Blunt Abdominal Trauma In Sports

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Blunt Abdominal Trauma in Sports

Disclosure

I have no actual or potential conflict of interest in relation to persons or institutions involved in this program/presentation.

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Blunt Abdominal Trauma in Sports

General Information

Contact (collision) sports with highest risk

Considered rare but actual incidence is hard determine

Leading cause of trauma related mortality (all trauma)

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Mechanisms of injury

- Crushing/Direct blow
- Shearing: Rapid deceleration across fixed organs
- Bursting: Raised intraluminal pressure from increased abdominal pressure leading to rupture

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Organs injured

- Spleen
- Liver
- Kidneys
- Pancreas
- Stomach
- Small Bowel
- Colon
- Ureters
- Bladder

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Solid organs

- Spleen 40%
- Liver 30%
- Kidney 20%
- Pancreas 3%

Hollow Organs

- Viscera 7%

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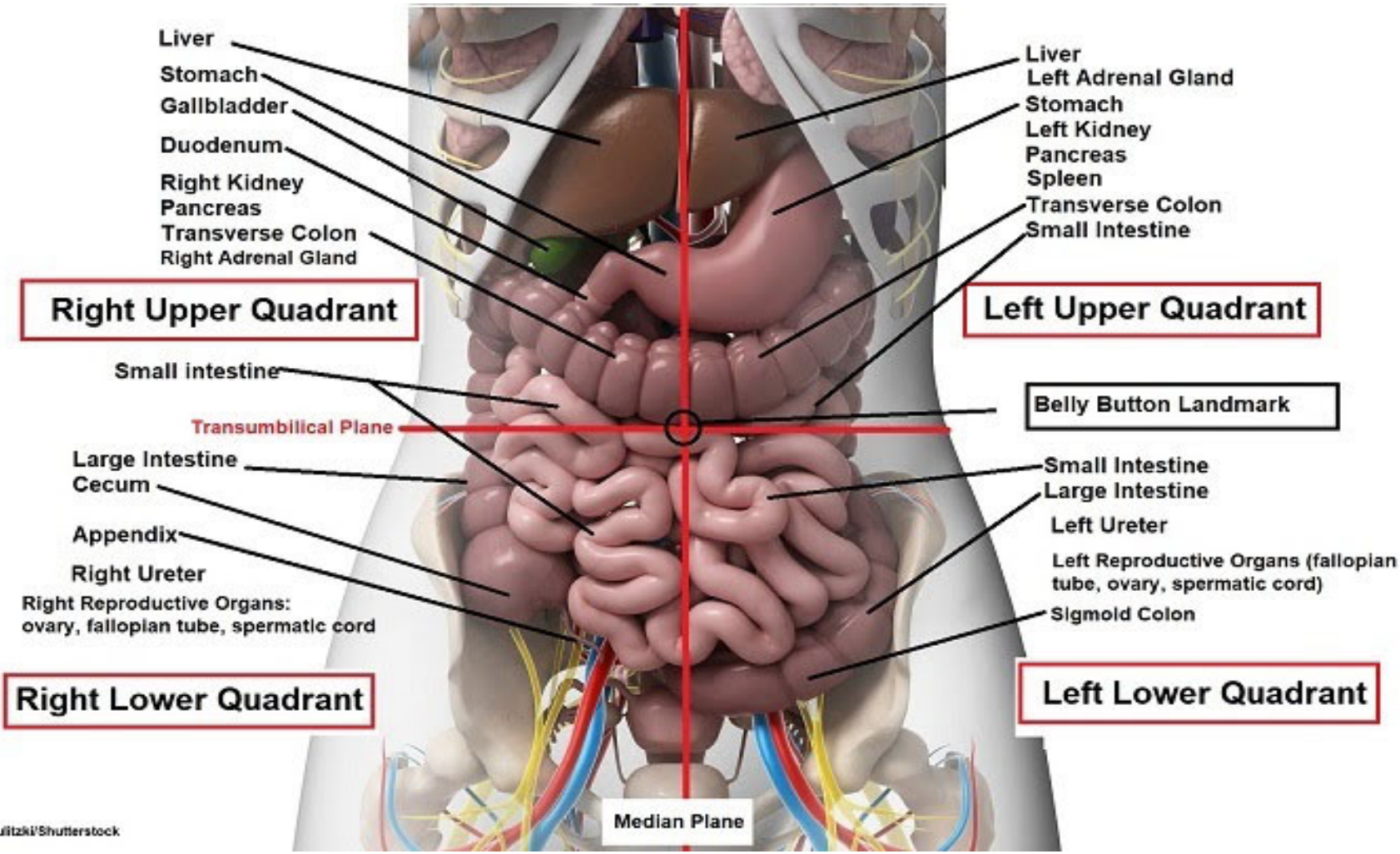

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Spleen

- Most commonly injured solid organ, approximately 40%
- Generally from direct blow
- Adjacent to L ribs 9-11
- Surrounded by strong fibrous capsule
- 5 parenchymal segments
- Vascularity from the hilum, splenic artery and vein

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Spleen

Clinical Presentation

- LUQ pain
- L shoulder pain (Kehr's Sign). Diaphragm/phrenic nerve irritation
- Stable vs unstable vital signs

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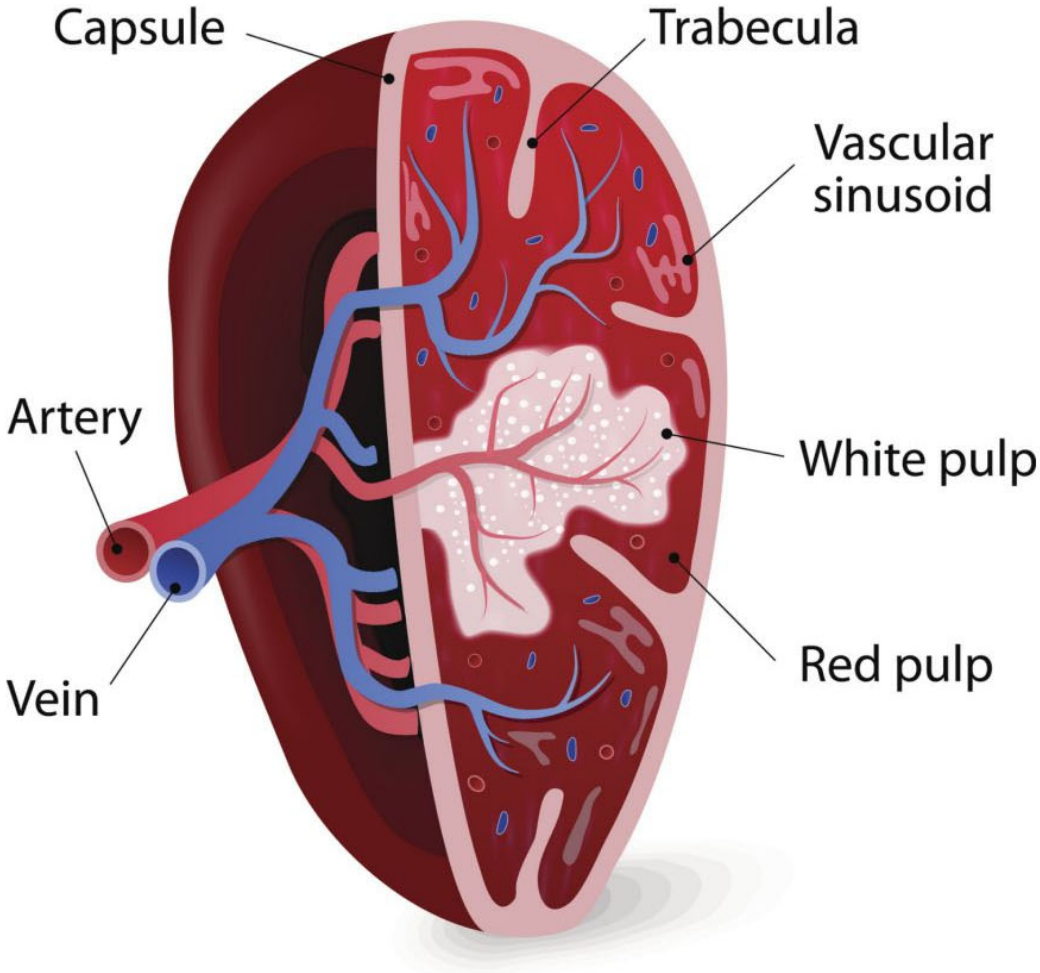
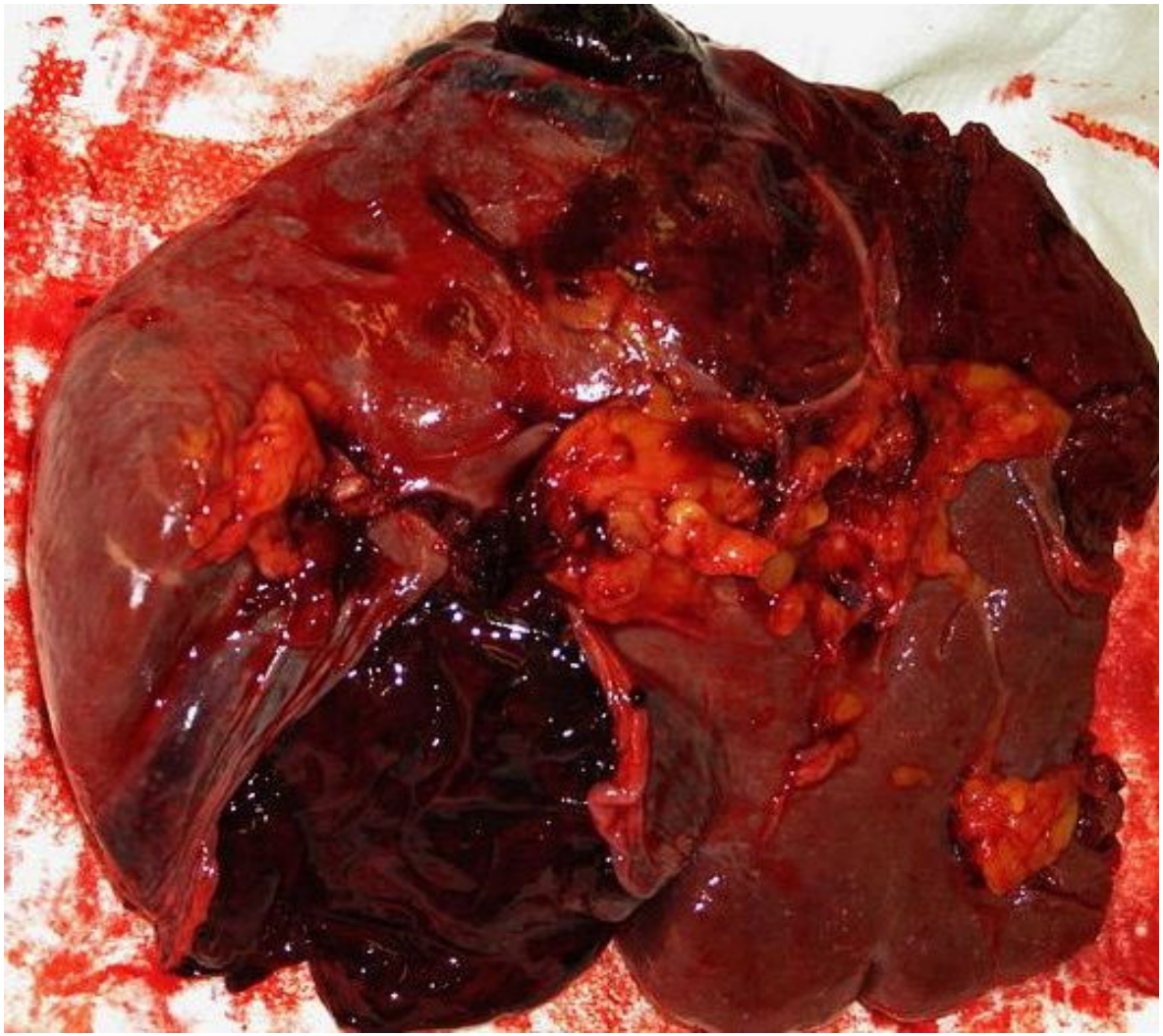
AAST Grade and Type of Injury	Description
I	
Hematoma	Subcapsular, <10% of surface area
Laceration	Capsular tear, <1 cm of parenchymal depth
II	
Hematoma	Subcapsular, 10%–50% of surface area; intraparenchymal, <5 cm in diameter
Laceration	1–3 cm in parenchymal depth
III	
Hematoma	Subcapsular, >50% of surface area; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma, >5 cm in diameter
Laceration	>3 cm parenchymal depth or involving trabecular vessels
IV	
Laceration	Laceration involves segmental or hilar vessels producing major devascularization (>25% of spleen)
V	
Laceration	Completely shattered spleen
Vascular	Hilar vascular injury that devascularized spleen

SPLEEN ANATOMY





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Liver

- Second most commonly injured solid organ
- Generally from direct blow
- Approximately 30% of injuries, but 50% of deaths
- Located in RUQ
- Capsule
- 2 main Lobes (R and L)
- Vasculature: hepatic artery, portal vein, hepatic vein, Inferior vena cava

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Liver

Clinical presentation

- R sided abdominal pain
- Nausea and vomiting
- R should pain
- Stable vs unstable vital signs

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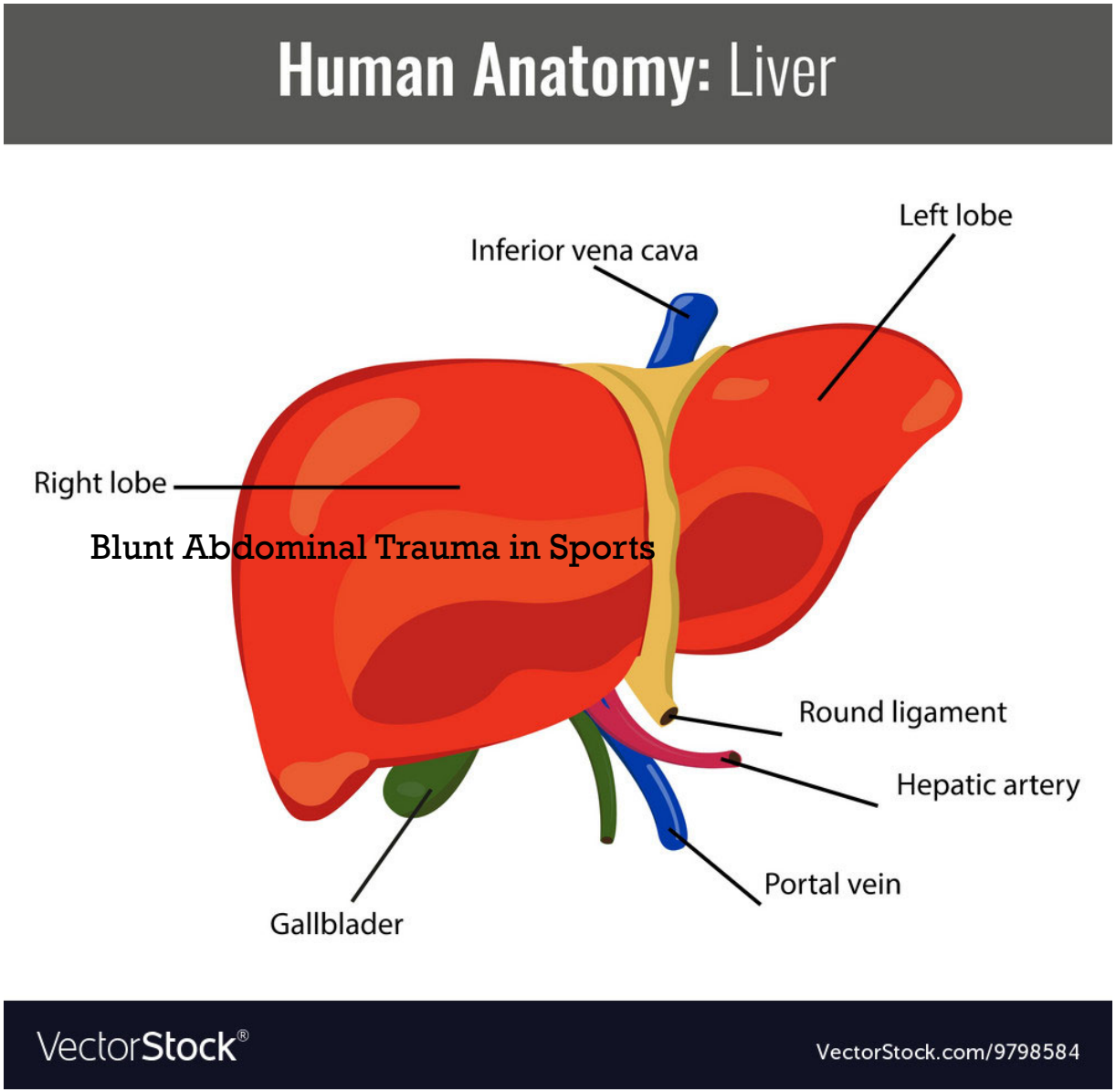
Grade	Grade
I	Hematoma subcapsular, non-expanding, < 10% of surface area Laceration capsular tear, non-bleeding, parenchymal depth < 1 cm
II	Hematoma subcapsular, non-expanding, 10-50% of surface area or intraparenchymal, non-expanding, < 2 cm in diameter Laceration capsular tear, active bleeding, parenchymal depth 1–3 cm, < 10 cm in length
III	Hematoma subcapsular, > 50% of surface area or expanding, ruptured subcapsular hematoma with active bleeding, intraparenchymal hematoma > 2 cm Laceration parenchymal depth > 3 cm
IV	Hematoma ruptured intra parenchymal hematoma with active bleeding Laceration parenchymal disruption of > 25-50% of hepatic lobe
V	Laceration parenchymal disruption of > 50% of hepatic lobe Vascular Juxtahepatic venous injuries
VI	Vascular hepatic avulsion



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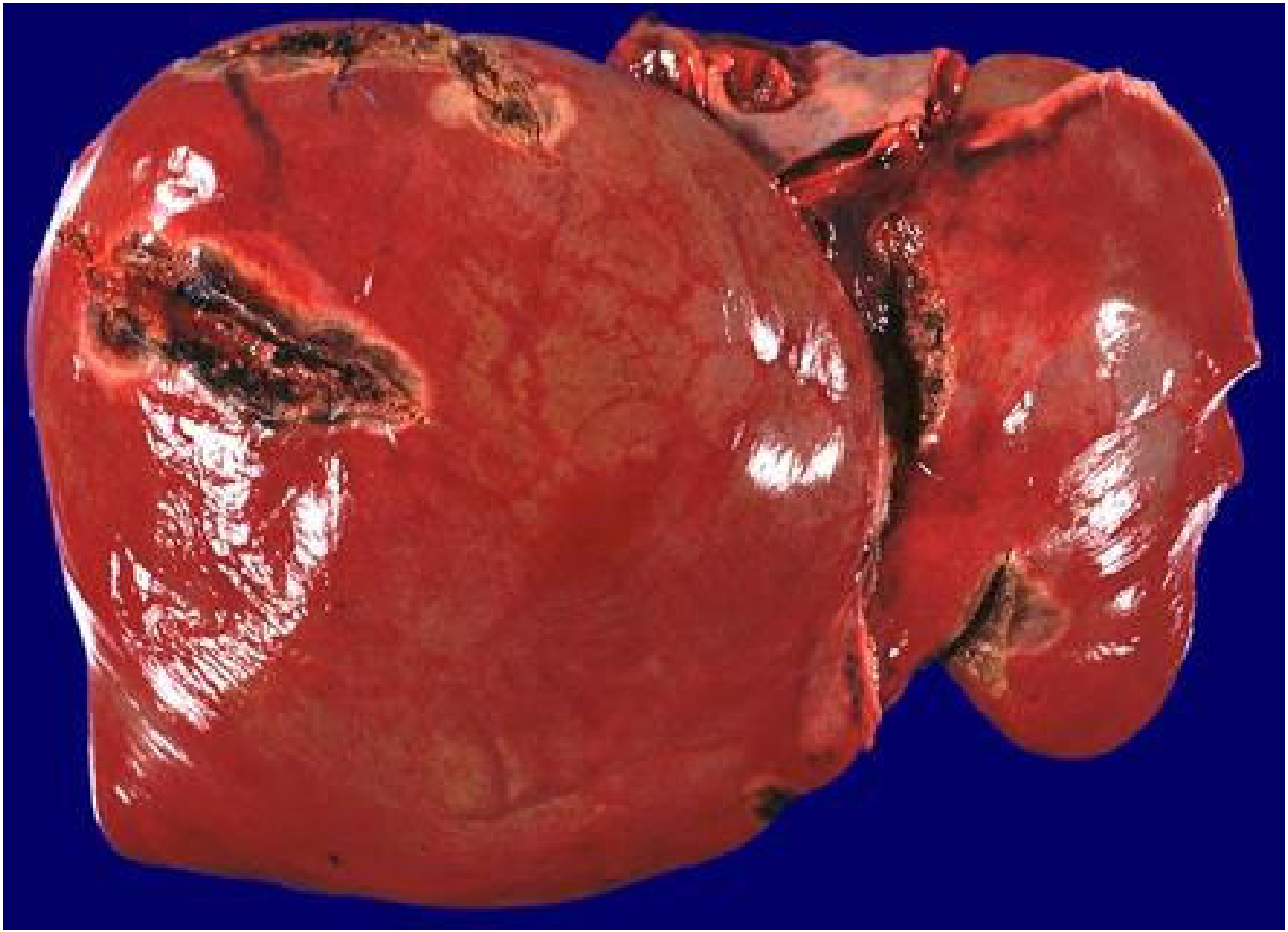

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Kidneys

- Third most common injured solid organ, approximately 20%
- Generally from direct blow, but can happen with deceleration, vigorous exercise
- Symptoms: flank pain
- Sign: hematuria (gross or microscopic)

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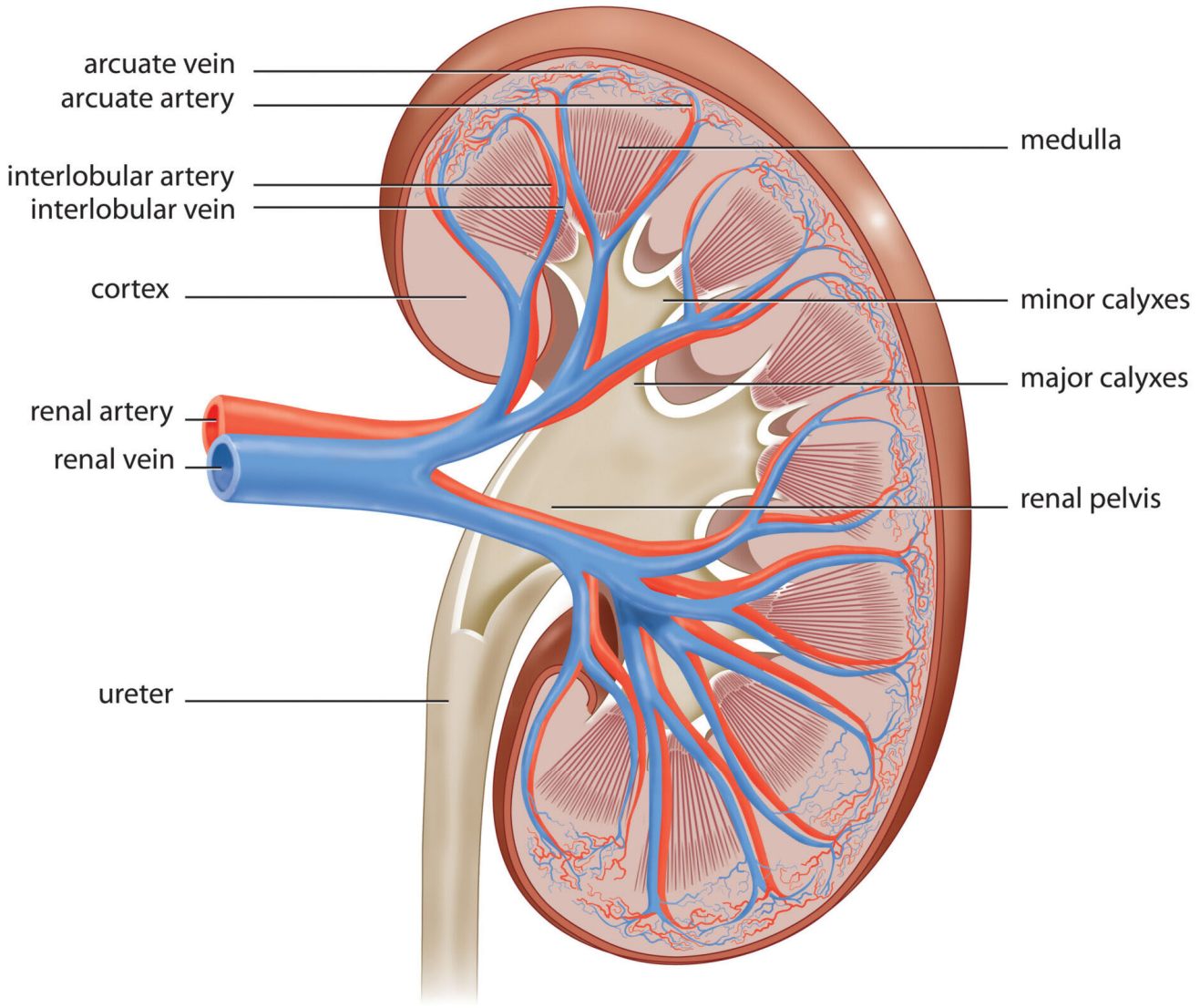
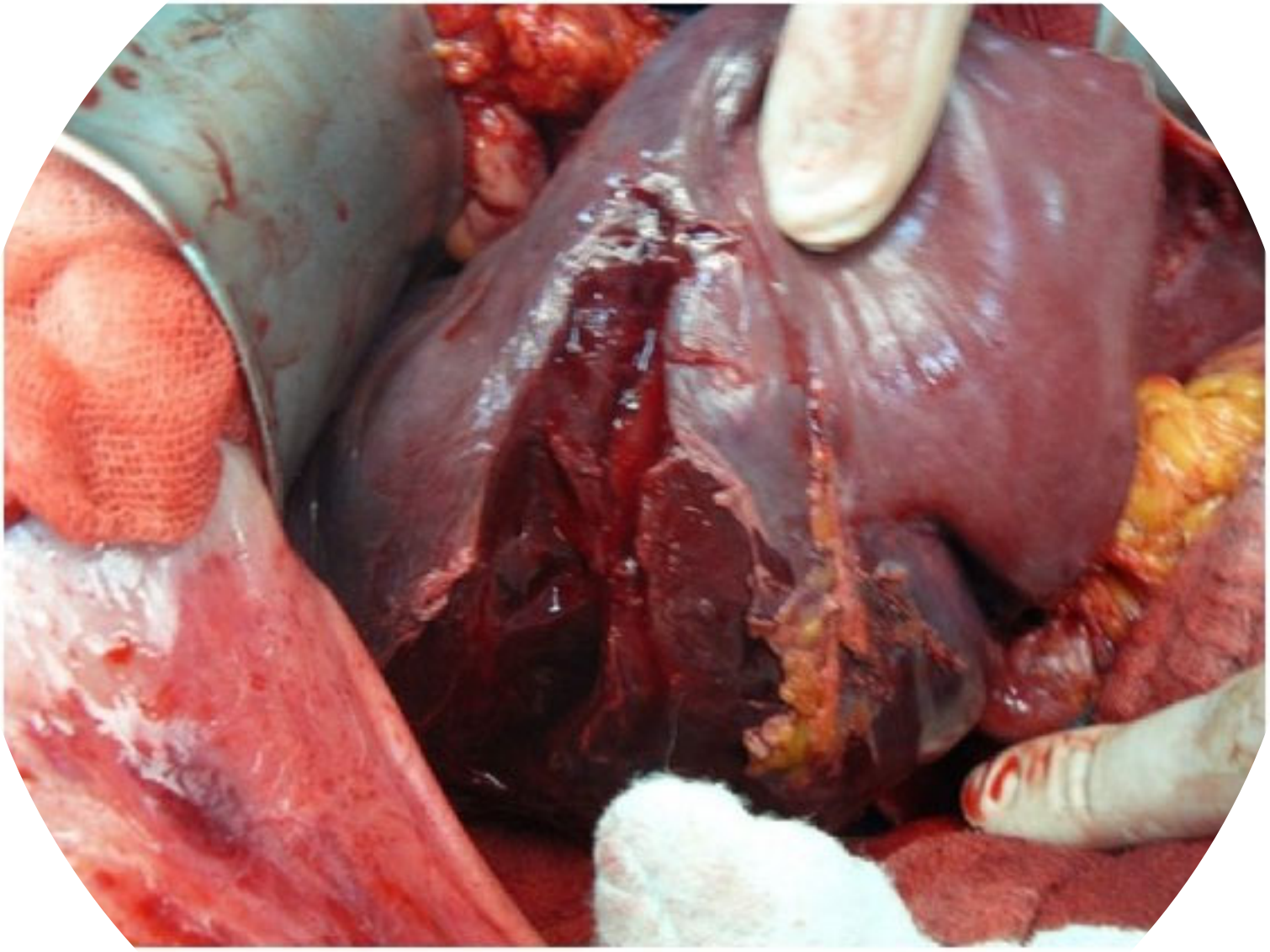
Grade	Type of injury	Description of injury
I	Contusion	Hematuria, urologic studies normal
	Hematoma	Subcapsular hematoma, without parenchymal laceration
II	Hematoma	Perirenal hematoma, without parenchymal laceration
	Laceration	<1.0 cm laceration, without urinary extravasation
III	Laceration	>1.0 cm laceration, without urinary extravasation
IV	Laceration	Laceration extends to renal pelvis, or urinary extravasation
	Vascular	Main renal artery or vein injury with contained hemorrhage
V	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum which devascularizes kidney

*American Association of Surgery for Trauma (AAST) system


arcuate vein
arcuate artery
interlobular artery
interlobular vein
cortex
renal artery
renal vein
ureter
medulla
minor calyxes
major calyxes
renal pelvis



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Pancreas

- Least commonly injured solid organ
- Generally from a direct blow of pancreas and spine
- Generalized abdominal pain
- More insidious
- May have delayed presentation

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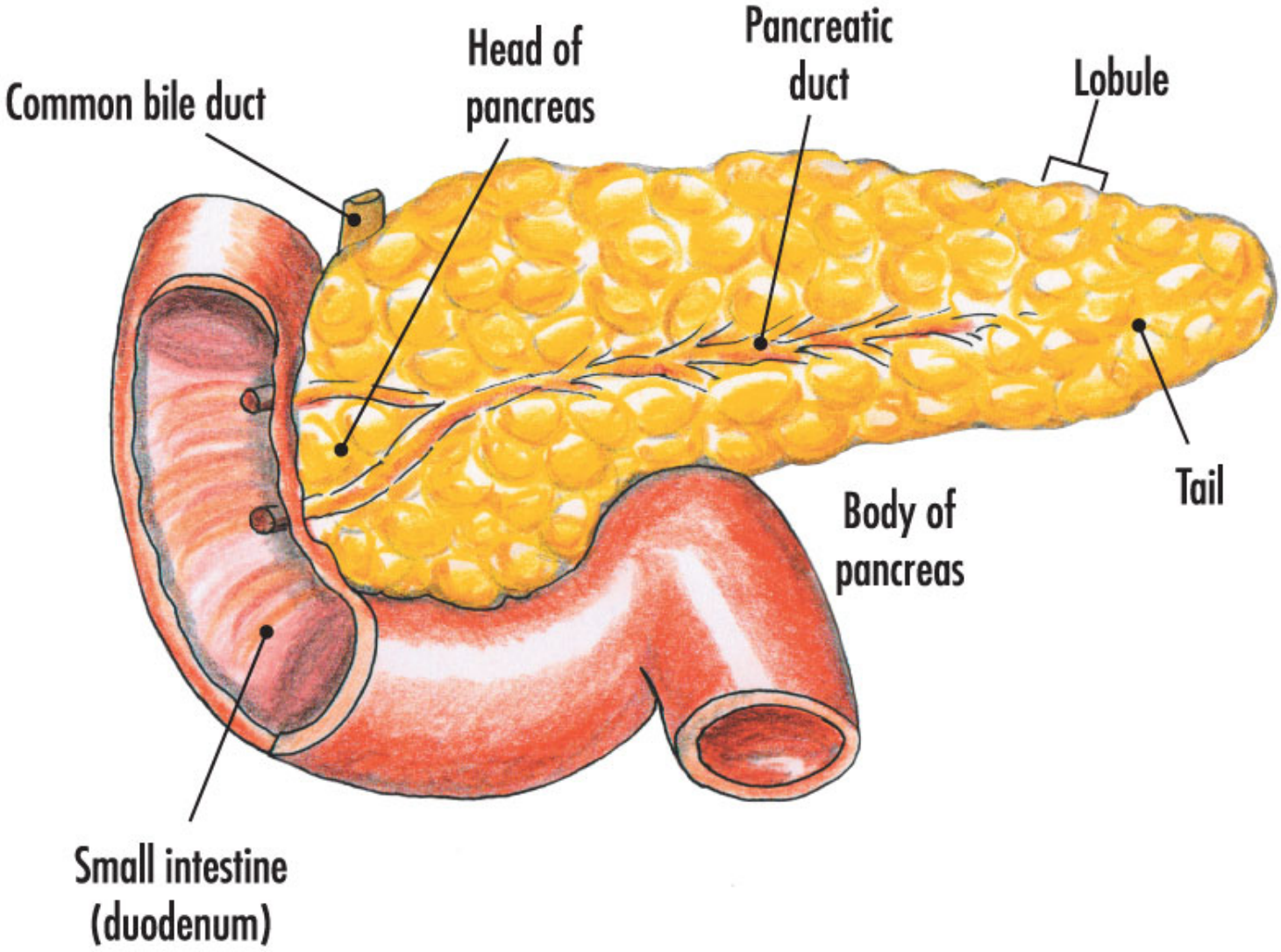
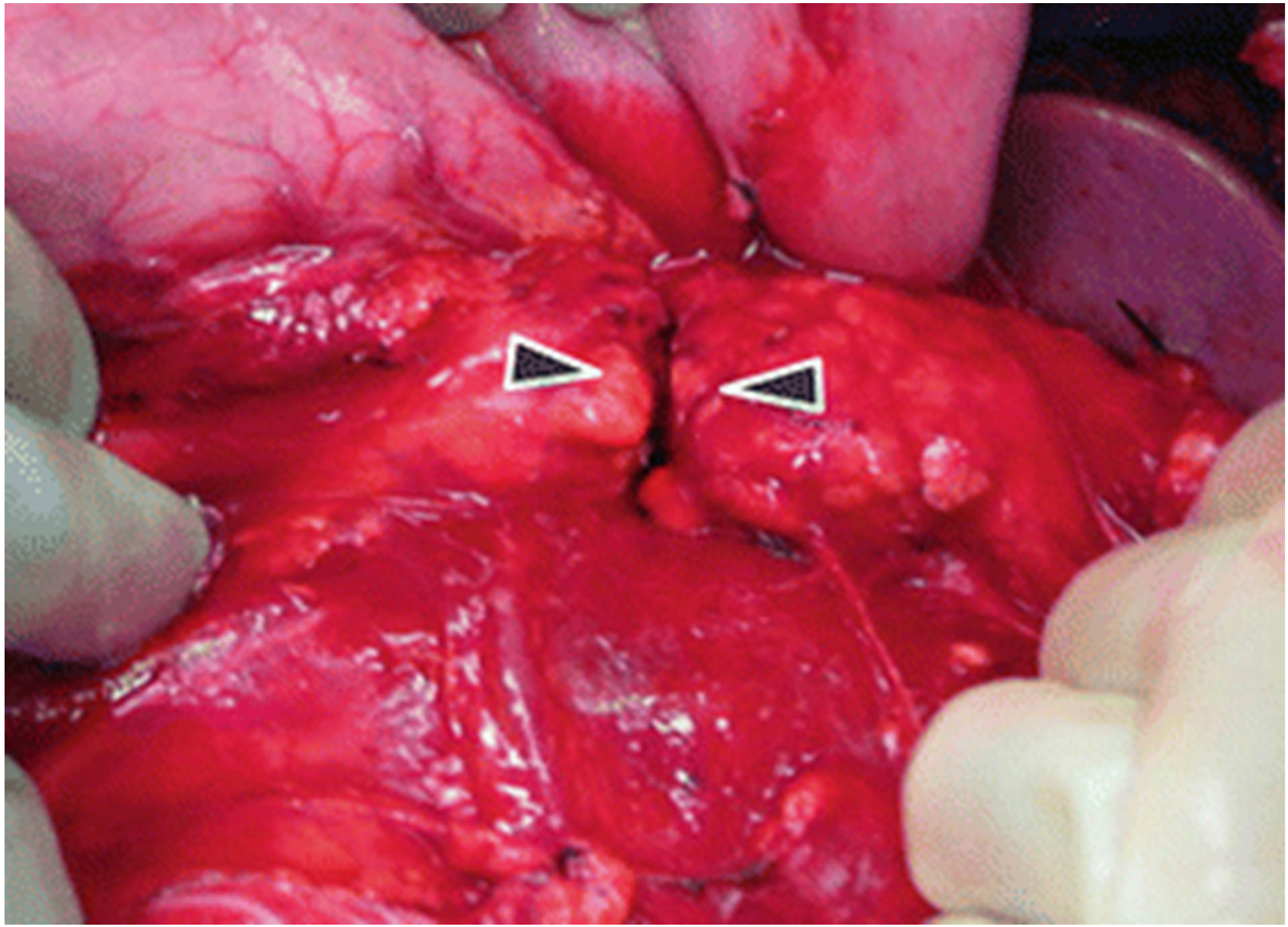

Common bile duct
Head of pancreas
Pancreatic duct
Lobule
Tail
Body of pancreas
Small intestine (duodenum)



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Hollow Viscous

- Includes various anatomies: Stomach, small bowel, colon, ureters, bladder
- Overall uncommon
- Small bowel most common
- Direct blow with increase abdominal pressure
- Generalized pain
- Often insidious and delayed

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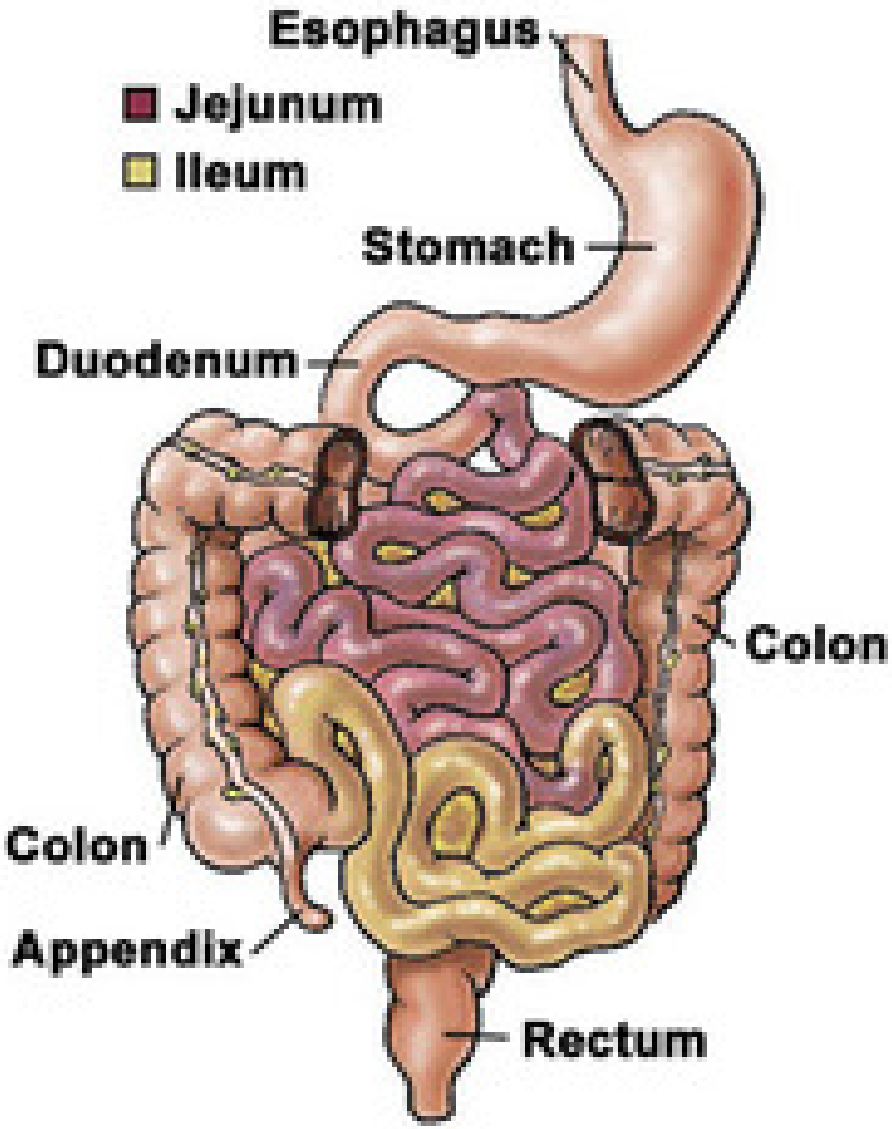
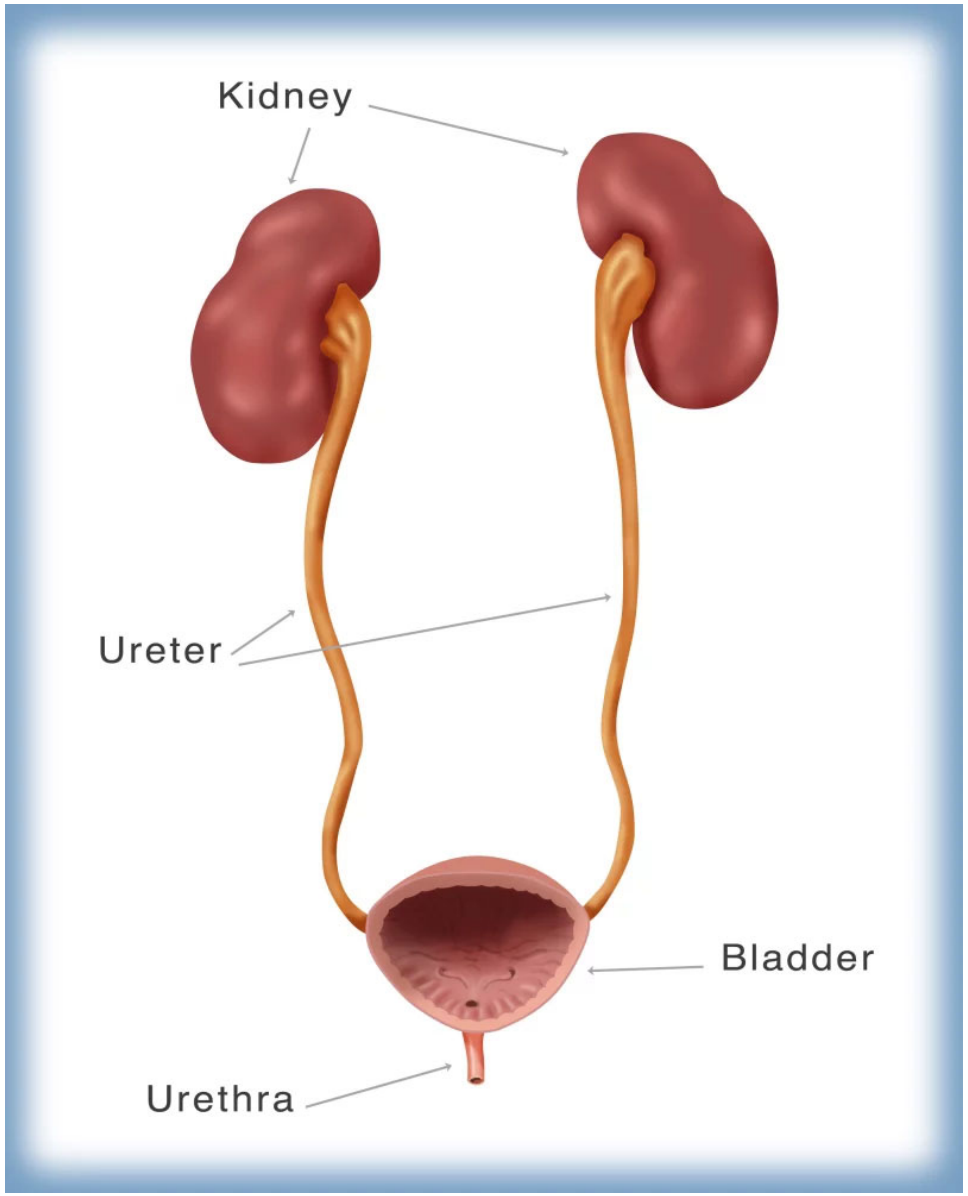
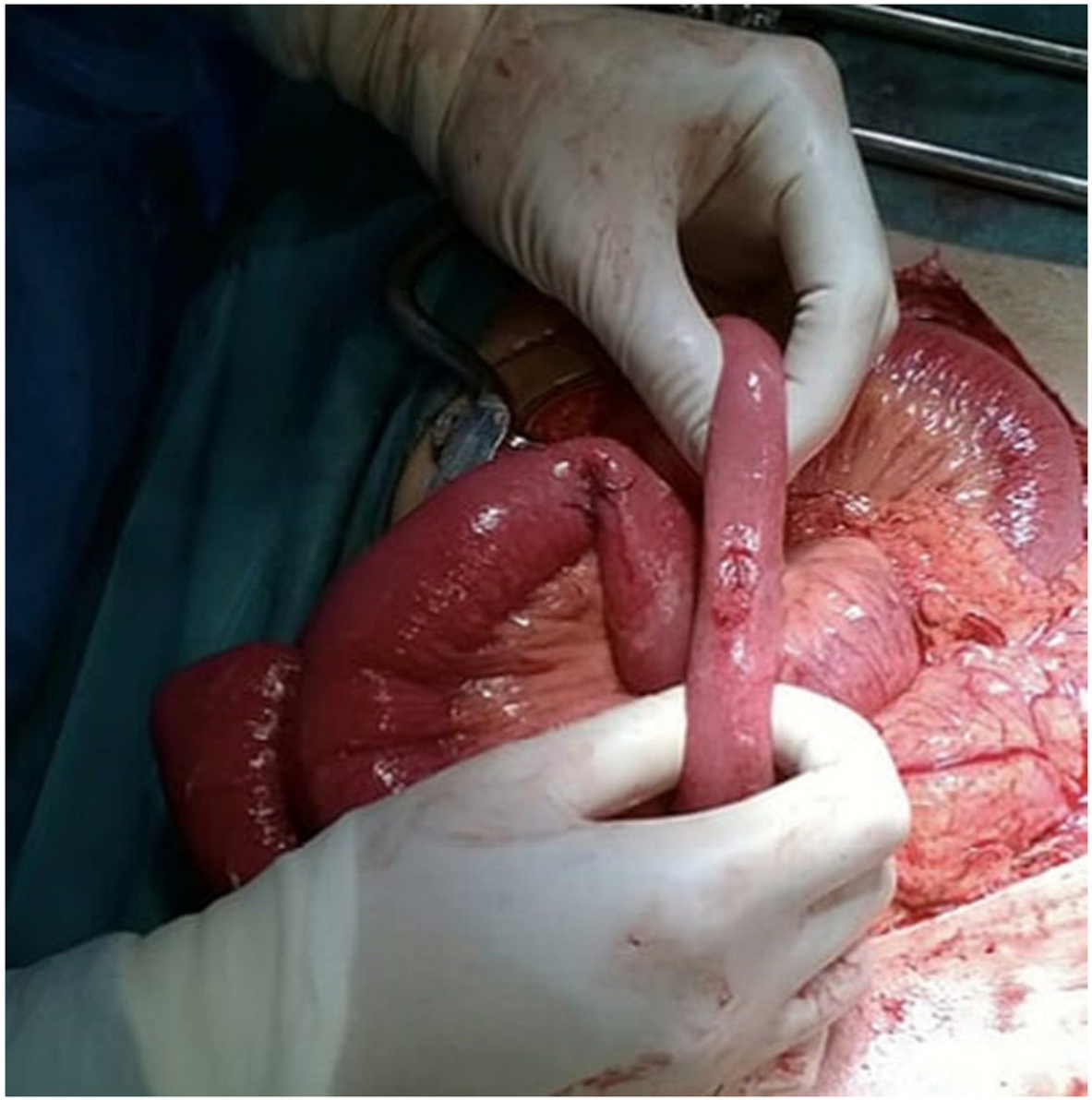
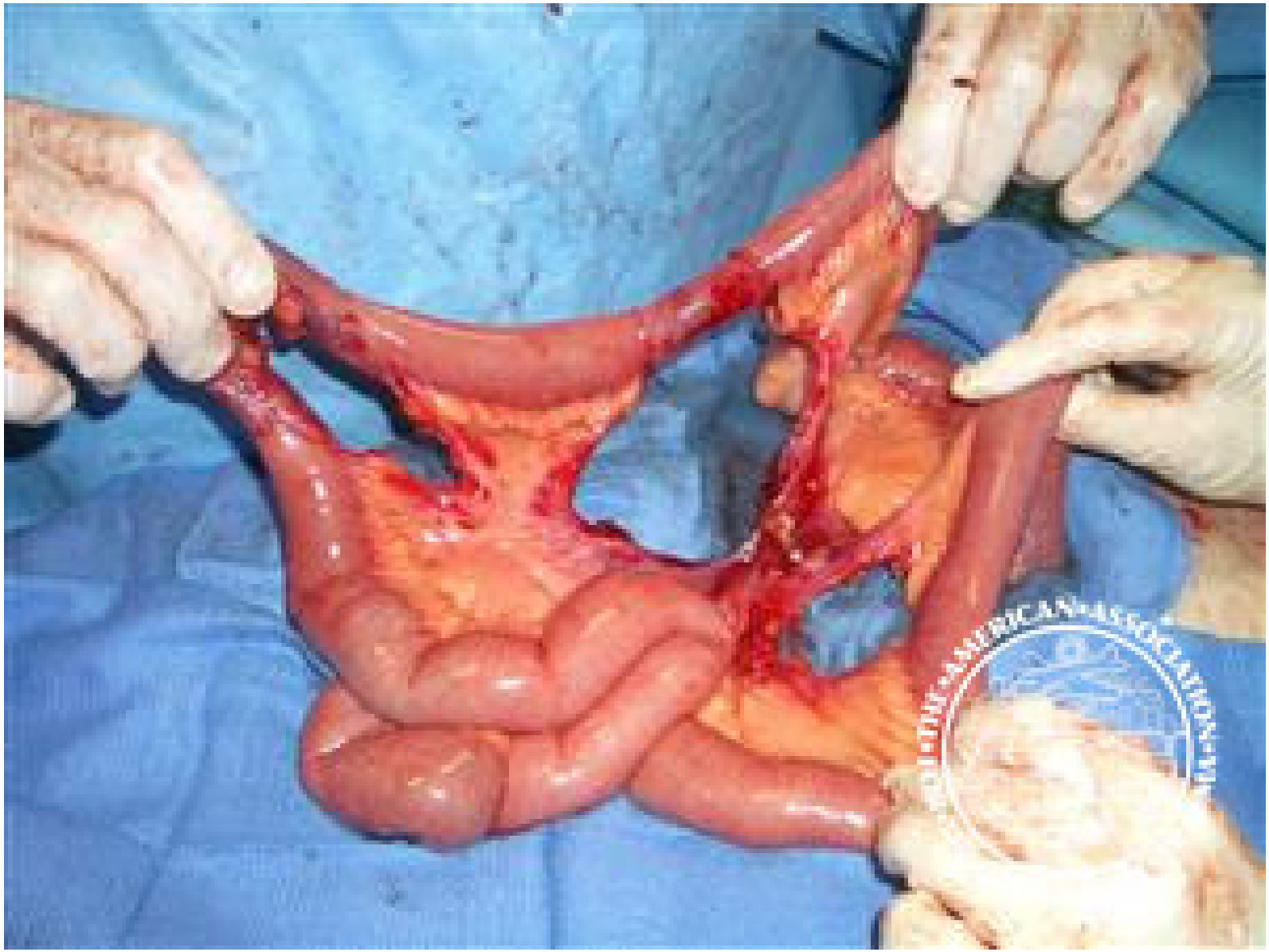
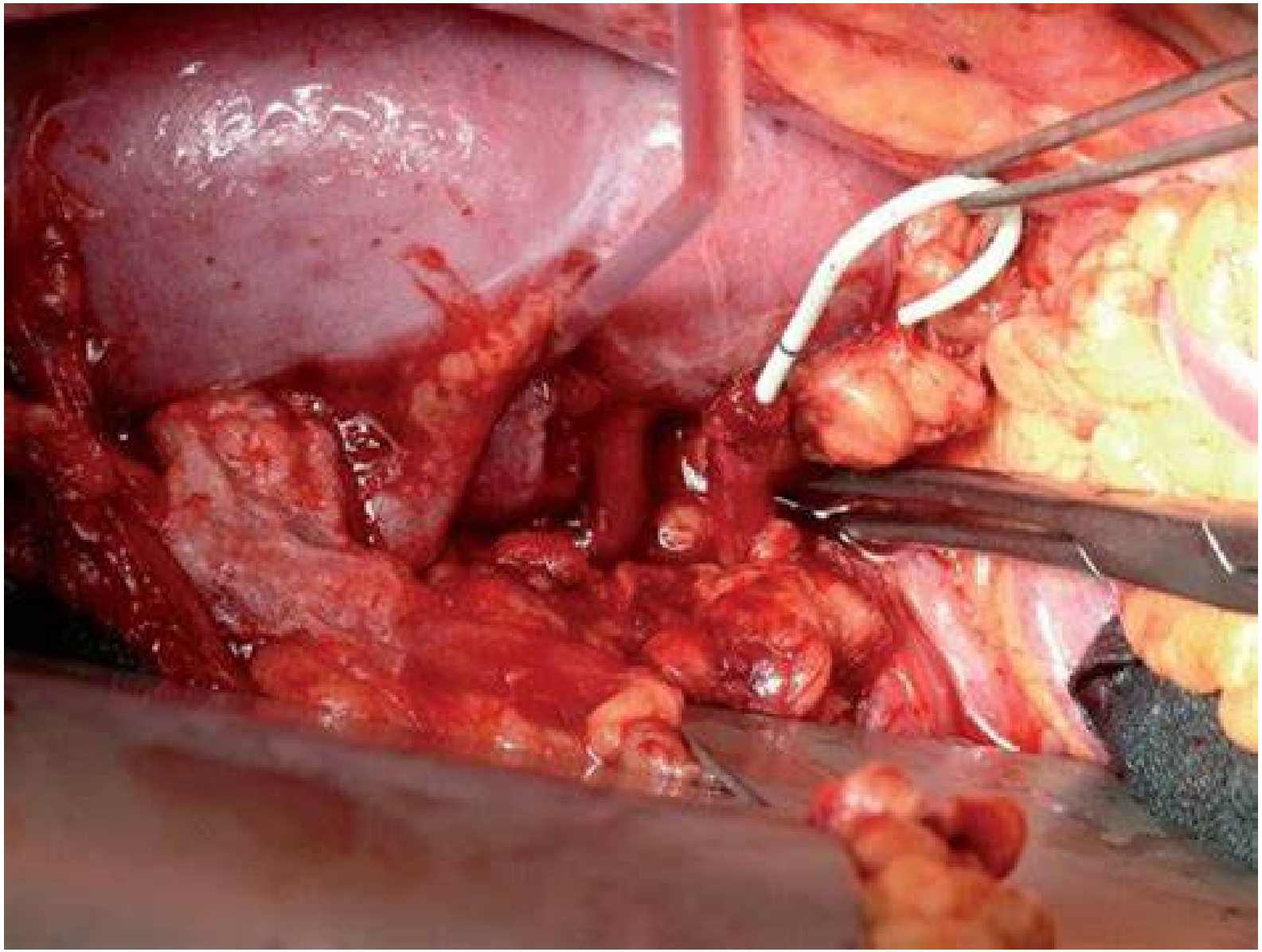
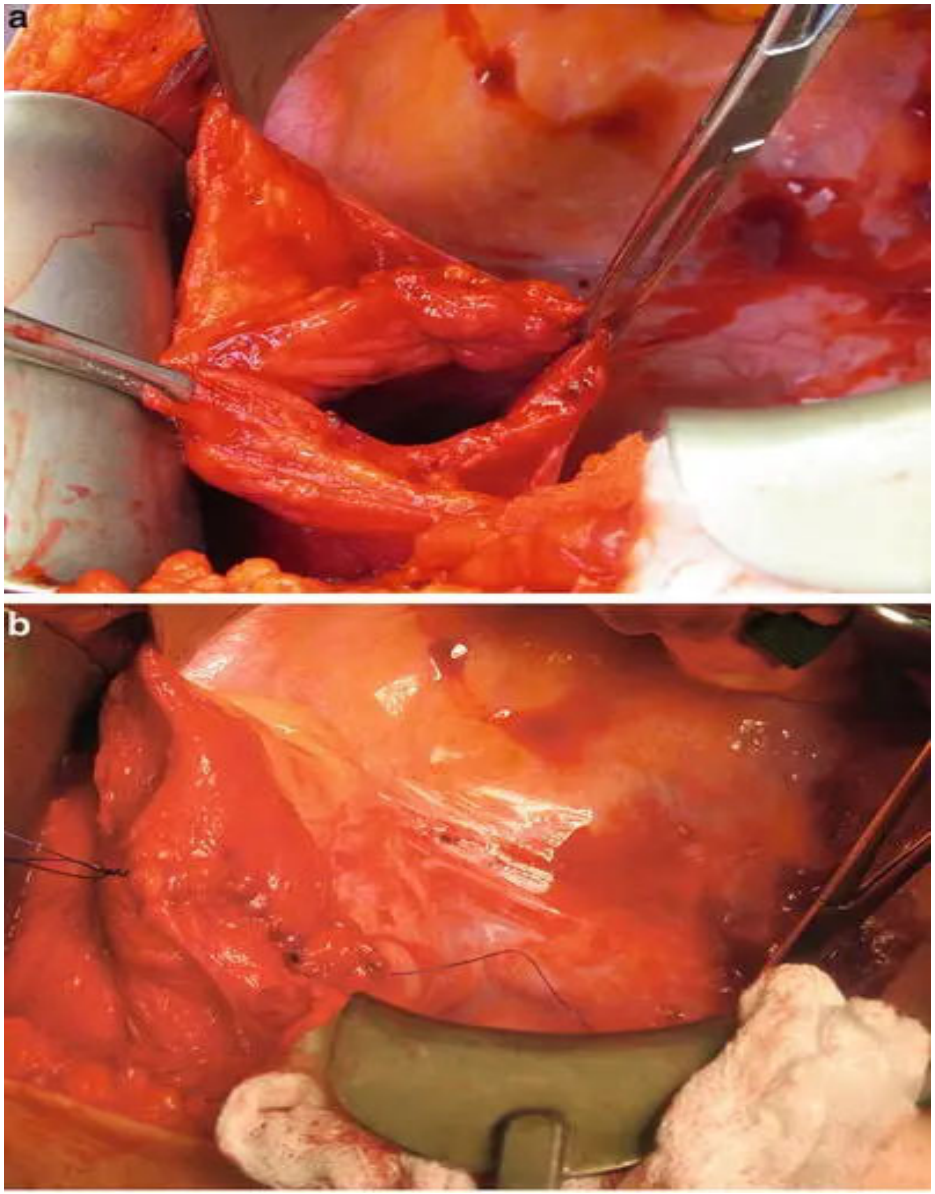

Esophagus
Jejunum
Ileum
Stomach
Duodenum
Colon
Colon
Appendix
Rectum


Kidney
Ureter
Bladder
Urethra




THE AMERICAN ASSOCIATION




a
b

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Sideline Evaluation

- ABC's (Always!!)
- Multiple injuries??
- Vital signs, including O2 saturation
- For this discussion, a focused abdominal exam based on symptoms
- Mechanism, Mechanism, Mechanism
  - Helmet, Lacrosse ball, handlebar, soccer ball, landing on ball, skateboard
- Rapid improvement, normal vital signs: Watch and Recheck
- High index of suspicion, abnormal vital signs, extremis: ED via EMS

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Outpatient vs Emergent workup – labs, imaging, specialty care

- Severity of symptoms
- Stability of vital signs
- Persistence of symptoms
- Frequent rechecks

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Emergency Department Initial Assessment

- Need good info – what exactly happened
- The home of ABC's (and DE's)
- Uncomfortable vs in extremis
- Vitals normal, tachycardic (pain, compensated shock), hypotensive
- Physical exam
- Ancillary work up??

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Emergency Department Workup

- Labs – often CBC (H&H) can be quite normal acutely
- Base excess/deficient often is sensitive for compensated shock
- Never rely on labs…
- Imaging has changed life in the ED

Typical Trauma labs

- CBC, CMP, Lipase, PT/PTT, Type and screen, Lactic Acid, CPK, CG8 or ABG, UA, ETOH, UDS, serum preg (if applicable)

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Imaging

CT with IV contrast is gold standard

- Solid organ injury Sensitivity 96-100%, Specificity 94-100%
- Much less sensitive for hollow organ and pancreatic injuries (60's %).
- High index of suspicion. Repeat exams. Repeat labs. Repeat imaging. (REASSESS)

FAST – Focused Assessment with Sonography for Trauma

- Use is increasing and is an expectation from the American College of Surgeons
- Overall less sensitive than CT (28-100%), similar specificity
- Operator, habitus, patient tolerance
- Used much more like an initial assessment tool – stethoscope
- Negative FAST does not rule out injury

MRI

- Not there yet – time factors, monitoring factors

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Treatment of injuries is complex and depends on degree of injury

- Watchful waiting
- Resuscitation with isotonic crystalloid – fallen out for favor for hemorrhage
- Resuscitation with blood – whole blood or component therapy
- IR for embolization
- OR for unstable, high suspicion for bowel injury, not amenable to IR

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Return to Play

- Liver and spleen
  - Simple 2-4 month
  - Complex 6 months
  - Repeat imaging – no consensus
- Renal
  - Simple 2-6 weeks
  - Complex/surgical - "longer"

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Take Home Points

- Intrabdominal trauma is rare, but can be life threatening
- Must have high degree of suspicion
- CT with IV contrast is gold standard
- Return to play is variable and based on degree of injury

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Questions

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