



## **Inflammatory Processes of the GI Tract**

Virtually every part of the GI tract can become inflamed. Etiologies range from the benign to the life-threatening. Presentations, etiologies, and treatment vary greatly. Through a careful history and physical examination and the judicious use of diagnostic testing, the clinician usually can establish a course of action in short order. In this course, the participant will hear about some of the more serious inflammatory processes that may affect the gut.

- Discuss the signs and symptoms that suggest serious inflammation.
- List useful diagnostic studies for such entities as hemorrhagic pancreatitis, inflammatory bowel disease, and ascending cholangitis.
- Describe an appropriate treatment and disposition plan for each entity.

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## **FACULTY**

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# **Occult Abdominal Injuries**

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## **Introduction**

**Leading cause of preventable  
trauma deaths**

## **Missed Injuries**

- **2% missed abdominal injuries**
  - 80% blunt 20% penetrating
- **Morbidity 83% and mortality 17%,**
- **Outcome worse when missed**

**Sung 1996**

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## **Overlooked Injury**

**5% cause of death**

**23% contributing cause**

**Albrektsen 1989**

**Multiple trauma**

**1 and 2cd survey miss 10 % of injuries**

**Enderson 1991**

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## **Patient Variables**

- **Altered level of consciousness**
  - **Head trauma**
  - **Intoxication**
- **Hemodynamic instability**

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## **Patient Variables**

- **Normal to near-normal PE**
- **Distracting injuries**
- **Spinal injury**
- **Pregnancy**

## Physician variables

- Inadequate history
- cursory physical exam
- Misread X-rays
- \*Admit to non-surgeon / discharge

## History

- Seat belt use
- Air bag deployment
- Steering wheel damage

## MOI-

- Long Fall - mesentery, jejunum
- Lap belt injuries- hollow viscus
- \*“Spearing” injury (handlebar)
  - Pancreas
  - Duodenum
  - Abdominal wall

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## **MOI-**

- **Low chest injuries-**
  - diaphragm, liver, spleen

## **Physical Examination**

- **Initial exam**
  - 65% accurate
- **Serial exams reliable**
- **Tertiary survey**

## **Physical Examination**

- **Lumbar fractures-**
  - Chance fracture and hollow viscus
- **Seat belt sign**
  - Hollow viscus
- **Abdominal ecchymosis**
  - Cullen's, Grey - Turner's

## **Physical Examination**

- Chest trauma
  - Rib fractures, pulmonary contusion
  - Hemo / pneumo
- Kerr's Sign
- Carnett's Sign

## **Physical Examination and Intoxication**

- No missed injuries if:
  - GCS 15
  - No abdominal pain or tenderness
  - Negative serial examinations

Perez 1991

## **Risk Factors for IAI**

- Hypotension, GCS < 11
- Spinal injury, chest injury
- Abnormal abd exam, gross hematuria

Grieshop, 1995

- 100% NPV - ETOH not significant factor

## Comatose patients

- Objectively evaluate abdomen
  - Despite normal VS
  - Despite lack of abdominal distention

Pral 1994, Butterworth 1980

## Computed Tomography

- Diagnostic test of choice if:
  - Suspected abdominal injury and
  - Hemodynamically stable
- 95 % sensitive for liver and spleen injuries

## CT less reliable in

- Bowel
- Diaphragm
- Pancreas
- Bladder

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## **ED Use of CT in BAT**

- Surgical consult prior to CT ?
- Recognize 5 - 8 % false negatives
- Observation / admission
  - Tender abd and neg CT

## **CT and DC from ED if**

- No hypotension
- No other significant injuries
- Normal mental status
- Non-tender abdomen

Brasel 1996

## **Diagnostic Peritoneal Lavage**

- Excellent for:
    - Unstable patients
    - Unexplained fluid on CT
  - > 98% sensitive for hemoperitoneum
  - Only contraindication :
    - Obvious need for laparotomy
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## Ultrasound

- Excellent for:
  - Hemoperitoneum
- Not good for:
  - Bowel
  - Subcapsular hematoma
  - ? Diaphragm

## Laparoscopy

- Penetrating wounds
- Hollow viscus injuries
- Suspected diaphragmatic injuries
- BAT

## Laboratory Tests

- Hct
    - Serial studies
    - Multiple sources for drop
  - Elevated transaminases
    - May identify occult IAI in children
- Coant 1992
- Marker for liver injury in adults

## **Metabolic Acidosis**

- Lactate- most accurate
- Base deficit - most rapidly available
- Serum bicarb.
- Sources of error
  - Cocaine, Sz, MUDPILES

## **Laboratory Tests in Children**

- UA
  - > 5 RBC / HPF
  - Dipstick reliable
- Plus physical exam
- Identifies 98% of IAI

Isaacman1993

## **Occult Penetrating injuries**

- Back
- Axilla, groin, perineum
- Rectal injuries
- Ice pick injuries

## **Penetrating Injury - GSW**

- **Tangential GSW**
  - Cannot predict trajectory
  - Role of DPL- RBC cutoff
- **Shotgun wounds**
  - Multiple pellets
- **Mandatory vs selective laparotomy**
  - RUQ wounds, pregnancy

## **Penetrating Injury - Stab Wounds**

- **Rule of thirds**
- **Serial exams**
  - Sensitive - ? delay in laparotomy
- **CT scans - not Indicated**

## **DPL and Abdominal Stab Wounds**

- **RBC > 100,000 cells / cc**
- **WBC > 3,000 cells / cc lavage + > 11,000 peripheral**
- **False + s with 500 cell / cc threshold**

Feliciano 1994

## **Stab Wounds to Back and Flank**

- Serial exams - accurate
- DPL - misses retroperitoneal injuries
- Triple contrast CT ~ 90% sensitive

Salazar 1997

## **Occult Splenic Injury**

- Delayed recognition 1 - 20 %
  - No initial CT
  - Latent period of Baudet
    - Rupture of subcapsular hematoma
  - Recognize prior trauma

## **Occult Splenic Injury**

- Delayed rupture - 1 %
  - Negative CT
  - Symptom onset > 48 hrs
    - High mortality
- Kluger 1994
- Hypotension , abdominal pain
  - 10 % vs 1 %

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## Mesenteric Injuries

- MOI
  - MVC
  - Fall from height
- Paucity of initial findings
- CT insensitive

Nolan 1995

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## Hollow Viscus

- MOI
  - Kicks
  - Handlebars, helmets
  - Steering wheel
  - Seat belts
    - Chance fracture

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## Positive Seat belt Sign

- Admit
- CT with contrast
- DPL
- ? DC - mandatory recheck  
12 hours

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## Hollow Viscus

- CT variable performance
  - 25-88 % sensitivity
- Mirvis 1992
- Free air neither sensitive nor specific

### 'CT Scans

- Unexplained free fluid
  - DPL ?
- Frequently negative hours later

Albanese 1996

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## Hollow Viscus

- DPL
  - WBC neither sensitive nor specific
  - Alk phos > 10 IU / L 95 % sens
  - Amylase > 20 IU/L

## Hollow Viscus

- Serial physical exams (Peritonitis)- 94 %
- DPL- 88 % sensitive
- Free air on upright- 24 %
- US (unexplained free fluid)- 30 %

Ulman 1996

## Blunt Duodenal Injury

- “Spearing” injury
- Clinical presentation
  - Delayed pain / intractable vomiting
- Imaging studies
  - CT, UGI

## Pancreas

- MOI
  - Large force/small area
- Paucity of physical findings
  - Initial mild tenderness
- Delayed symptoms
  - Anorexia, pain, jaundice-
  - Weeks to months
- Associated liver, duodenal, splenic injury

## **Pancreas**

- **Variable serum and lavage amylase**
  - Serum levels not routinely useful
  - Isoenzymes, lipase not helpful
- **Morbidity frequent**
  - Pancreatitis, abscess, pseudocyst
  - Jaundice, delayed hemorrhage

Emmick 1996

## **Pancreas**

- **CT inconsistent**
  - Initial scan often normal
  - Delayed scan - diagnostic
- **DPL variable sensitivity**
- **ERCP - definitive**

Gholson 1994, Smith 1996

## **Diaphragm Injuries**

- **75 % blunt, 25 % penetrating**
- **17 % mortality**
  - Severe associated injuries
- **Significant pulmonary morbidity**
- **Phases:**
  - Acute, latent, obstructive



## **Diaphragm**

- 12 - 15 % missed injuries
  - 40% mortality if late strangulation
- Guth 1995, Shah 1995
- Avoid MAST

## **Diaphragm- Blunt**

- .8 - 5 % of blunt trauma
- Left more often than right
  - 7 0 1 3 0
  - Right sided injuries often missed
- 1.5 % bilateral

Meyers 1993, Shah 1995

## **Associated Injuries in Blunt Trauma**

- 90 % associated injuries
  - Liver, spleen
  - Thoracic aorta
  - Lung
    - Pulmonary contusion
  - Pelvis

## Diaphragm-Penetrating

- IO % of penetrating trauma
- Stab wound below:
  - Nipple, 6th ICS, scapular tip
- Any truncal GSW

## Diaphragm - Blunt

- CXR
  - Bowel or NG in chest - 44%
  - Hemothorax / elevated diaphragm - 42%
  - Normal - 15%

## Diaphragm-Penetrating

- CXR + / - NG
  - ~ 55 % sensitive
- Thorocostomy
  - Finger palpation of diaphragm

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## **Diaphragm - Penetrating**

- **Diagnosis**
  - **DPL**
  - **5,000 RBC**

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## **Diaphragm**

- **Laparoscopy, thoracoscopy**
- **Intraperitoneal radioisotope**
- **CT, liver-spleen scan**
- \* **u s**
  - **Flapping diaphragm**

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## **Diagnosis- cont**

- **DPL - 25 % false negatives**
- **Diaphragm fluoroscopy**
- **Barium study**
- **MRI**

Shanmuganathan 1996

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## **Blunt Biliary Injuries**

- Rare
- Often occult
  - Frequently missed by CT
- HIDA, ERCP

Feliciano 1994

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## **P r e g n a n c y -**

- \* Difficult to recognize shock
  - 35% blood loss - normal VS
- Difficult to detect IAI
  - Peritoneum not irritable
  - CT - risk to fetus

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## **Pregnancy**

- Supra-umbilical DPL
  - Accurate and safe
- Ultrasound
  - 95 % sensitive for IAI
  - Misses 50% abruptions
- Cardiotocographic monitoring

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## Pearls and Pitfalls

- Significance of MOI
- \*Value of observation
  - Serial exams
  - Tenderness and ecchymosis
- Recognize limitations of tests

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## Disposition

- Exact nature of injury
    - Unimportant to EMP
  - Admit to surgeon
  - Discharge
    - Mandatory F/U 12-24 hrs
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