in Blunt TraumaBowel and Mesenteric Injury

Lina Pezzella, MS3
Core Radiology Clerkship
Beth Israel Deaconess Hospital
Dr. Gillian Lieberman

Epidemiology

(1)5% of blunt abdominal trauma at • Bowel and/or Mesenteric Injury is found in laparotomy

abdominal injuries.(2)Incidence is estimated at 1-5% of all blunt

• In one study, 74% of patients with surgically important solid organ injurysurgically

important BMI did not have (2)

M&M

(3)to operative intervention• In patients with near-isolated SBI, the incidence of mortality increased with time

within 8 hours: 2%

8-16 hours: 9.1%

16-24 hours: 16.7%

greater than 24 hours: 30.8%

Surgical Indications (2)

- Bowel Injury
  - Full-thickness perforation
  - Serosomuscular tear
  - Devascularized bowel
- Mesenteric Injury
  - Active mesenteric bleeding

Injury resulting in ischemic bowel loop

Imaging Modalities (4)

- Ultrasound
  - FAST exam has high sensitivity for free fluid
  - Significant intra-abdominal injury, particularly BMI, may present without hemoperitoneum
- Direct Peritoneal Lavage
  - Relies on detecting hemoperitoneum, free floating intestinal contents, and/or leukocytosis

injury can occur without transmural ruptureIn BMI, bleeding is typically minimal, and significant

CT Evaluation (2)

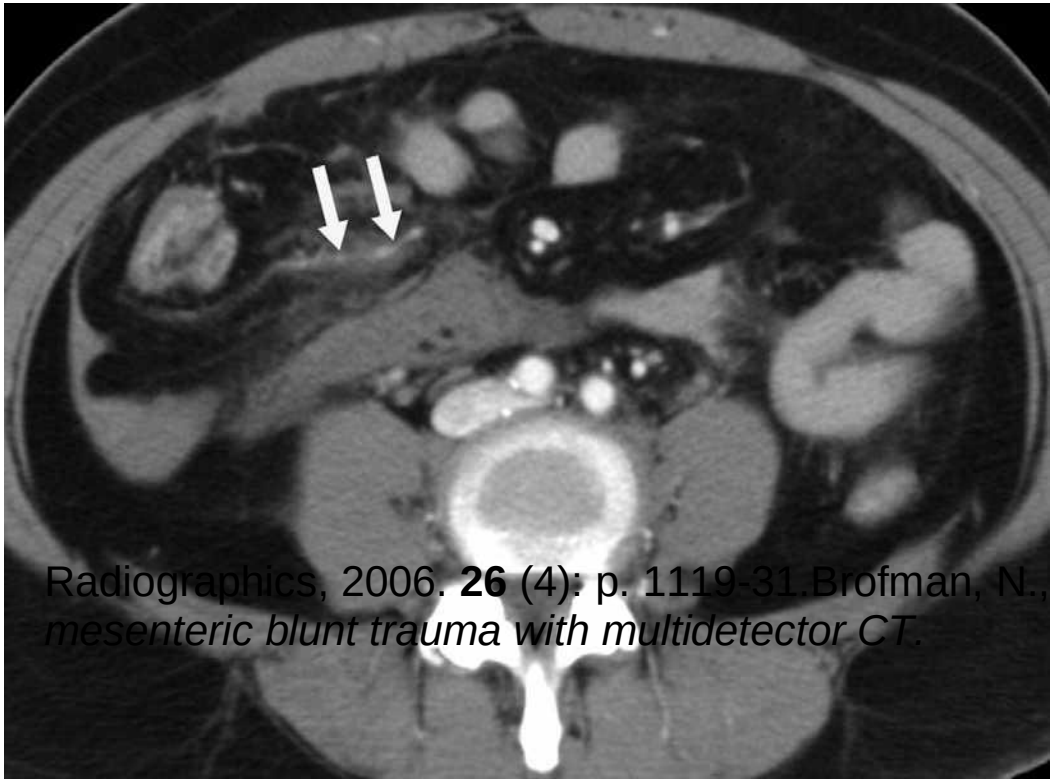
CT Sign	Sensitivity	Specificity
Bowel wall defect	11%	100%
Extraluminal contrast material	8%	100%
Mesenteric vessel extravasation	26%	100%
Thickened large-bowel wall	18%	97%

Intraperitoneal Fluid 100% 26%

84% 66%

Mesenteric fluid “Triangle Sign”
and/or stranding

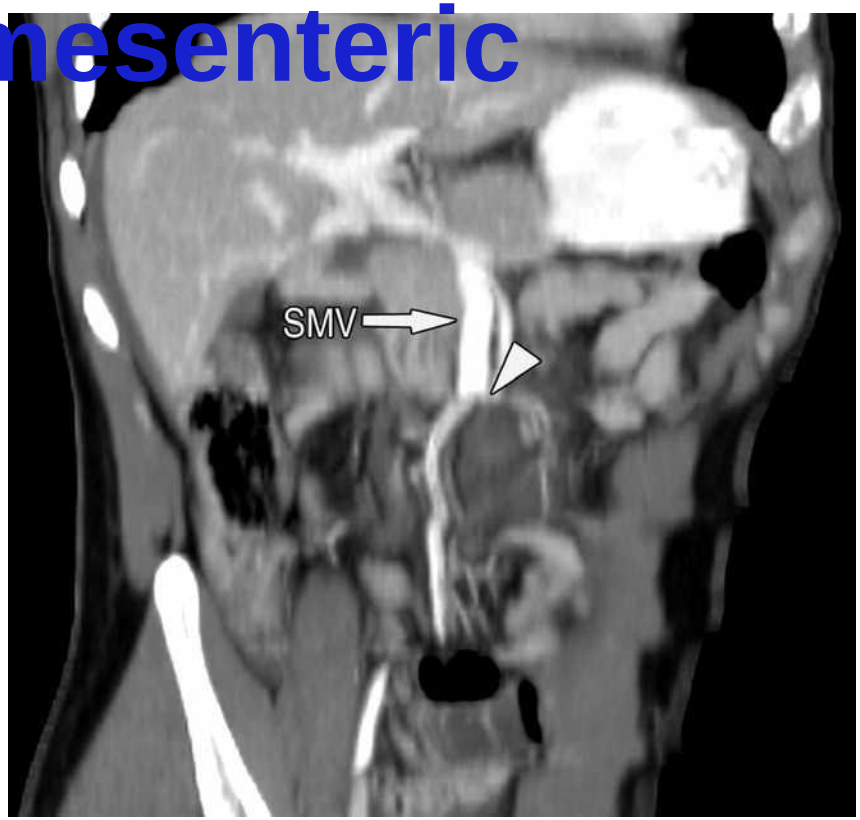
Vessel beading or irregularity



Radiographics, 2006. **26** (4): p. 1119-31.Brofman, N., et al., *Evaluation of bowel and mesenteric blunt trauma with multidetector CT.*

- Specificity: 95%
- Sensitivity: 50%

vesselsAbrupt termination of mesenteric



Termination of SMV

- Sensitivity:

45%•Specificity: 93%

Radiographics, 2006. **26** (4): p. 1119-31.Brofman, N., et al., *Evaluation of bowel and mesenteric blunt trauma with multidetector CT.*

Our Patient: Z.Z.

Emergency Department…Let's look at a patient seen in the

Our Patient: History and Exam

via non-reb

oncoming car at 30-40mph• 77 y.o. female pedestrian struck by an

• ?LOC at scene, GCS 15 on arrival

on 100% O• VS: T 95.6°F, HR 69, BP 104/47 RR 27

2

Abdomen soft, NT/ND• Exam: RUE deformity,

2+ distal pulses.

- Hematocrit: 25.6

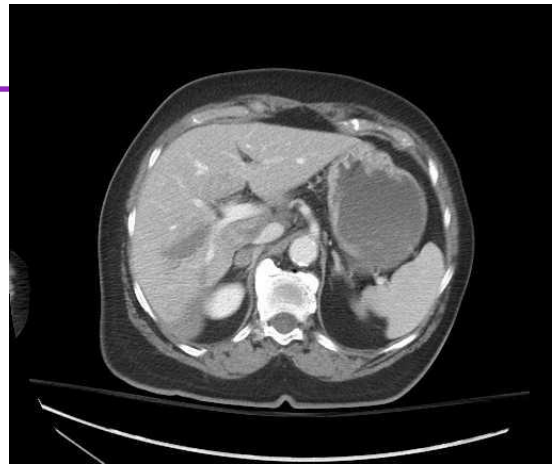
Our Patient: CT Abdomen & Pelvis

bowelDilated loops of small

Mesenteric Fat stranding

Coronal Contrast-enhanced CT Abdomen & Pelvis - PACS, BIDMC

Our Patient: CT Continued



Liver laceration with fluid in Morrison's Pouch

AdenomaIncidental Adrenal

Mesenteric fat stranding

Axial Images from Contrast-enhanced CT Abdomen & Pelvis - PACS, BIDMC

Our Patient: CT Final Read

rupture.into the peritoneal cavity, worrisome for intraperitoneal bladder
• Extravasation of the contrast most likely from the urinary bladder
associated with hemorrhagic fluid.• Extensive liver laceration extending to the liver surface posteriorly
laceration.rounded low density which can possibly represent small splenic
• Small amount of hemorrhagic fluid surrounding the spleen with small
due to mesenteric injury.• Mesenteric hematoma in the left lower abdomen with fat stranding
small bowel loops.• Dilated loops of small bowel measuring up to 2 cm. This finding with associated mesenteric hematoma is worrisome for blunt injury to the

represent hematoma in the setting of trauma.• Right adrenal lesion, probably representing adenoma, however, may

Our Patient: Additional Findings

associated with hemorrhagic bilateral pleural fluid and atelectasis.• Acute fracture of the T11 vertebral body with oblique fracture line,

and hematoma.• Extensive comminuted fracture of the pelvis, with bladder rupture,

represent small amount of extravasation in this area.• Small foci of hyperdensity in the left pectineus muscle, which can

- Small anterior medial pneumothorax on the left.
- Renal cysts.

Our Patient: Operative Findings

- Hemoperitoneum
- Avulsion of distal bowel from mesentery
- Intact Bladder

Our Patient Course

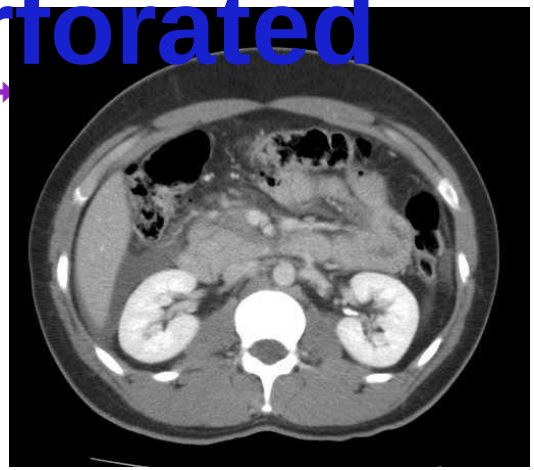
- HD2: ORIF of R humeral fracture

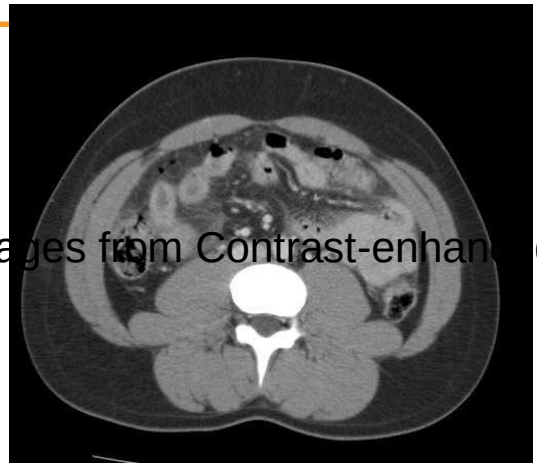
T11 fracture• HD3: Transfer to floor, TLSO brace for

- Pelvic fractures were non-displaced; patient was advanced to weight-bearing status

- HD10: Repair of R medial condyl fracture
- HD11: Discharge

JejunumComparison Patient #1: Perforated

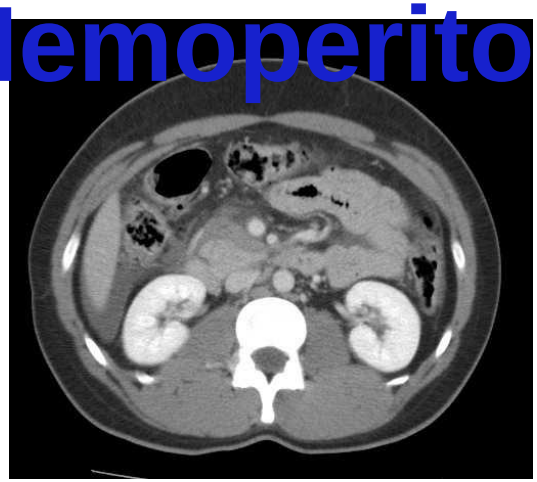


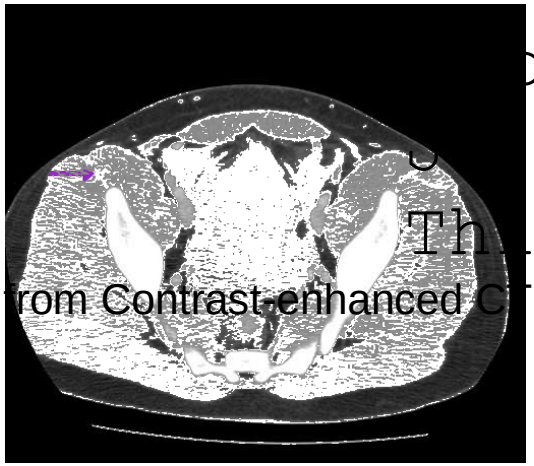


Pneumoperitoneum
Blood in Morrison's Pouch
Mesenteric Vessel Beading

Axial Images from Contrast-enhanced CT Abdomen & Pelvis - PACS, BIDMC

Hemoperitoneum





ood bladderof

unumsurrounding

Thickened loops

Axial Images from Contrast-enhanced CT Abdomen & Pelvis - PACS,

Comparison Patient #1:

Comparison Patient #2: Free Fluid

Coro ontrast-enhanced CT en & Pelvis - PACS, BIDMC

cavity.cornersabdominal • Notice the triangular Collection of fluid within the

StrandingComparison
Patient #2: Fat

Axial Images from Contrast-Enhanced CT Abdomen & Pelvis - PACS, BIDMC

- Mesenteric Fat Stranding

The “Normal” CT

mesenteric injury on CT?What if we don’t see bowel or

Accuracy of CT Evaluation (6)

1 trauma center)(5)• Overall incidence of missed injury on CT evaluation is low (2 SBI out of 7 total missed injuries in 833 patients over 3 years at one level

CT detection of BMI without oral contrast• A larger study found 99% NPV and 64% PPV for finding that abdominal trauma with a negative CTpatien be safely discharged following blunt (7) • Re

prior
multi-cente
r study

References

with multidetector CT. Radiographics, 2006. **26** (4): p. 1119-31.1. Brofman, N., et al., *Evaluation of bowel and mesenteric blunt trauma* 2008. **249** (2): p. 524-33.2. Atri, M., et al., *Surgically important bowel and/or mesenteric injury in blunt trauma: accuracy of multidetector CT for evaluation.* Radiology,
experience. J Trauma, 2000. **48** (3): p. 408-14; discussion 414-5.3. Fakhry, S.M., et al., *Relatively short diagnostic delays (<8 hours) of time to operative intervention in 198 patients from a multicenter produce morbidity and mortality in blunt small bowel injury: an analysis*
Emergency & Trauma Radiology. American Roengten Ray Society. 4. Camacho, M., “Bowel and Mesenteric Injury.” *Conf. State of the Art* Washington D.C., 13-18 Apr. 2008.

References Continued

2002. **53** (2): p. 238-42; discussion 242-4.5. Miller, P.R., et al., *Associated injuries in blunt solid organ trauma: implications for missed injury in nonoperative management.* J Trauma,
without oral contrast material. Radiology, 2004. **233** (3): p. 689-94.6. Stuhlfaut, J.W., et al., *Blunt abdominal trauma: performance of CT suspected blunt abdominal trauma: results of a prospective, multi- a negative abdominal computed tomographic scan in patients with institutional trial.* J Trauma, 1998. **44** (2): p. 273-80; discussion 280-2.7. Livingston, D.H., et al., *Admission or observation is not necessary after*

Acknowledgements

M. Camacho, MD, BIDMC

- G. Lieberman, MD, BIDMC
- M. Levantakis, BIDMC