

P.O.O.P.

When “Pain Out Of Proportion” Kills

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Case #1

- 92 yo female with chronic A-fib, HTN, DM presents with severe abdominal pain and chest pain.
- Mild confusion, irregularly irregular tachycardia, abdomen soft, + UTI



Case #1

- PMHx: paroxysmal atrial fibrillation with RVR, HTN, DM, CHF, hyperlipidemia, renal insufficiency, constipation with impaction
- Surg Hx: appendectomy, hysterectomy, cholecystectomy



Case #1

- ◎ Cath 2008
 - minimal CAD, mod MR, mod TR, mild pulm HTN,
- ◎ Admission 1 month prior
 - Endoscopy: erosive gastritis
 - CT: no dissection, no acute findings
- ◎ CT chest/ abd/ pelvis
 - No acute findings, no free fluid, sigmoid diverticulosis, obstipation

Case #1

◎ Dx:

1. Chronic atrial fibrillation
2. Constipation causing abdominal pain
3. Urinary tract infection
4. Irritable bowel syndrome
5. Hypertension
6. Diabetes
7. Mild dementia



Case #2

- ◎ 57 yo male h/o diet-controlled DM presents with rectal pain x 2 days. No pain with BM, no abd pain, no fevers.
 - h/o hemorrhoids and feels “knot” in the rectal area, similar to previous
 - Ran out of cream from prior visit.



Case #2

◎ PMHx:

- Diet-controlled DM, HTN, Hepatitis C, hemorrhoids, BPH

◎ Meds:

- HCTZ, lisinopril, sildenafil, terazosin, rectal hemorrhoid suppositories, topical hydrocortisone, ibuprofen



Case #2

- VS: T 97.8, P 120, RR 14, BP 112/69
- Exam:
 - Well-appearing, unable to sit comfortably
 - Abd soft, nontender
 - Rectal: non-thrombosed external hemorrhoid, no fluctuance, no erythema



Case #3

- 25 yo male arrives via EMS after slip and fall while inner tubing in river. Unable to bear weight. No numbness or tingling.
- Mild swelling, moderate tenderness, no deformity, compartments soft, DP 2+, skin intact



Case #3

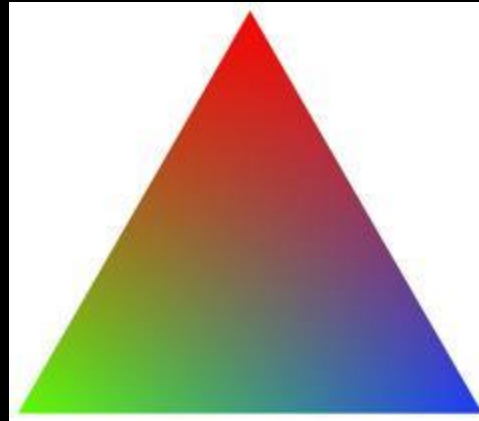


- Ortho
- Splint, elevate
- Rx: oxycodone
- Discharge





Dies



Recovers



Disabled



Objectives

- List life- and limb-threatening illnesses that present with “Pain Out of Proportion” (P.O.O.P.) to physical examination findings
- Identify patient risk factors for select diseases that present with P.O.O.P.
- Discuss the limitations of diagnostic imaging and laboratory studies in the evaluation of patients with P.O.O.P.



*We will never diagnose what
we fail to think of*

Case #1 – the Bounceback

- ◎ 92 yo female with c/o severe sharp epigastric abdominal pain x 4 hours.
 - +nausea, small diarrhea.
 - Admitted twice in 2 months for similar symptoms.
 - Worse pain than previous admission.



Case #1

- Meds: digoxin, glimepiride, clopidogrel, tolterodine (Detrol), fioricet, pantoprazole, sucralfate, metoprolol, lubiprostone (Amitiza), topiramate, diltiazem
- Allergies: aspirin and PCN



Case #1

- ⊙ VS: T 97.4, P 115, RR 20, BP 170/80, 98% 2L
- ⊙ Exam:
 - moderate distress due to pain,
 - irregularly irregular rhythm, 2/6 systolic murmur at left sternal border,
 - + BS, nondistended, soft, mild epigastric/periumbilical tenderness, no rebound, no guarding

Case #1

137	99	13
3.1	20	1.1

253

UA: 1+blood, 0-5
WBC, 0-5 RBC, 1+
sm bact

LFT - wnl
Lipase 242

Lactate 4.7

12.4
23.3
303
36.4

N⁸⁷ L⁹ M³ B³



Case #1

- ◎ CT abd/ pelvis with iv contrast
 - Cardiomegaly, pulmonary congestion, small right pleural effusion
 - Good opacification of celiac and SMA
 - No SBO, AAA, or bowel wall thickening
 - Moderate obstipation with large amount retained stool in colon

Case #1

- ⦿ Disposition: ICU
- ⦿ Dx: sepsis
- ⦿ Several hours later....
 - Peritoneal signs
 - Surgical consult → OR



Acute Mesenteric Ischemia



Dx: gangrenous colitis

**SEVERE ABDOMINAL PAIN
PLUS BENIGN EXAM
(P.O.O.P.)**



MESENTERIC ISCHEMIA

(Until proven otherwise.....)

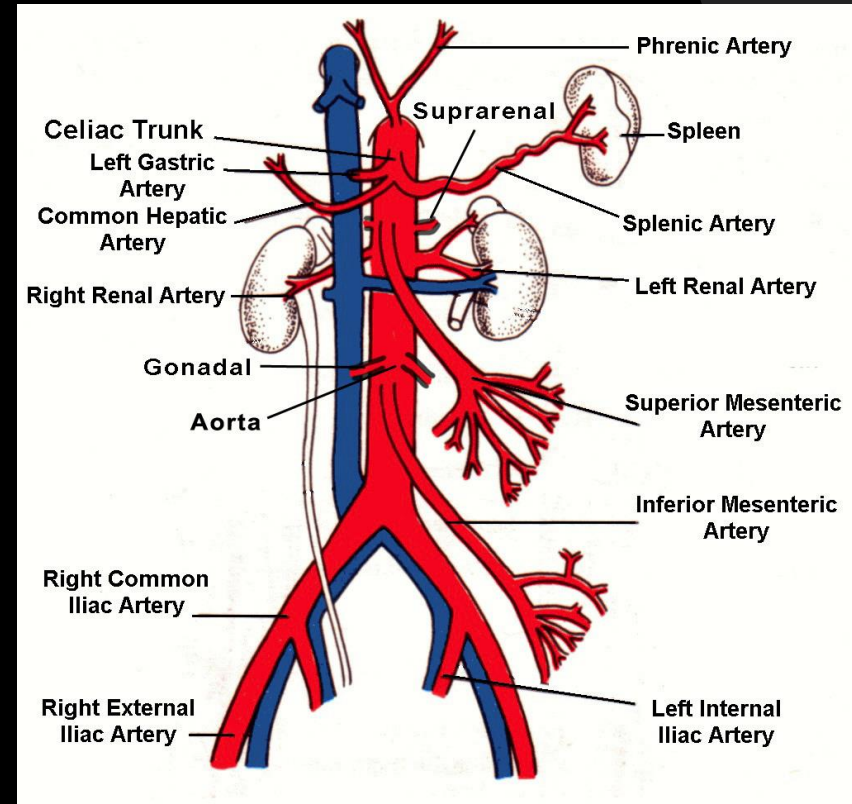


Acute mesenteric ischemia: updated guidelines of the World Society of Emergency Surgery

Miklosh Bala^{1*}, Fausto Catena², Jeffry Kashuk³, Belinda De Simone⁴, Carlos Augusto Gomes⁵, Dieter Weber⁶,

Mesenteric Ischemia: *What is it?*

- ↓ intestinal blood flow
- mucosal injury, tissue necrosis and metabolic acidosis



Mesenteric Ischemia

- Incidence 0.09-0.2% ED
- Interdisciplinary team with clinical pathways
“intestine stroke center”
- Mortality 60-100%
 - 70% even if angiography available 24/7
- Intestinal viability:
 - 100% if duration to diagnosis < 12 hours
 - 56% if 12-24 hours
 - 18% if > 24 hours

Mesenteric Ischemia

⊙ Occlusive

- mesenteric arterial embolism (50%)
 - Cardiac thrombus
- mesenteric arterial thrombosis (25%)
 - preexisting atherosclerosis
- mesenteric venous thrombosis (<10%)
 - Hypercoag state

⊙ Non-occlusive (20%)

- severe and prolonged vasoconstriction
- systemic shock

Mesenteric Ischemia

- ⦿ Pain out of proportion – “classic”
 - Ischemia starts from mucosa towards serosa
 - Peritonitis = irrev intestinal ischemia
- ⦿ “acute on chronic”

Diagnosis - Labs

- No accurate biomarkers identified
- Not definitive but may help corroborate
 - 90% abn WBC
 - 88% elevated lactate
 - D-dimer indep risk factor for intestinal ischemia
 - Elevated amylase
- Normal values do NOT exclude diagnosis

Nonspecific for
early phase

Diagnosis

- ⊙ Classic triad:
 - abrupt pain + vomiting or diarrhea + source
- ⊙ Pitfalls:
 - 93% tenderness
 - 43% TnI positive
 - 25% elevated amylase or LFTs
 - 52% elevated lactate
 - 44% referred to internal medicine

Mesenteric ischemia – Imaging

- ⦿ Every 6h of delay in CTA doubles mortality
- ⦿ CTA - thin-section CT acquisition of peak arterial or venous enhancement; primary transverse reconstructions, multiplanar reformations and 3-D renderings
- ⦿ CT with IV contrast lacks arterial phase
 - suboptimal evaluation of the mesenteric arteries
 - arterial phase influenced care in 19% of patients compared to portal venous phase alone

Mesenteric ischemia – ED management

- ⦿ Heightened clinical suspicion
- ⦿ IVF fluid resuscitation
 - Vasopressors for MAP > 65
 - Consider dobutamine
- ⦿ Broad spectrum antibiotics
 - Piperacillin/tazobactam
 - Levofloxacin *plus* metronidazole
- ⦿ Heparin (loading plus infusion)
- ⦿ Early vascular consult

Case #2 – the Bounceback

- 57 yo male h/o diet controlled DM p/w pain in the lower right buttock. Improved hemorrhoid pain but right buttock now more swollen and painful. + subj fevers/chills.



Case #2

◎ PMHx:

- Diet-controlled DM, HTN, Hepatitis C, hemorrhoids, BPH

◎ Meds:

- HCTZ, lisinopril, sildenafil, terazosin, rectal hemorrhoid suppositories, topical hydrocortisone, ibuprofen



Case #2

- ⦿ VS: T 99.8, P 104, R 18, BP 98/59, 99% RA
- ⦿ Exam:
 - slightly ill-appearing
 - Abdomen soft, nondistended, nontender
 - GU – right buttock with area of edema/induration/ warmth/ erythema, no point fluctuance, no crepitus, no drainage, rectum without abscess or tenderness to palpation

Case #2

133	96	30	166
3.9	26	2.3	

LFT - wnl

UA: neg

~~13.2~~
~~21.5~~ ~~273~~
~~37.9~~



Case #2

- CT abd/ pelvis

- heterogeneous gas-containing mass in the right ischiorectal fossa consistent with perirectal abscess
- marked STS of subcutaneous fat in right buttock and perineum with large amount of air in the connective tissues.

Case #2

- Started on vancomycin and zosyn
- Wound cultures: e.coli, group C streptococcus, enterococcus faecalis – sens to zosyn
- Laparoscopic diverting colostomy with serial debridements of wound, split-thickness skin graft

**SOFT TISSUE INFECTION
PLUS P.O.O.P.**



NECROTIZING FASCIITIS

(Until proven otherwise.....)

Outline – Necrotizing Fasciitis

- ⦿ Epidemiology
- ⦿ Clinical picture
- ⦿ Labs
- ⦿ Imaging
- ⦿ ED management

Necrotizing fasciitis - epidemiology

- ⦿ Incidence: 0.40 cases per 100,000
 - Increases with age > 50
 - Men $\geq$ women
 - Predominately adults
- ⦿ 85% sporadic in community

Necrotizing fasciitis

- ◎ Mortality 27-80%
 - Affected by pathogen
 - Patient characteristics
 - Site of infection
 - Time to intervention
 - Recognition
 - Antibiotics
 - Surgical debridement

Necrotizing fasciitis

- ⦿ Risk factors:
 - Diabetes, obesity, smoking, alcoholism, IVDA, immunodeficiency, cirrhosis, peripheral vascular disease, HTN, age > 60
- ⦿ Early diagnosis missed 85-100%
- ⦿ 35-85% initial misdiagnosis as simple cellulitis or abscess
- ⦿ Crepitus and necrosis rare (13-31%)

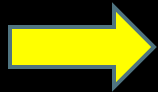


Classification NSTI

Classification factor	Comment
Anatomic location	Fournier's gangrene of perineum/scrotum
Depth of infection	Necrotizing adipositis (most common), fasciitis, myositis
Microbial cause	Type 1: polymicrobial (70-80%) Type 2: monomicrobial (20%) Type 3: gram-negative monomicrobial Type 4: fungal

Necrotizing fasciitis

- ⦿ Early phase



- Erythema, warmth, induration, edema, pain

- ⦿ Intermediate phase

- Increased pain, swelling, purplish rash, blistering, “dishwater” purulence

- ⦿ Late phase

- Hemorrhagic bullae, anesthesia, crepitus, necrosis (dusky to gangrene)
- Septic shock, MODS

Maintain high suspicion in rapidly progressive cellulitis, associated with severe progressive pain

“Dishwater” Drainage



Laboratory risk indicator for necrotizing fasciitis (LRINEC)

Measurement	Score
CRP (mg/L) > 150	4 points
WBC ($\times 10^6 / \text{mm}^3$) < 15	0 points
15 – 25	1 point
> 25	2 points
Hemoglobin (g/dL) >13.5	0 points
11 – 13.5	1 point
< 11	2 points
Sodium (mmol/L) < 135	2 points
Creatinine ($\mu\text{mol/L}$) > 141 (1.6)	2 points
Glucose (mmol/L) > 10 (180)	1 point

Score ≥ 6

PPV 92%
NPV 96%

Sens 80%
Spec 67%
PPV 57%
NPV 86%

Necrotizing fasciitis – imaging

- ⦿ Radiographs

- Subcut gas or soft tissue swelling

- ⦿ Ultrasound

- Superficial abscess

- ⦿ CT

- Inflammatory changes, fascial edema, abscess

- ⦿ MRI

- High sens (90-100%), lower spec (50-85%)
- Prohibitive in unstable patient

Limited by low sensitivity and low specificity

Necrotizing fasciitis – ED Management

- ⦿ Heightened clinical suspicion
- ⦿ IVF resuscitation
- ⦿ Broad spectrum antibiotics
- ⦿ Early surgical consult
- ⦿ Adjunctive therapy
 - Hyperbaric therapy – should not delay OR!
 - IVIG - controversial

Necrotizing fasciitis - antibiotics

- ⦿ Gram-positive
 - Vancomycin, linezolid, daptomycin
- ⦿ Anaerobic
 - Clindamycin
- ⦿ Gram-negative
 - Fluoroquinolones or 3rd gen cephalosporin
 - Anti-pseudomonal penicillin
 - piperacillin-tazobactam, ticarcillin-clavulanate

Case #3 – the Bounceback

- 25 yo male presents to the ED with increased pain in leg. Seen earlier that day and splinted with orthopedics follow up. Reports severe pain and numbness.



Case #3

⦿ Exam:

- Increased pain with dorsiflexion of great toe. Decreased cap refill. Compartment soft.
- Splint loosened, leg elevated.

⦿ 2 hours later:

- Reports increased pain
- Ortho re-evaluated
- Taken to OR



**EXTREMITY INJURY
PLUS P.O.O.P.**



COMPARTMENT SYNDROME

(Until proven otherwise.....)

Outline – compartment syndrome

- ⦿ Background
- ⦿ Clinical picture
- ⦿ Labs
- ⦿ Imaging
- ⦿ ED management

Compartment syndrome

⦿ Mechanism

- Trauma
 - Can occur *without* fracture
- Burns
- Envenomations
- Injections
- Overuse
- Constriction
 - Jewelry, clothing, casts

Compartment syndrome

⦿ Leg

- Anterior
- Lateral
- Superficial posterior
- Deep posterior
- Tibialis posterior

Compartment syndrome

⦿ Forearm

- Superficial volar (flexors)
- Deep volar
- Dorsal (extensors)
- Compartment with mobile wad (of Henry)

Compartment syndrome

- ⦿ Pain
- ⦿ Paresthesia
- ⦿ Pallor
- ⦿ Paralysis
- ⦿ Pulselessness

Pain with passive stretching

Decreased 2-point discrimination

Compartment syndrome

- ⊙ Measure intracompartmental pressures:
 - Commercial device vs pressure transducer
 - Normal < 10 mmHg
 - Fasciotomy if:
 - $P_{\text{compartment}} > 30 \text{ mmHg}$
 - Diastolic BP – $P_{\text{compartment}}$ (delta P) < 30 mmHg

Compartment syndrome

⦿ Pitfalls:

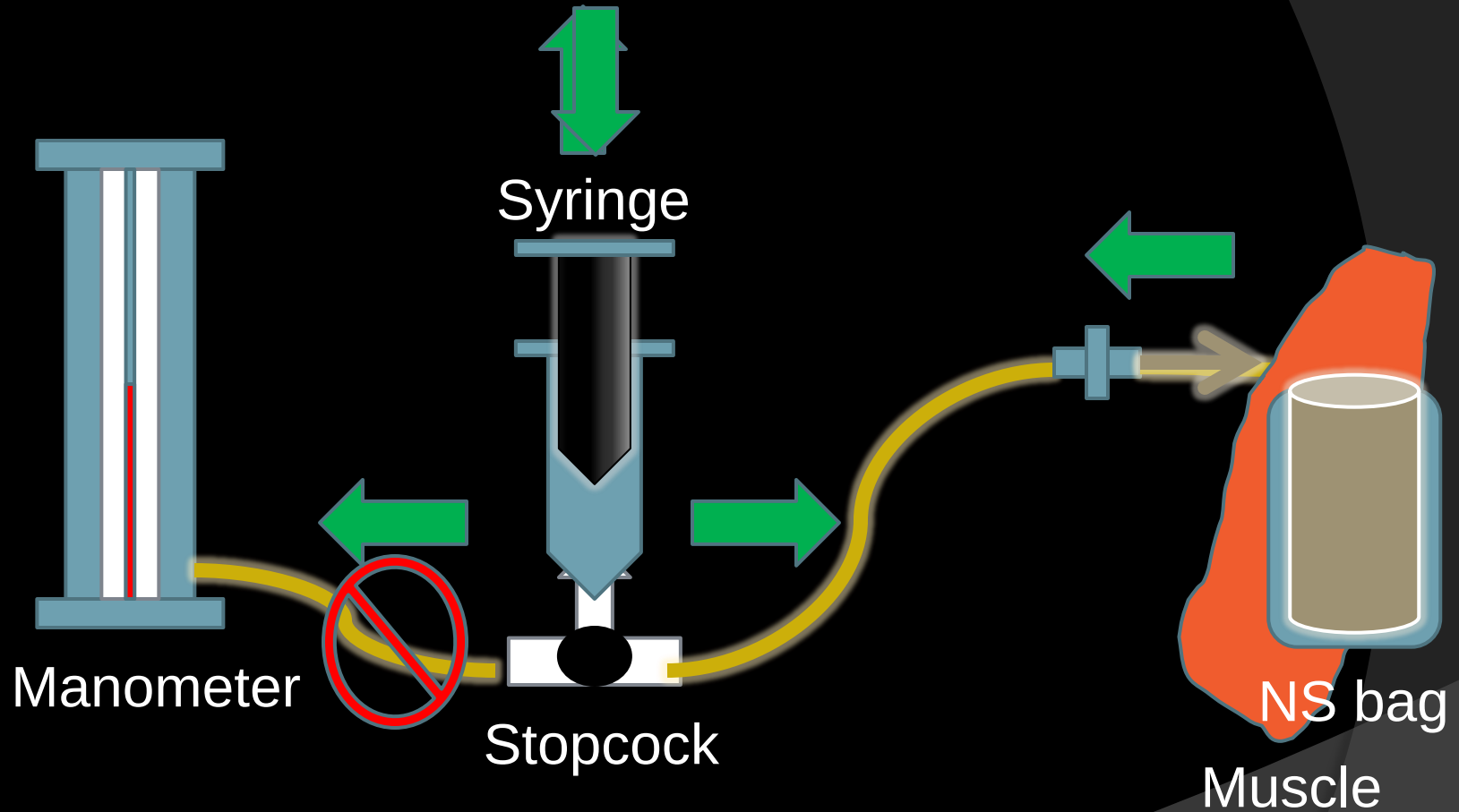
- Measure wrong compartment
- +pulses and normal CR does not exclude
- Open wound does not exclude
- US not helpful
- Inadequate skin incision

Compartment syndrome

⦿ Equipment

- 1— 3-way stopcock
- 1— Sterile 20 ml Luer lock syringe
- 2 — IV extension tubing sets
- 2 — 18 gauge needle
- 1 — Bag of Normal Saline
- 1 — Manual blood pressure manometer
- Gauze
- Chlorhexidine/betadine scrub

Compartment syndrome



Compartment syndrome- labs

- CBC
- Creatinine kinase
- Creatinine
- Coagulation studies
- Urinalysis
- Urine myoglobin

Not well
validated

Compartment syndrome- imaging

- Radiographs
- Ultrasound
- MRI
- Nuclear scintigraphy
- Infrared imaging

Not well
validated

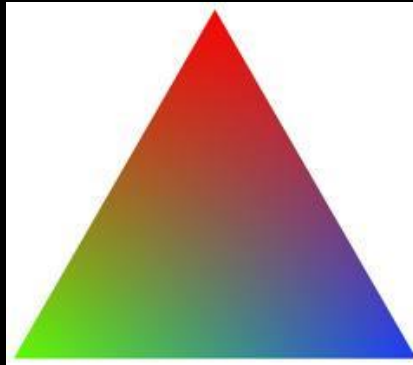
Compartment syndrome - ED Management

- ⦿ Heightened clinical suspicion
- ⦿ Elevate extremity
- ⦿ Analgesics
- ⦿ Treat the underlying cause
- ⦿ Early orthopedics consult
- ⦿ Measure intracompartmental pressures
- ⦿ Fasciotomy (< 6 hours)



Dies

Recovers



Disabled



Summary

	Labs	Imaging	P.O.O.P.
Mesenteric ischemia	Lactate(?)	CTA	Yes
Necrotizing fasciitis	LRINEC(?)	No	Yes
Compartment syndrome	No	No	Yes

Summary

- Maintain high index of suspicion for illnesses manifesting as “Pain Out Of Proportion”
- Decreased utility of labs and imaging
- Early surgical consult

Summary

- ⦿ P.O.O.P + abdominal pain
= mesenteric ischemia
- ⦿ P.O.O.P + soft tissue infection
= necrotizing fasciitis
- ⦿ P.O.O.P. + injury
= compartment syndrome

Questions?



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