Abdominal Trauma

Thamer Nouh MD, FRCSC, FACS

Associate professor & Consultant

Trauma Surgery & Critical Care Medicine

King Saud University

Introduction

- Solid organ injury is a leading cause of significant morbidity and mortality following injury.

- Identification of serious solid organ injury may be challenging.

- Many injuries, however, manifest during the initial assessment and treatment period. Thus, early identification is essential.

Initial Assessment and Resuscitation

- Primary Survey: Identification and treatment of life threatening injuries.

- **A**irway with cervical spine precautions
- **B**reathing
- **C**irculation
- **D**isability
- **E**xposure

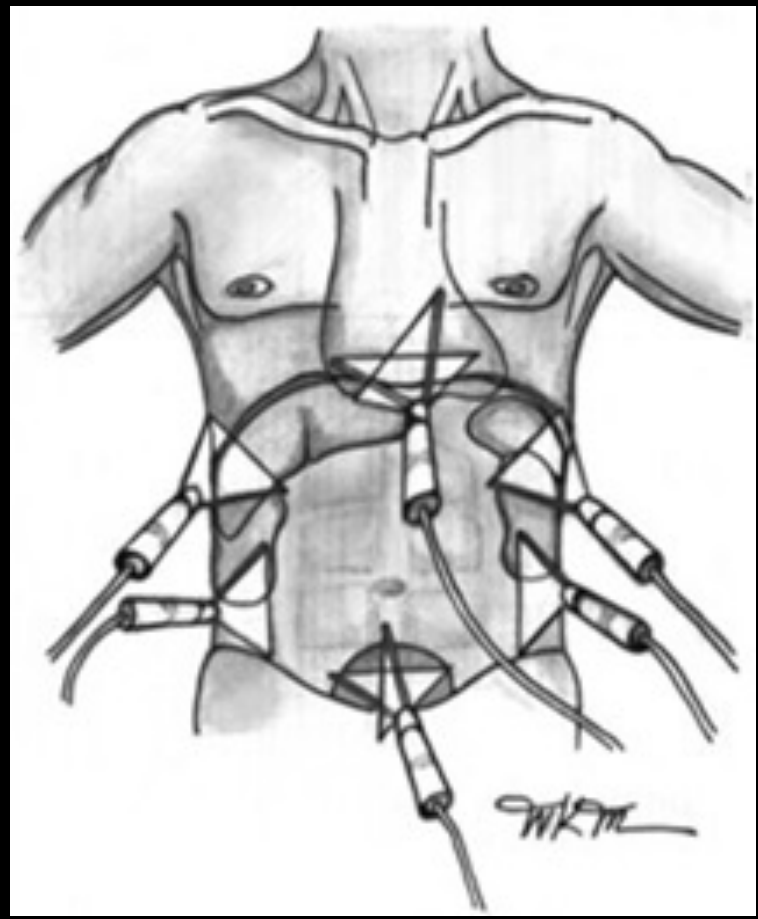
Abdominal assessment

- Vital signs and physical exam

- Investigational Studies
  - FAST
  - DPA/DPL
  - CT Abdomen/Pelvis

Focused Assessment with Sonography in Trauma (FAST)

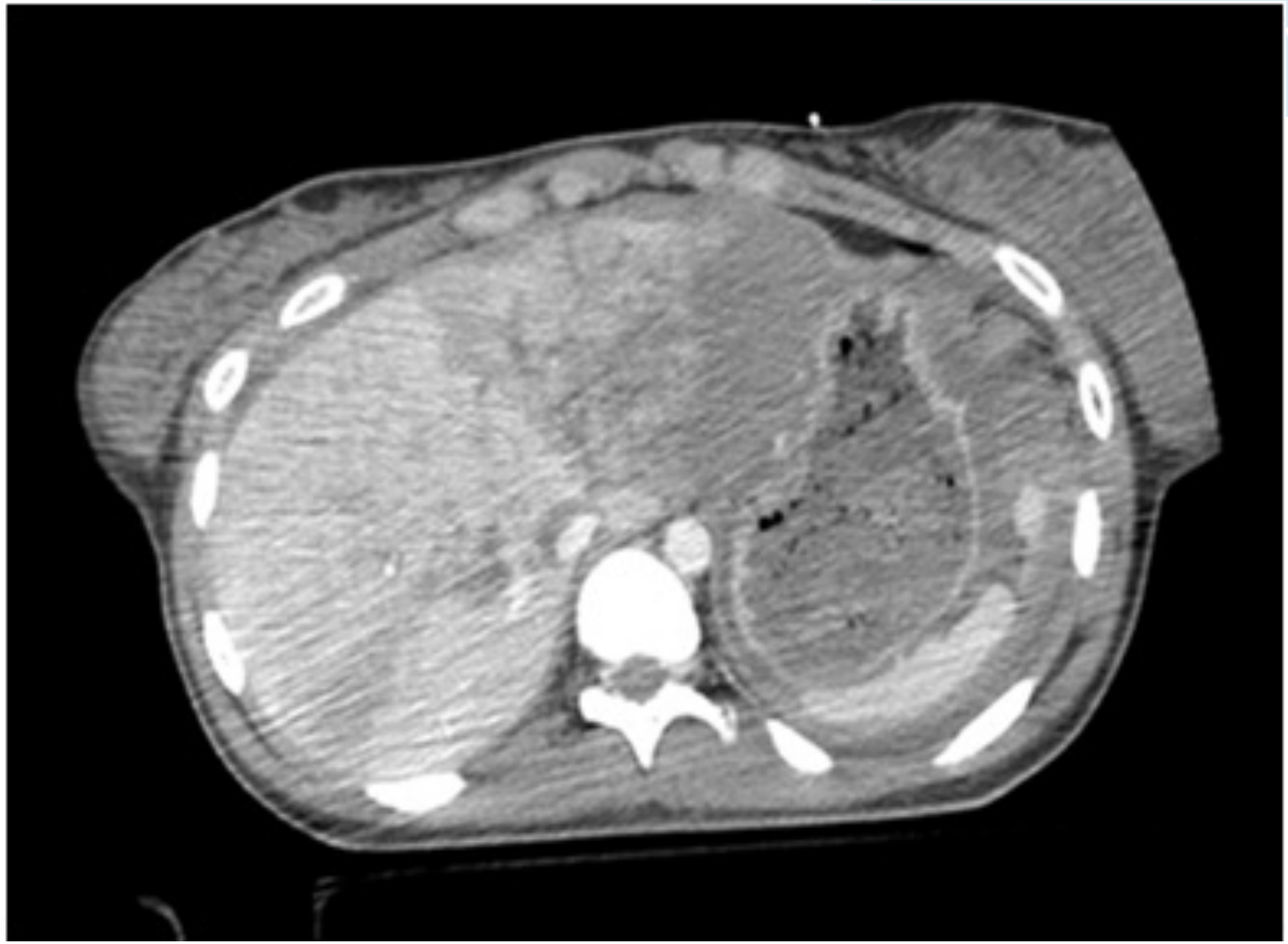
- First used in 1996
- Rapid
- Sensitivity 86-99%
- May be able to detect as little as 100 ml of blood
- Cost effective
- Views: Pericardiac, perihepatic, perisplenic, and peripelvic spaces.
- User dependent with inherent limitations of ultrasound.
- Useful in unstable patient



CT Scan

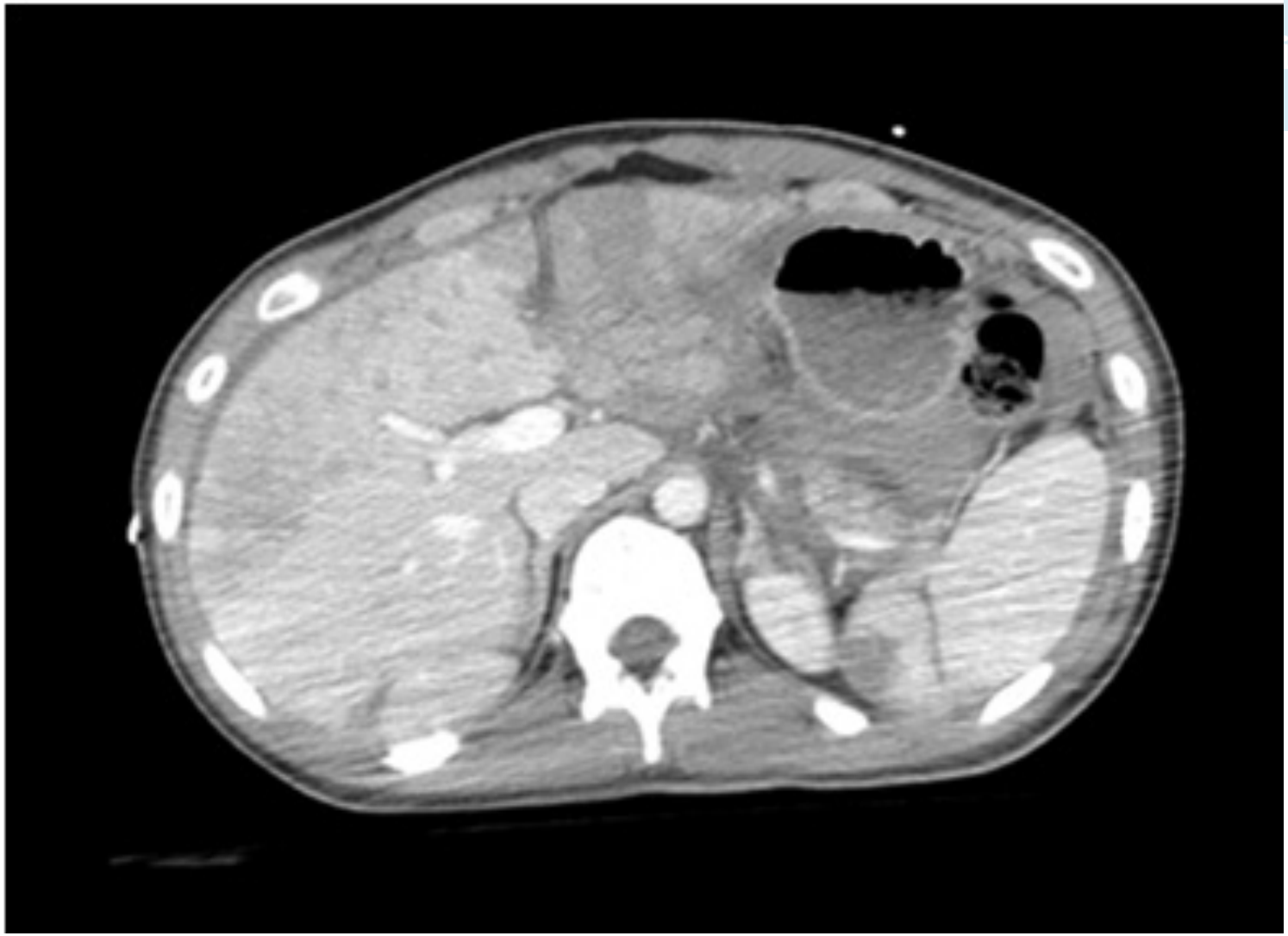
- Gold standard.
- Hemodynamically normal patients!
- Provides excellent imagining of solid organs (liver and spleen).
- Determines the source and amount of bleeding (angio phase).
- Reveals associated injuries: pancreas, genitourinary.
- Poor for hollow viscous injury.

CT scan



CT scan

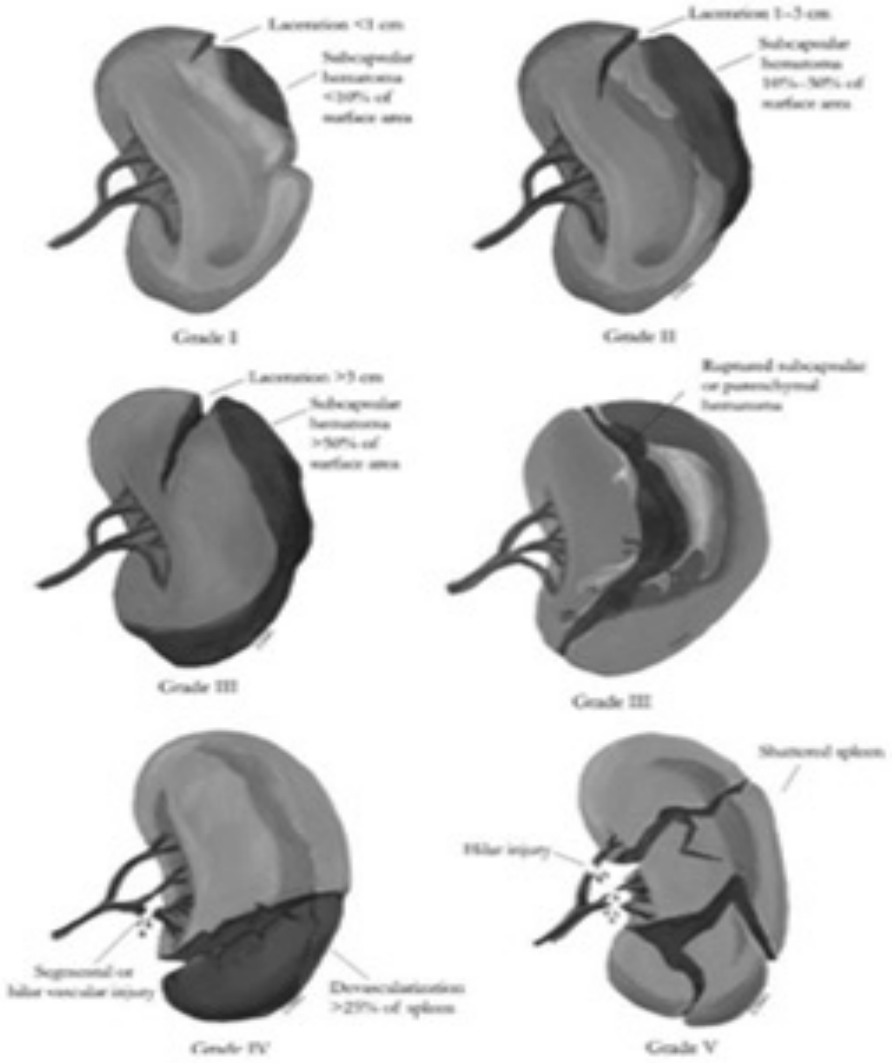
CT scan



Solid Organ Injuries

- Difficult to diagnose on physical exam
- May lead to significant blood loss
- Grading of solid organs dependent on degree of hematoma, laceration, or avulsion.
- Injuries may present late, leading to further difficulty in assessment and management.
- The most common solid organs injured spleen and liver.

Splenic Injuries



Grade	Type of Injury	Description
I	Hematoma	Subcapsular, <10%
	Laceration	Capsular tear, <1cm in depth
II	Hematoma	Subcapsular, 10-50%, <5 cm diameter
	Laceration	Capsular tear, 1-3 cm in depth
III	Hematoma	Subcapsular, >50%, ruptured; intraparenchymal hematoma > 5cm
	Laceration	>3cm in parenchymal depth or involving trabecular vessel
IV	Laceration	Segmental or hilar vessels, major devascularization (>25%)
V	Laceration	Completely shattered spleen
	Vascular	Hilar vascular injury that devascularizes the spleen

Key Principles

- Hemodynamically unstable patients require immediate laparotomy.
  - Splenectomy

- Non-operative management is an option in the hemodynamically stable patient **ONLY**.

- No patient should die as a consequence of non-operative management.

Non Operative management

- Intensive monitoring
- Serial clinical exam, Hgb level.
- High grade injury patients may require angiography +/- angioembolization to improve success rates.
- Patients are told to avoid contact sports for a period of time (up to 7 weeks).
- If the patient becomes hemodynamically unstable, or requires multiple transfusions, then this is considered failure.
- Failure of NOM → laparotomy and splenectomy.

Complications of NOM

- Failure!
- Splenic ischemia, infection, abscess.
- Chronic pain

Liver injuries

- **Classification**
- **grade I**
  - haematoma: subcapsular, <10% surface area
  - laceration: capsular tear, <1 cm parenchymal depth
- **grade II**
  - haematoma: subcapsular, 10-50% surface area
  - haematoma: intraparenchymal <10 cm diameter
  - laceration: capsular tear 1-3 cm parenchymal depth, <10 cm length
- **grade III**
  - haematoma: subcapsular, >50% surface area of ruptured subcapsular or parenchymal haematoma
  - haematoma: intraparenchymal >10 cm or expanding
  - laceration: capsular tear >3 cm parenchymal depth
- **grade IV**
  - laceration: parenchymal disruption involving 25-75% hepatic lobe or involves 1-3 Couinaud segments
- **grade V**
  - laceration: parenchymal disruption involving >75% of hepatic lobe or involves >3 Couinaud segments (within one lobe)
  - vascular: juxtahepatic venous injuries (retrohepatic vena cava / central major hepatic veins)
- **grade VI**
  - vascular: hepatic avulsion
- N.b. advance one grade for multiple injuries up to grade III.

Liver Injuries

- Similarly, regardless of grade, a trial of non-operative management is appropriate for stable patients.

- Unstable patients → laparotomy
  - packing.
  - packing + angio.
  - deep liver sutures.
  - balloon tamponade.
  - hemostatic agents.
  - hepatic artery ligation.

Liver Injuries

- Laparotomy for continued blood loss with hypotension, tachycardia, decrease urine output, and decreasing HCT.

- Operative rate:
  - 3-11% with multiple injuries
  - 0-3% when isolated

Biliary Tree Injury

- 4% incidence of continued bile leak. Increased 10 fold in Grade IV and V injuries.

- ERCP with decompression and stenting may be both diagnostic and therapeutic.

- May require operative washout for delayed bile leak and peritonitis.

Other Complications

- Failure!
- Liver ischemia, infection, abscess
- Biliary leak, biloma, peritonitis.

Bowel Injury

1. Blunt

2. Penetrating: Stab, Gunshot

3. Operative

Mechanism

- Crushing: Compression
- Shearing: Sudden Deceleration
- Bursting: 🤰Abdominal Pressure

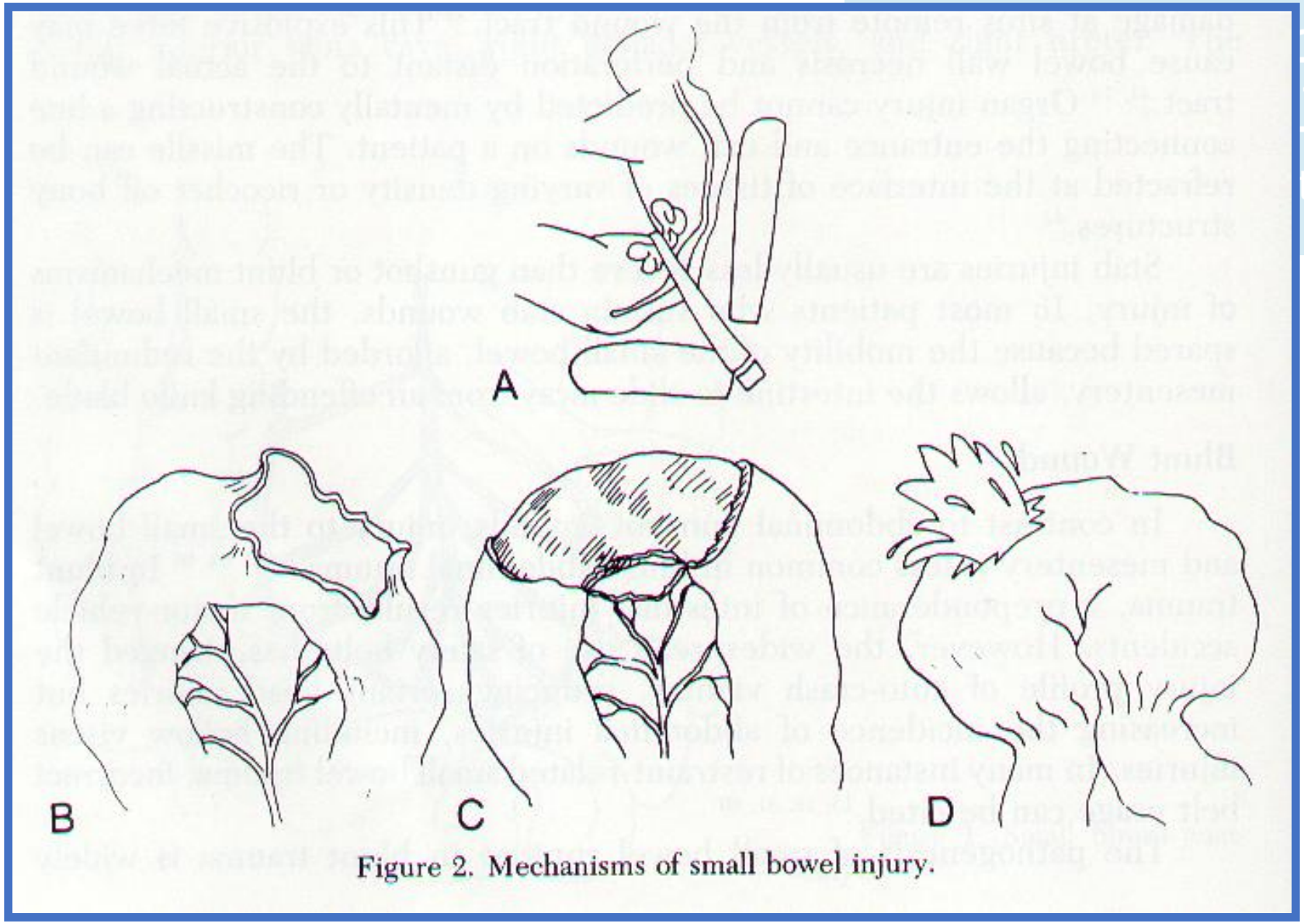


Figure 2. Mechanisms of small bowel injury.

Causes

- Motor – Vehicle: 75%
- Fall from Heights
- Seat Belt
- Penetrating

Unrecognized : frequent cause of preventable death

Symptoms and Signs:

Unreliable

Often Masked:

1. Head Injury
2. Major Fractures
3. Alcohol

Signs

1. Echymosis & Abrasions
2. Tender ribs
3. Peritonitis
   a. Tenderness and Guarding : 75%
   b. Rebound and Rigidity: 28%
4. DRE
5. Blood from NG, DRE.

Management

- Needs operative management
- If <50% and non destructive, primary repair.
- If >50% or destructive, resection and anastomosis.

?