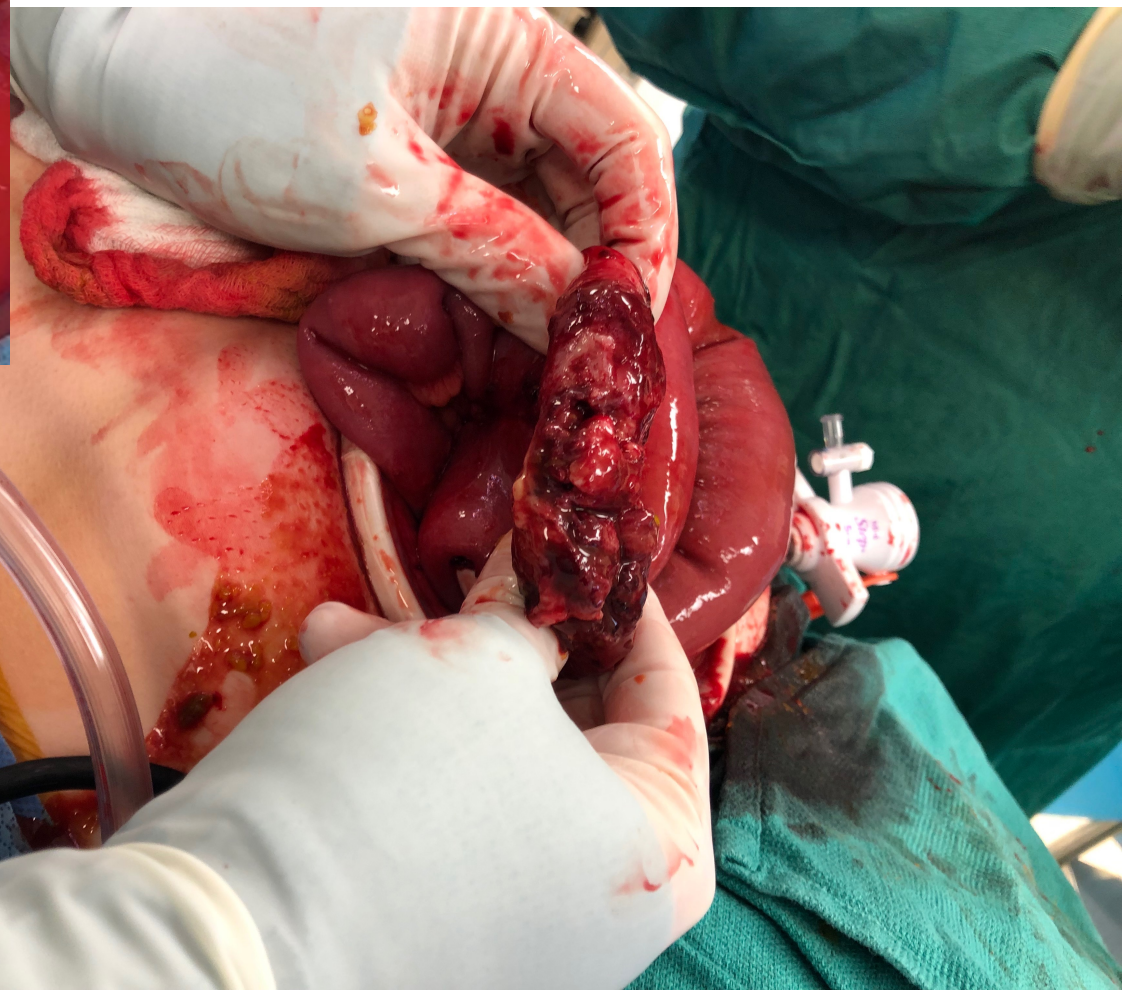
Splenic Sparing

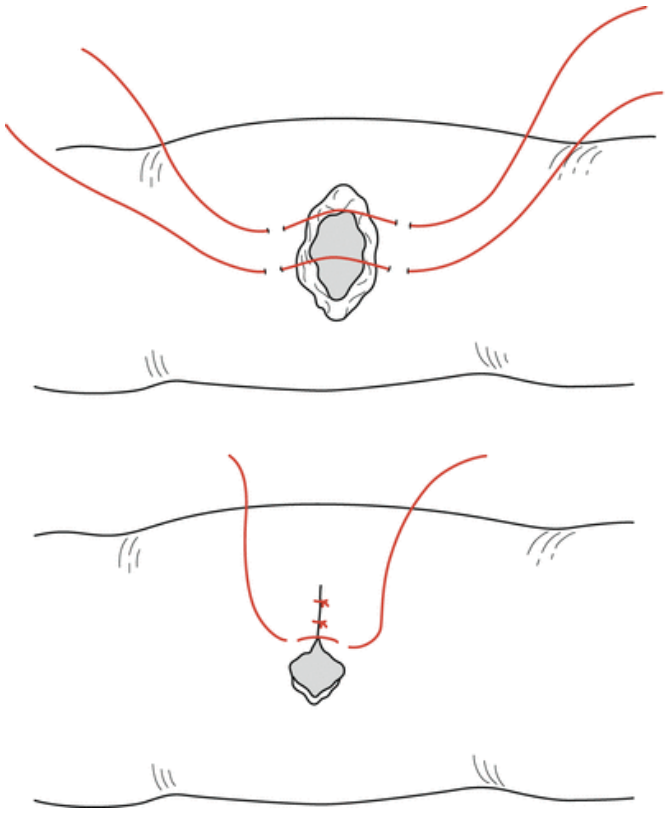


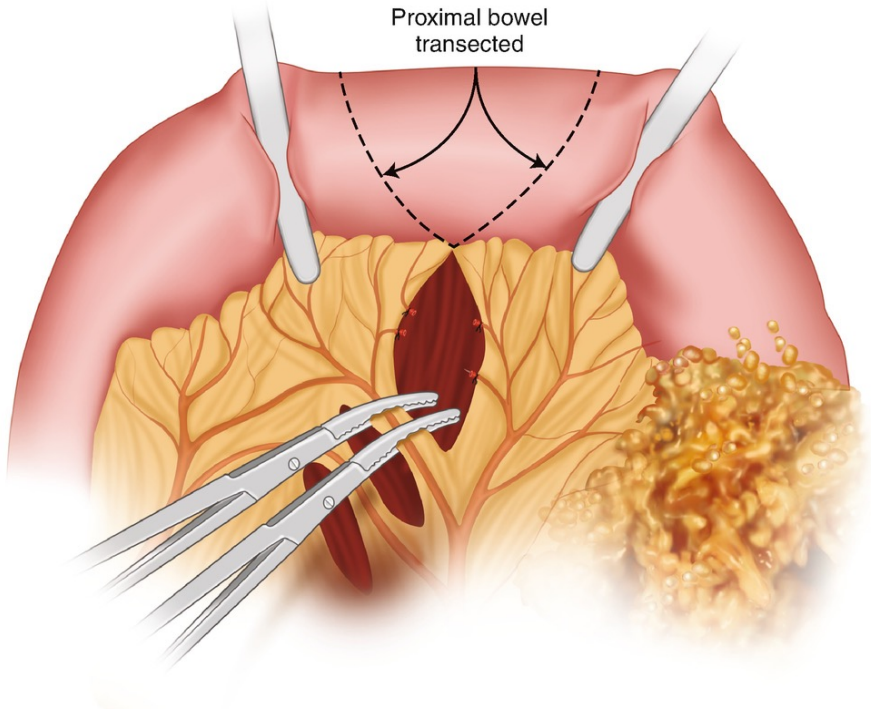
Peritonitis

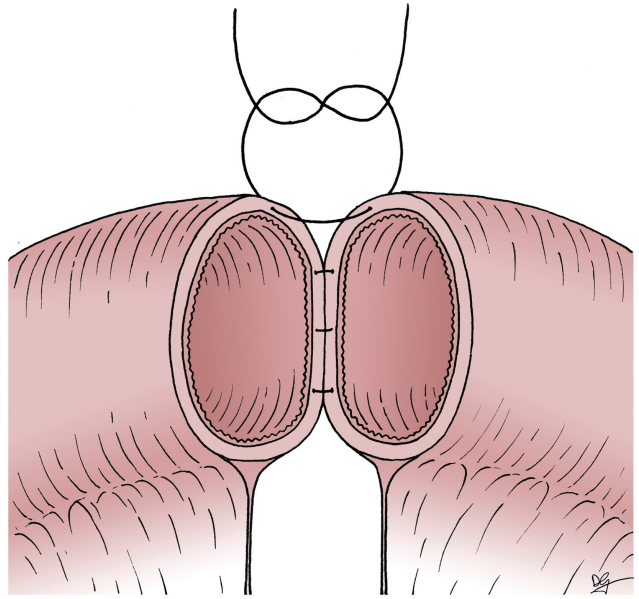




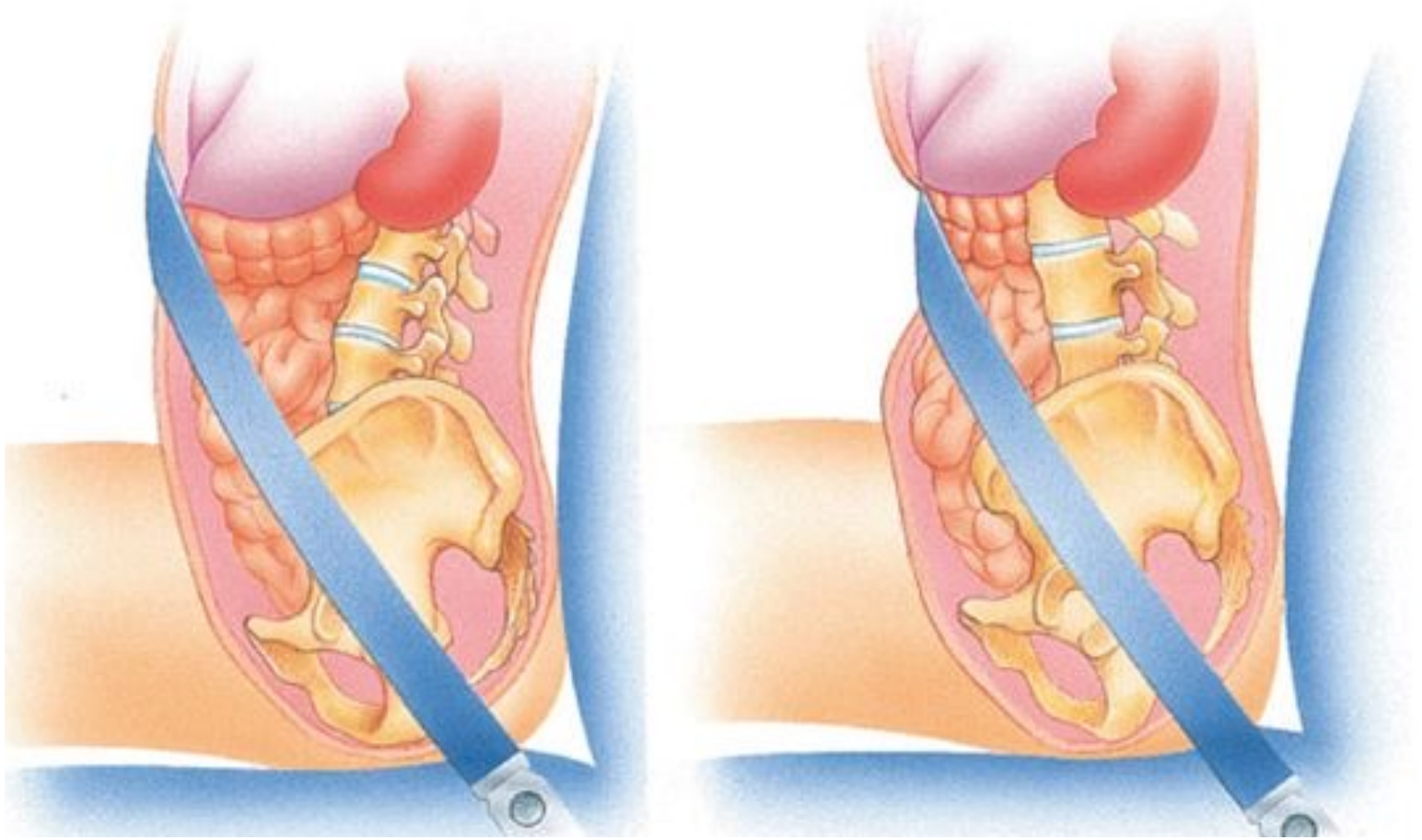




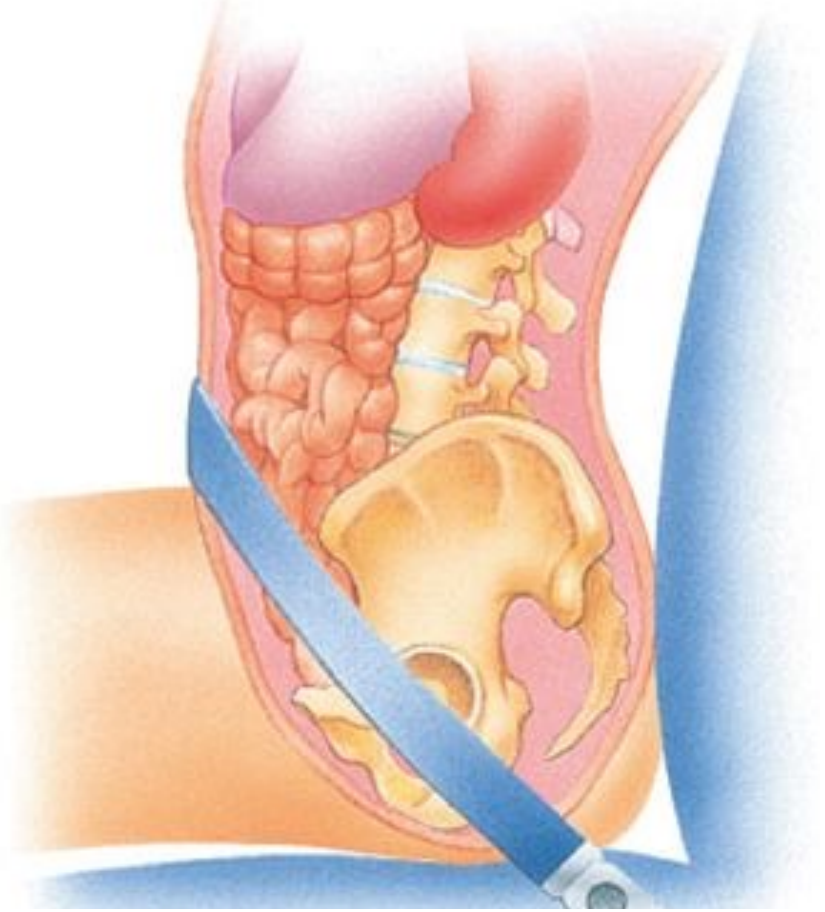

Proximal bowel
transected

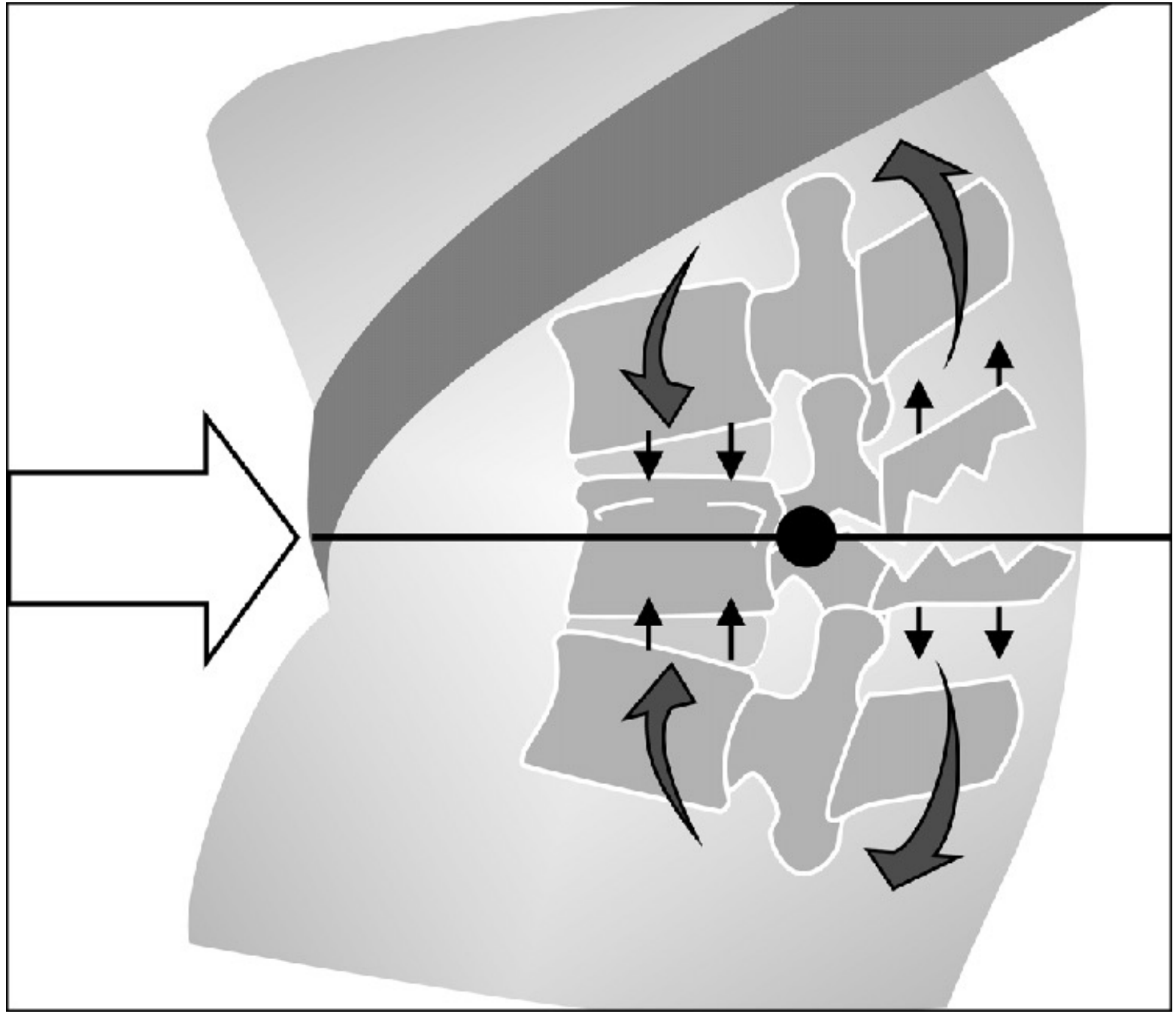


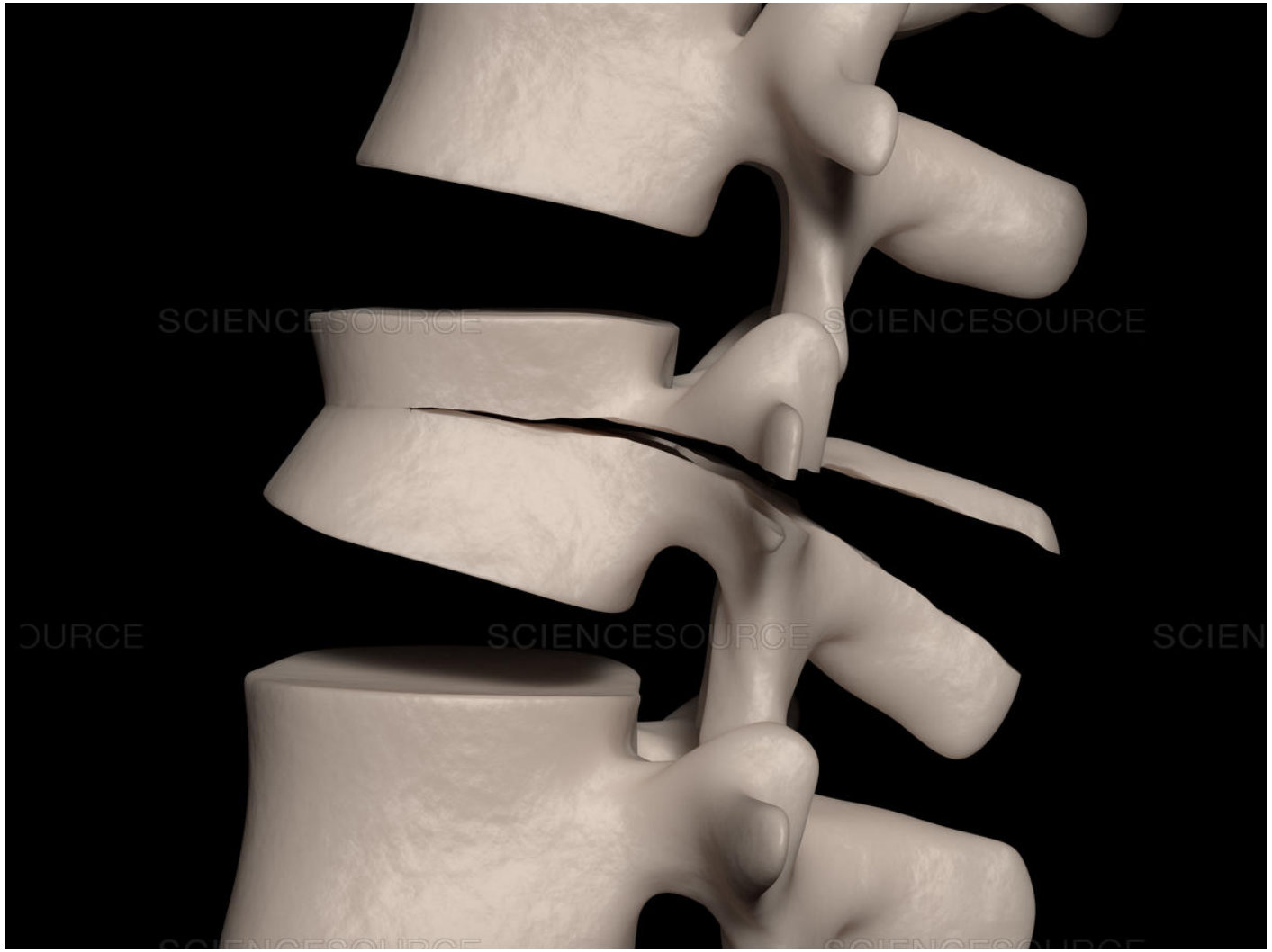
Incorrect position

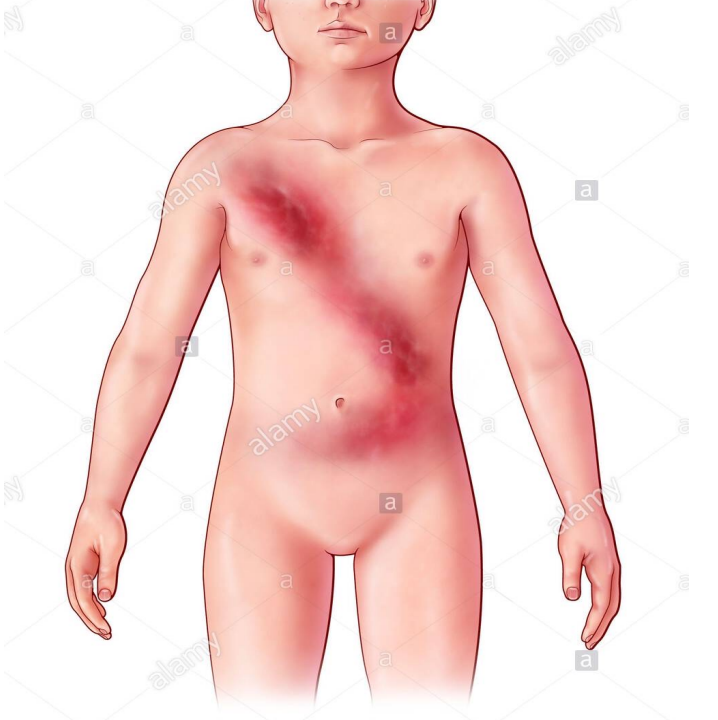


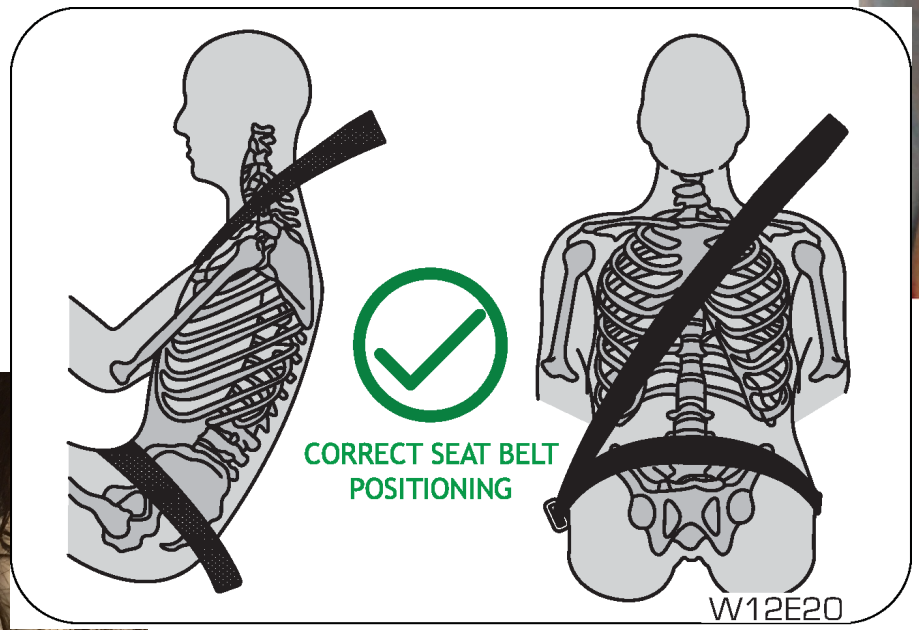
Correct position










CORRECT SEAT BELT
POSITIONING
W12E20

True or False: Best outcomes for traumatic intestinal perforation can only be achieved with immediate diagnosis and surgical intervention?

1. True
2. False

True or False: Best outcomes for traumatic intestinal perforation can only be achieved with immediate diagnosis and surgical intervention?

2. False

Contact:

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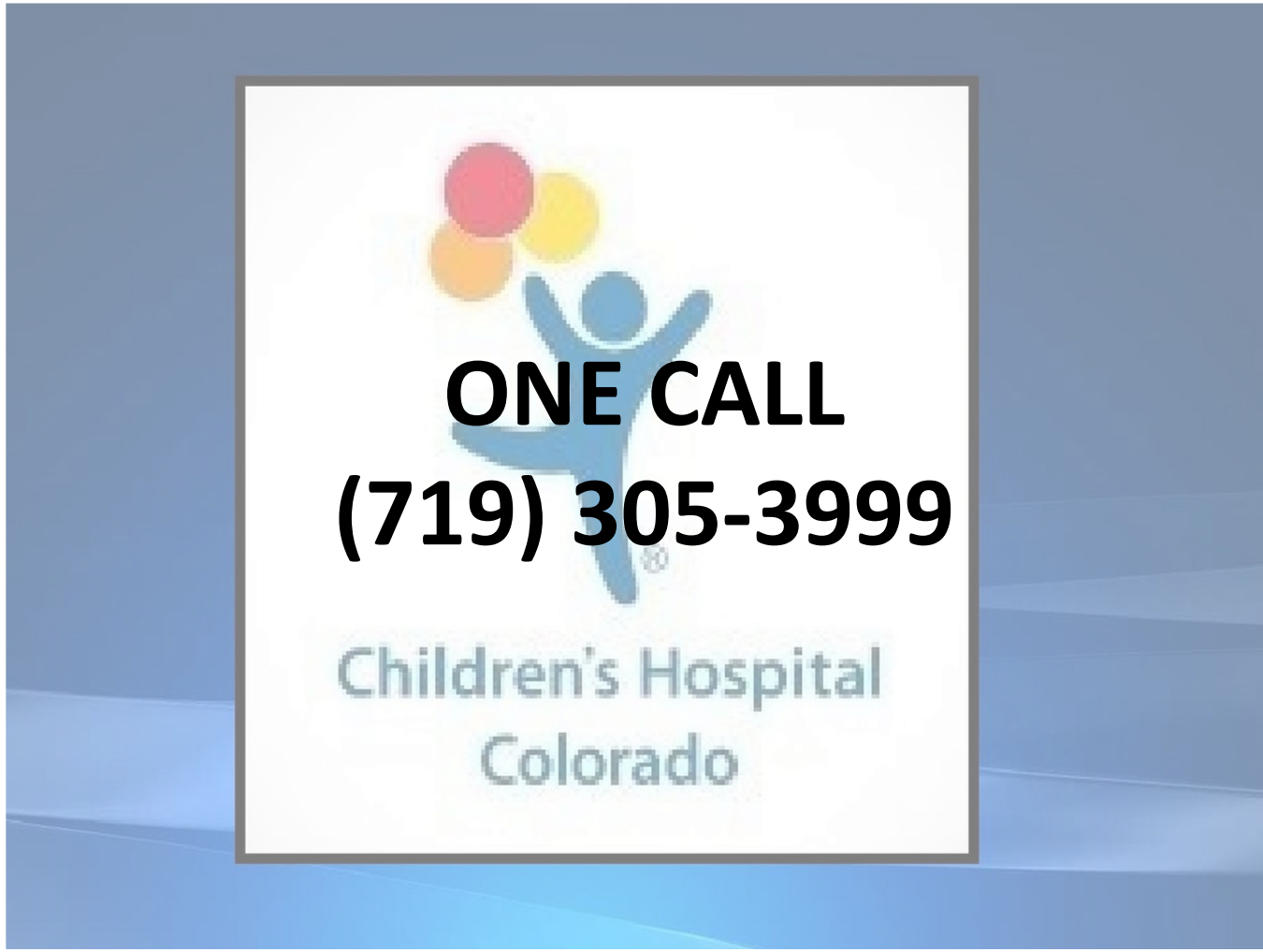
John.bealer@childrenscolorado.org

(719) 305-9035

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