Mesenteric Ischemia:
High Risk Pearls and Pitfalls

Matthew DeLaney MD

1

No Relevant Financial Disclosures

2

0.2% of patients

1% of acute abdomens
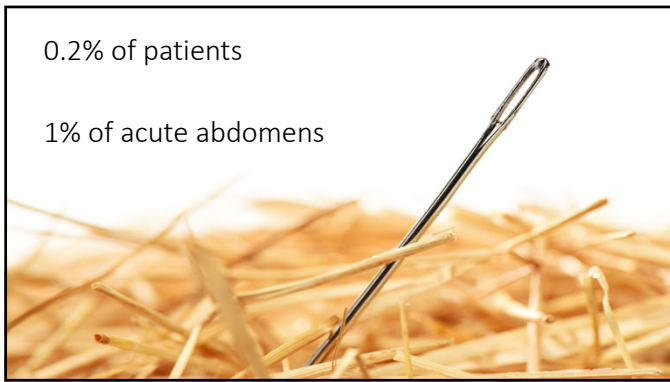
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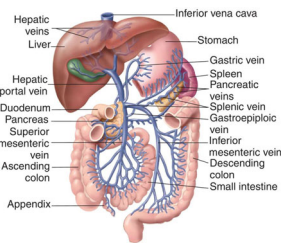
50%

4

Not suspected in 22% of cases.

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5

**AMI**: Acute (Arterial) Mesenteric Ischemia

- Acute embolus
  - 40%
- Acute thrombus
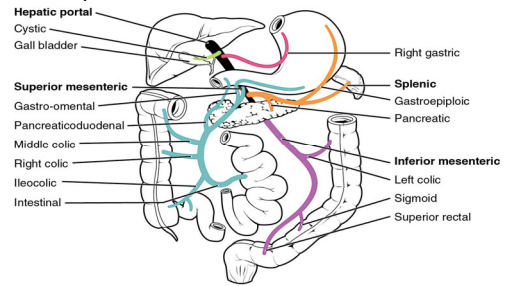  - 40%
- Non-occlusive
  - ~10%
- Partial
  - ~10%

6

## Venous occlusion

- Unclear incidence ~2%
- Lower morbidity/mortality
- Look for hypercoagulability
- ~2 days of pain before presentation
- CT is good (~90% accuracy)
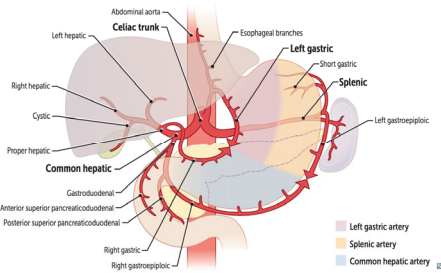- MRI is better
- Treat with anti-coagulation
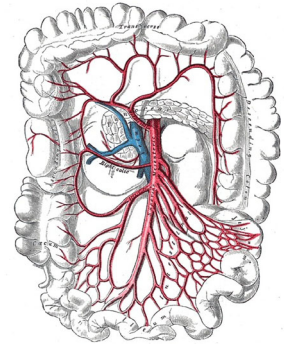


7

## Anatomy:



8

## Celiac:

- Rarely affected
- Branches
  - Gastric
  - Splenic
  - Hepatic



9

## Superior Mesenteric:

- Most commonly affected
- 45 degree takeoff
- Branches:
  - Inferior pancreaticoduodenal artery
  - Left-sided
    - jejunal branches
    - ileal branches
  - Right-sided
    - ileocolic artery
    - right colic artery
    - middle colic artery
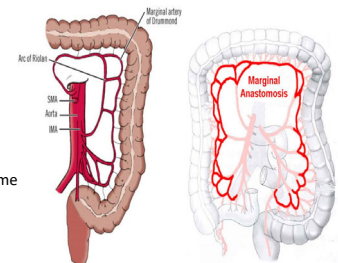


10

## Inferior Mesenteric:

- Small caliber
- L sided blood supply to bowels
  - left colic artery
  - two to four sigmoid arteries
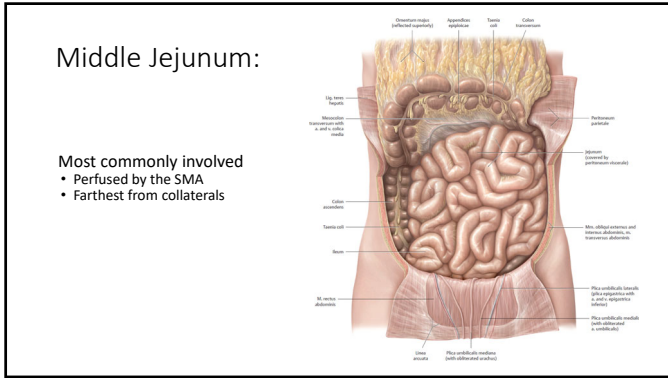  - superior rectal artery (terminal branch)
- Rarely involved
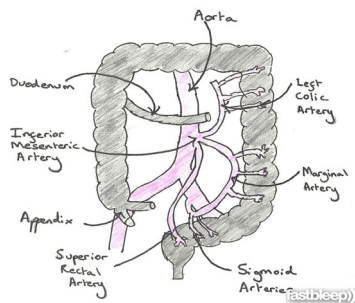


11

## Collaterals

- Marginal artery of Drummond
  - SMA to IMA
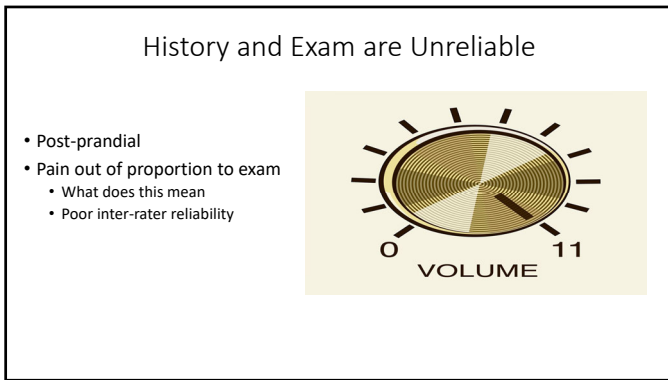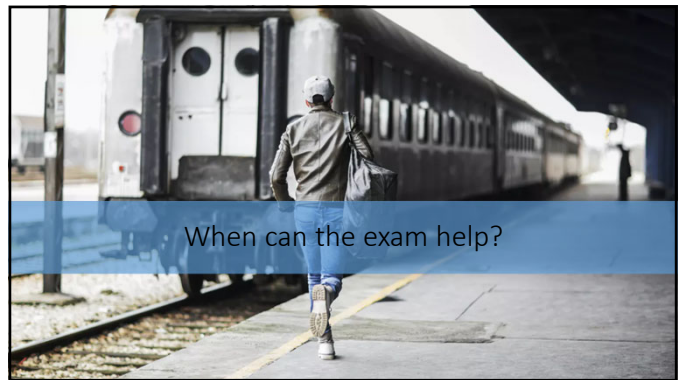- Arc of Riolan
  - Only seen about ~10% of the time



12

2

## Middle Jejunum:

Most commonly involved
- Perfused by the SMA
- Farthest from collaterals



13



14

## History and Exam are Unreliable

- Post-prandial
- Pain out of proportion to exam
  - What does this mean
  - Poor inter-rater reliability



0   11
VOLUME

15

When can the exam help?



16

4 key points to catch AMI:

- Judge a book by it's cover
- "Typical" labs are overrated
- We need to order more CTA's
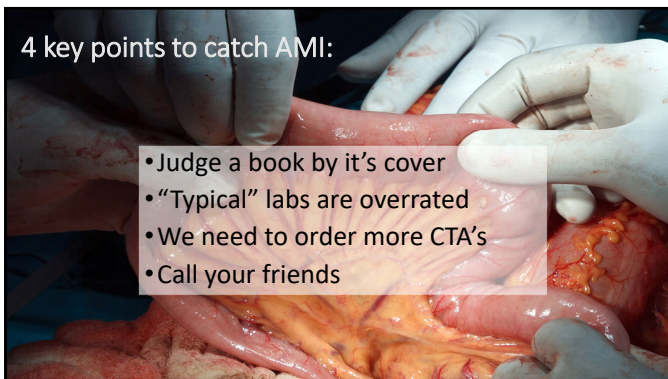- Call your friends



17

*Judge a book by its cover*:



18

Are you likely to form clots?
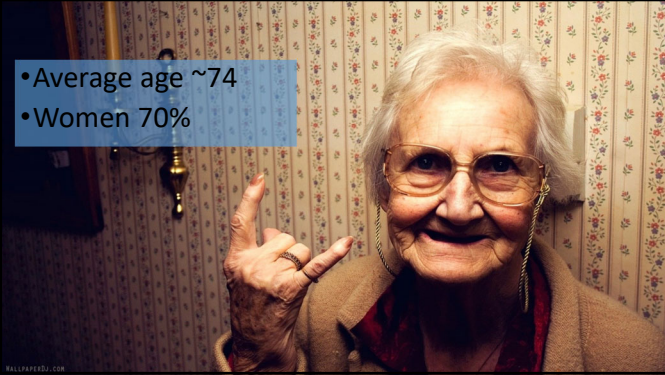
- MI
- PAD
- CVA
- Previous PE/DVT

19

Dysrhythmia:

~50% with AMI have a-fib

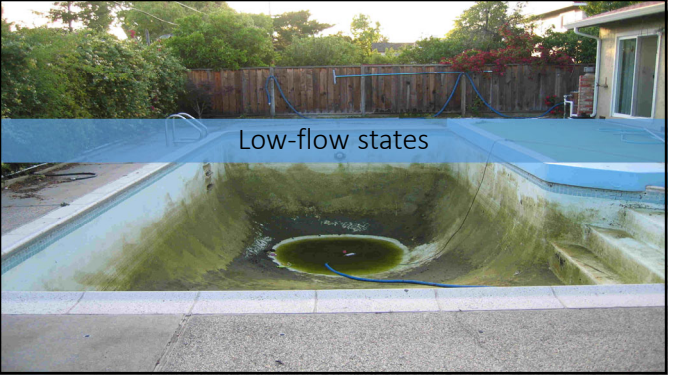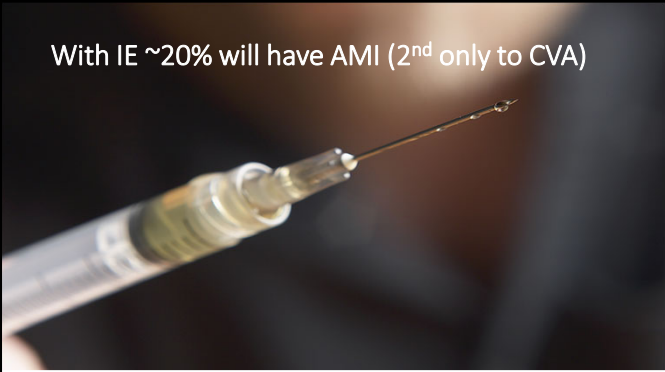20

- Average age ~74
- Women 70%

21

Low-flow states
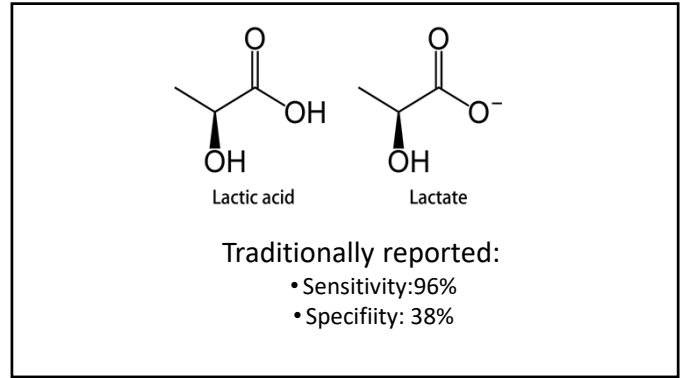
22

With IE ~20% will have AMI (2nd only to CVA)

23

Usually week 2-4 after starting abx.

24

*Typical Labs are overrated.*

25



Traditionally reported:
- Sensitivity:96%
- Specifiity: 38%

26

Where did this come from?
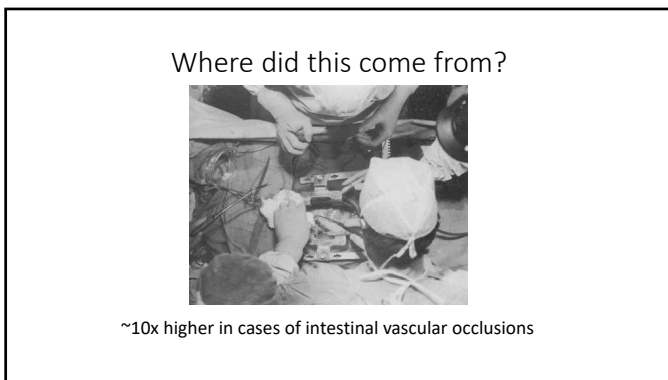

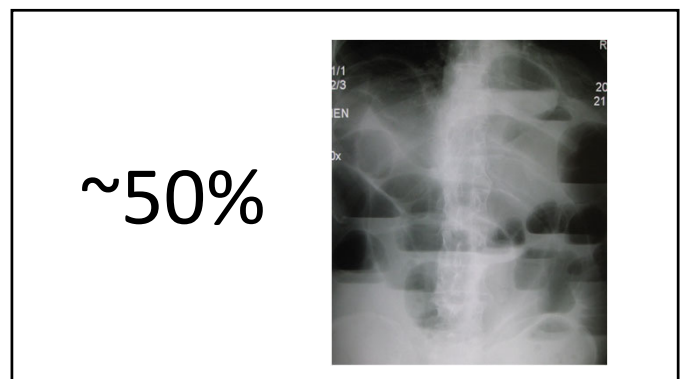
~10x higher in cases of intestinal vascular occlusions

27

Animals Studies: Early missteps:

- *Lactate is specific to SMA*
- *Gut hypo-perfusion releases lactate*
- *Lactate is helpful early*



28

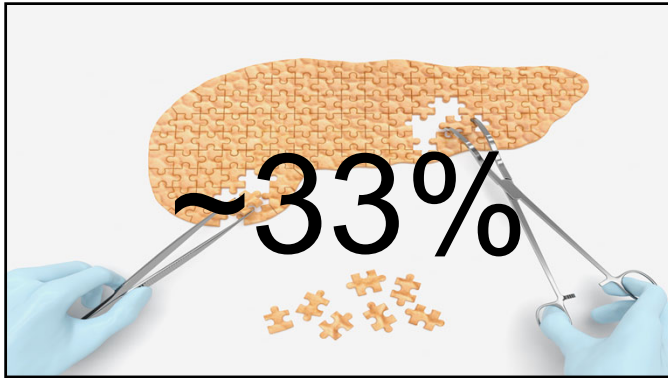Poor specificity:
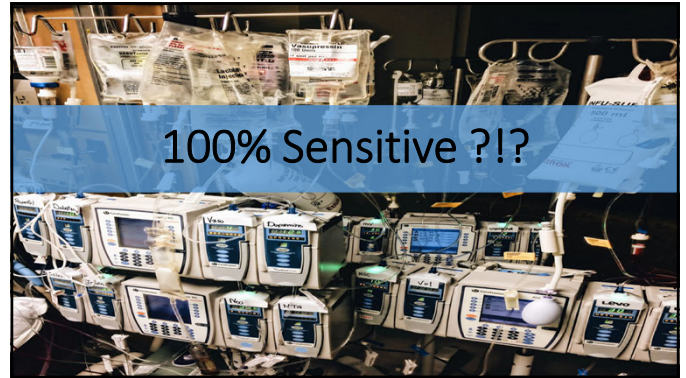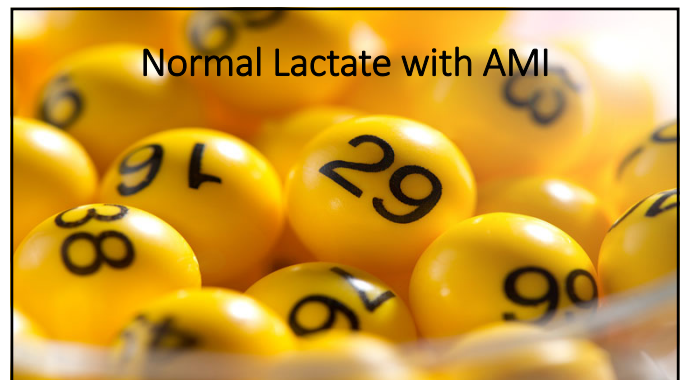
# 100%



29

~50%



30

~33%

31

100% Sensitive ?!?

32

Erratic Sensitivity

(12/27) AMI had normal lactate

33

Normal Lactate with AMI

34

Lactate: Prognostic not diagnostic
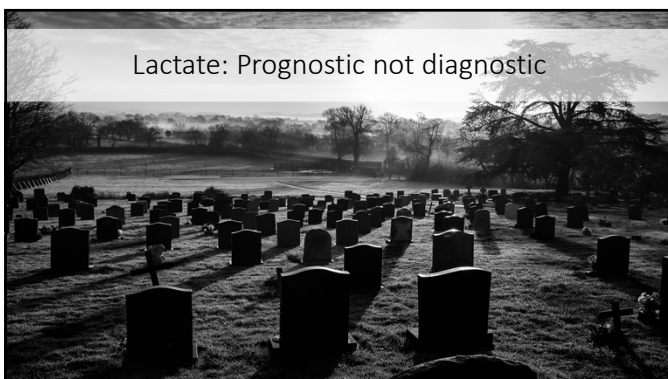
35

D-Dimer:

- It works for other clots
  - PE
  - DVT

36

## D-Dimer in AMI: **Yes**

### SMA ligation
- D-dimer checked at hour 1/2/3
- D-dimer > 0.125 ng/l
  - 36x increase in rate of AMI

Coskun et al. 2017

37

## D-Dimer in AMI: **No**

- Ex-lap:
  - SMA seen
  - SMA manipulated
  - SMA ligated

- D-Dimers and lactate at hour 1/4/6
  - D-dimer didn't help early
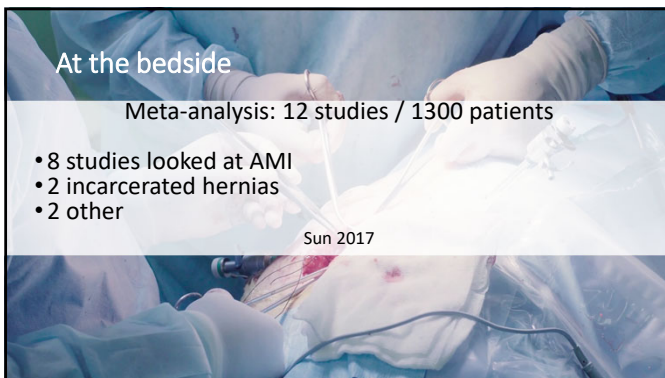  - Lactate was helpful at 4 hours.

Aydin et al. 2015

38

### At the bedside
Meta-analysis: 12 studies / 1300 patients

- 8 studies looked at AMI
- 2 incarcerated hernias
- 2 other

Sun 2017

39
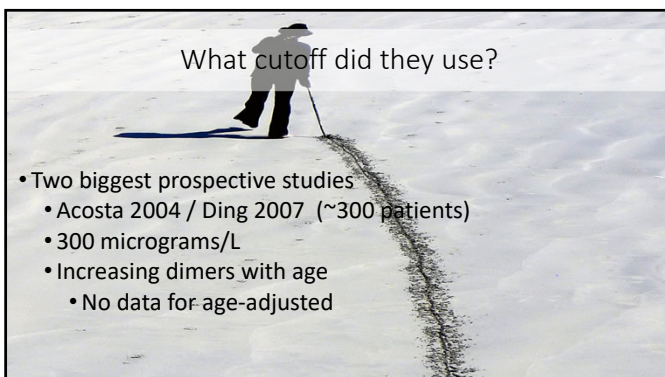
- Sensitivity: 94%
- Specificity: 50%
- + LR: 1.9
- - LR: 0.12

40

### What cutoff did they use?
- Two biggest prospective studies
  - Acosta 2004 / Ding 2007  (~300 patients)
  - 300 micrograms/L
  - Increasing dimers with age
    - No data for age-adjusted

41

### Labs in AMI

- Lactate is not helpful early
  - Becomes more accurate after 4 hours

- D-dimer < 300 a/w decreased likelihood of AMI
  - Not clear how well this performs early
  - Only use with low pre-test probability

42

**43**
*We should be getting more CTAs*

**44**
## What kills patients?

**45**
## Ultrasound
- Good specificity for proximal occlusions/stenosis
- Poor sensitivity
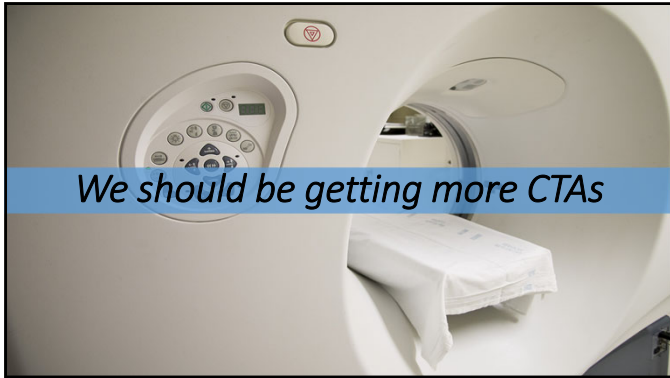- May be helpful as POCUS
  - Quick answer if +
  - Rule out other stuff.

**46**
## MRI/MRA
- Fairly accurate
- Issues with access/speed

**47**
## CTA
- Non-contrast scan
  - Likely adds little
- One contrast bolus
  - Two scans
    - Arterial Phase (Vascular)
    - Venous phases (Bowel)
- Multi-plane reconstructions

**48**
## CTA vs. CT
- A little more radiation (arterial and venous phases)
  - 1-10 mSV per scan (3mSV is background yearly dose)
- A little more contrast
  - 100cc bolus
- A lot more accuracy
  - Arterial phase
  - Venous phase

**2 for 1**

## CTA Performance:

Bowel wall thickening: 88%/70%
- Most common finding
- Hypo-enhanced bowel wall
  - "*pale ischemia*"

49

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Vascular occlusion: 12-25% / 94-100%

50

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## Bowel + Vasculature: ~97%/100%

**Buy One GET ONE FREE**
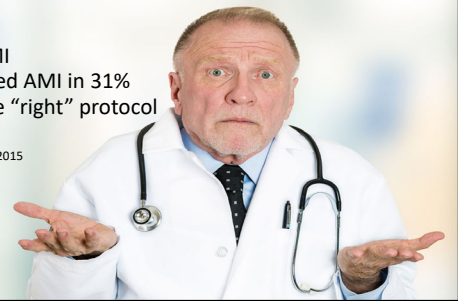
51

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## Talk to Radiology:

- 95 patients with AMI
  - Provider suspected AMI in 31%
  - Only 35% had the "right" protocol

Lehtimaki 2015

52

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## Accuracy of Radiology Report

- Provider suspected AMI: 97%
- Provider did NOT suspect AMI: 81%
  - Higher rates of bowel resection (did worse)
  
  Lehtimaki 2015

53

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## *Call a friend.*

- Anticoagulation
- Vasodilation
- Antibiotics
- Surgery
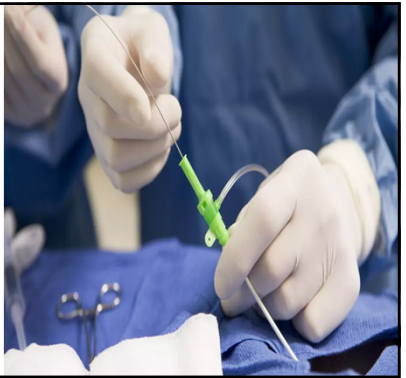- Interventional Radiology

Good → Better → Best

54

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55

## Endovascular

- Increasing in popularity
- 2004-2009
  - 12 -> 30% of cases



56

## Endovascular vs. Surgical:

- Worked in 87% of cases
- Mortality:
  - Endovascular: 36%
  - Surgical: 50%

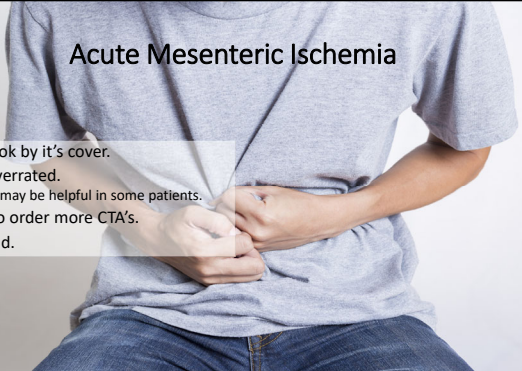Ryer 2012

57

## Acute Mesenteric Ischemia

- Judge a book by it's cover.
- Labs are overrated.
  - D-dimer may be helpful in some patients.
- We need to order more CTA's.
- Call a Friend.

58