Pediatric Seminar:
Primary Care
Office Emergencies

November 4-5, 2023

Acute Abdominal Pain

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Experts in pediatrics,
Advocates for children.

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Disclosures

- This speaker has no disclosures.

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Objectives

- Briefly review the anatomy and physiology of the pediatric abdominal pain.
- Identify specific acute pediatric abdominal pain emergencies.
- Discuss the differential diagnosis, testing and treatments as well as the management of specific causes of acute pediatric abdominal pain and current evidence-based practice guidelines available.

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Acute Abdominal Pain Fast Facts

- ~ 75,000 children < 18 in the US have appendicitis annually
- 216% increase in Cholecystectomies in children over the past 10 years
- Acute Cholecystitis most common gallstone related complication
- 4.9 cases of Ovarian Torsion per 100,000 children <20
- Up to 20% of menarchal adolescents may have ovarian hemorrhagic cysts

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Types of Pain

- Visceral
- Somatic or parietal
- Referred

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Causes of Abdominal Pain

- Congenital/anatomic
- Infectious
- Toxic, Environmental, Drugs
- Trauma
- Tumor
- Metabolic
- Allergic/Inflammatory
- Functional
- Miscellaneous

Schwartz, W (2000)

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Acute Abdominal Pain

- Varies by Age, symptoms and location of pain
- Causes vary significantly and may require non-surgical or surgical methods to resolve
- Most episodes of abdominal pain are brief and benign, but some situations may require urgent intervention.

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Assessment

- Symptoms onset
- Location and character of pain
- Exacerbating factors
  - Movement
  - Car ride
  - Eating
- Associated factors
  - Nausea
  - Vomiting
  - Anorexia
  - Fever

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Pearls of Associated Pain Symptoms

- Failure to pass flatus or feces- intestinal obstruction
- Urinary frequency, dysuria, urgency or malodorous urine-UTI
- Purulent vaginal discharge –PID
- Cough, shortness of breath, chest pain- thoracic source
- Polyuria and polydipsia- DM
- Joint pain, rash and smoke colored urine- HSP
- Currant jelly stool- intussusception
- Bloody diarrhea- IBD or enterocolitis

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Gynecologic History

- Menstrual history
- History of sexual activity
- Contraception
- Pearls
  - Amenorrhea- may suggest pregnancy
  - Multiple partners, vaginal discharge- PID
  - PID history-ectopic pregnancy
  - Sudden pain midcycle-mittelschmerz

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Past health

- Previous hospitalizations
- Previous surgeries- can eliminate some diagnoses
- Significant past illnesses-sickle cell anemia
- History of similar pain-recurrent problem

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Other history

- Family History
  - Sickle Cell Anemia
  - Cystic Fibrosis
- Drug use
  - Erythromycin
  - ASA
  - Lead poisoning
  - Venoms
- Social History
  - Psychosocial Stress
  - New stressors
    - Home
    - Family
    - School

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Physical Exam

- General Appearance
- Vital Signs
- Abdominal Examination
- Rectal/Pelvic/Testicular examination
- Associated Signs

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Various Physical Findings/Signs

- Psoas sign
- Obturator Sign
- Murphy's sign
- McBurney's Point
- Roving sign
- Rebound tenderness
- Blumberg sign

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Psoas Sign

- An indicator of irritation to the iliopsoas group of hip flexors in the abdomen.
- This test is performed by having a supine patient with knees extended and flex their thighs against resistance. If abdominal pain results, it is a positive psoas sign.
- Because the right iliopsoas muscle lies under the appendix when the patient is supine, a "positive psoas sign" may suggest appendicitis

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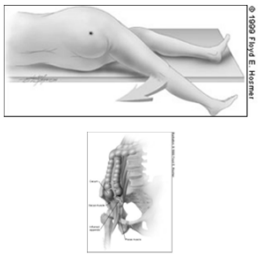
The psoas sign

- Pain on passive extension of the right thigh. Patient lies on left side. Examiner extends patient's right thigh while applying counter resistance to the right hip (asterisk).
  - Hardin, M (1999)



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Obturator sign

- An indicator of irritation to the obturator internus muscle.
- Performed when acute appendicitis is suspected.
- If the appendix becomes inflamed and enlarged, the appendix may come into physical contact with the obturator internus muscle, which will be stretched by this physical examination maneuver. This causes pain and is an evidence in support of an inflamed appendix.
- The principles of the obturator sign in the diagnosis of appendicitis are similar to the psoas sign.

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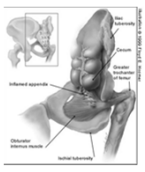
Obturator Sign

- Pain on passive internal rotation of the flexed thigh. Examiner moves lower leg laterally while applying resistance to the lateral side of the knee (asterisk) resulting in internal rotation of the femur. Hardin, M (1999)



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Murphy's sign

- A maneuver that is part of the abdominal exam and a finding elicited in ultrasound. Useful in differentiating right upper quadrant abdominal pain. Typically, it is positive in cholecystitis or gall bladder etiology.
- Elicited by firmly placing a hand at the costal margin in the right upper abdominal quadrant and asking the patient to breathe deeply.

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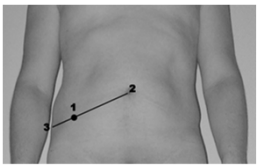
McBurney's Point

- **McBurney's point** is the name given to the point over the right side of the human abdomen that is one-third of the distance from the ASIS (anterior superior iliac spine) to the umbilicus. This point roughly corresponds to the most common location of the base of the appendix where it is attached to the Cecum.



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Roving's sign

- A sign of appendicitis.
- Palpation of the lower left quadrant of a person's abdomen results in more pain in the right lower quadrant.
- Considered a positive Roving's sign and may have appendicitis.

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Rebound Tenderness

- Refers to pain that is felt after the examiner's hand is removed from an area (as distinct from tenderness, which is pain felt when the examiner's hand touches an area).
- It represents aggravation of the parietal layer of peritoneum by stretching or moving.
- Rebound is regarded as one of the classic local signs of peritonitis from diseases such as appendicitis. The others are tenderness and guarding.
- However, in recent years the value of rebound tenderness has been questioned, since it may not add any diagnostic value beyond the observation that the patient has severe tenderness.

http://en.wikipedia.org

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Blumberg sign

- Indicative of peritonitis.
- The abdominal wall is compressed slowly and then rapidly released. Presence of pain makes the sign positive. It is very similar to rebound tenderness and might be regarded by some as the same thing, or at least a particular application of it.

http://en.wikipedia.org

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Challenges

- Patients frequently present very early in their clinical course
- Symptoms can mimic other conditions:
  - gastroenteritis, constipation, gastritis, strep, UTI, cyst, mittelschmerz, PID, TOA, torsion, cyst, ectopic, pneumonia, DKA, and many more . . .
- Symptoms can be non-specific, and children have difficulty articulating their symptoms

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HPE (History and Physical Exam) Red Flags

- Significant abdominal pain and/or tenderness
- Persistent or progressively worsening pain
- Peritoneal signs (Pain with movement/jumping jacks/care ride +Roving's/Obturator/psoas sings, +Murphy's sign)
- Persistent or worsening associated symptoms, including nausea/vomiting, fever

Refer for further evaluation if any of the above signs.

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HPE -Specific Red Flags (Likely Appendicitis)

History
- Periumbilical/Epigastric Pain, progression to the RLQ
- Associated nausea, vomiting, anorexia, fever
- Worse with movement, car ride

Physical exam
- Noted RLQ pain to palpation
- +Roving sign (pain to the RLQ with LLQ palpation)
- Pain with movement of bed, jumping jacks
- May also have +obturator or psoas signs

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Work up for suspected Appendicitis

- CBC
- UA
- RLQ US
- +/- Pelvic US in females

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MANTRELS Pneumonic

- **Migration** of Pain
- **Anorexia**
- **Nausea** and vomiting
- Right lower quadrant **tenderness**
- **Rebound** tenderness
- Elevated l**eukocytosis**
- **Shift** to the left

Dahlberg, D et al (2004)

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HPE red flags
(likely dx symptomatic cholelithiasis vs cholecystitis)

History
- Epigastric pain/RUQ pain, possible radiation to back
- Post –prandial
- +/- nausea, fever

Physical Exam
- +RUQ or epigastric tenderness to palpation
- +/- Murphy's sign

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Work-up for suspected cholelithiasis vs cholecystitis

- CBC
- LFTs
- RUQ US

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HPE Red Flags (likely Dx Ovarian Torsion versus Ovarian hemorrhagic cyst rupture)

History
- Female patient
- Periumbilical pain, may progress to lower abdomen pain
- +/- nausea, vomiting, dysuria
- May present with sudden onset of pain

Physical Exam
+/-unilateral lower quadrant or suprapubic tenderness
+/-Pain with movement
+/-Tender pelvic mass on palpation

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Work-Up: (likely Dx Ovarian Torsion versus Ovarian hemorrhagic cyst rupture)

- CBC
- UA
- Pelvic US
- Serum HCG (pregnancy)test

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Other potential medical/surgical causes of Abdominal Pain

- Inflammatory bowel disease
- Omental Infarct
- Meckel's diverticulitis/obstruction from omphalomesenteric duct remnant
- Gastroenteritis
- Mesenteric adenitis
- Pyelonephritis/cystitis
- Endometriosis
- Intussusception
- Epiploic appendagitis
- Urolithiasis
- Gastric/duodenal ulcer
- Pelvic inflammatory disease
- Ectopic pregnancy

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Differentials using Case Studies

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Case Study 1

- 2-year-old male
- CC-crying
- Intermittent abdominal pain-at least 6 episodes today
- No vomiting or diarrhea
- Still Playful in room
- VS -35.9, 112, 26, 105/87 Wt. 16.4

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Diagnostics/Results

- Abdominal X-ray?
- Stool Guaiac?
- What further studies/consults should be considered?

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Intussusception

- Classic
  - 3-26 months
  - Colicky, intermittent pain
    - Playful in between
    - Fussy, anorexic or vomiting as disease progresses
  - Current jelly stools

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Intussusception

- Practical
  - <50% with red stools
  - Poor oral intake
  - Vomiting
  - Ill appearance
  - Fussy or irritable
  - Rarely can present with altered mental status
  - Discomfort with abdominal exam

Need to maintain a high index of suspicion!!

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Diagnosis

- Intussusception-By ultrasound.
  - Occurs when proximal portion of the intestine telescopes into a more distal portion
  - Most common between 3 months-1 year
  - Intestinal contents cannot pass
  - Stools contain blood and mucus (currant-jelly stools)-50% of cases.
  - History of colicky abdominal pain
    - Drawing up or straightening of legs
    - Every 15-20 minutes for several hours
  - Air contrast enema or surgical intervention

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Intussusception

- Management
  - IV / IVF
  - Abdominal Film?
  - Ultrasound
  - Air contrast enema
    - <2% perforation rate, but possible
    - Must have an IV
    - Surgery should be aware
    - ? Role of pain control
  - Observation

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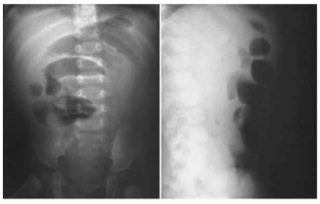
Abdominal X-ray



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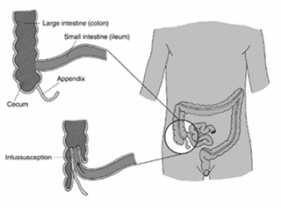
Intussusception



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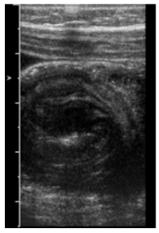
Bulls-eye



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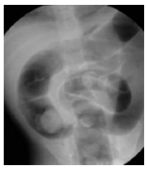
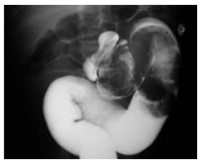
Air-contrast enema





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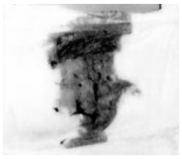
Currant Jelly-Stool

- Currant jelly stool (contributed by Celebration Hospital, FL, emergency department nursing staff)-www.Emedicine.com



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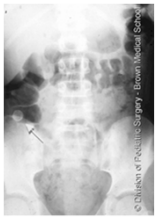

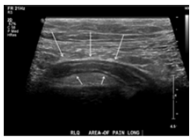

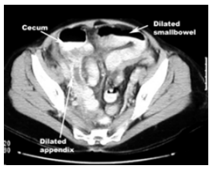

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Case Study 2

- 13-month-old female
- CC- abdominal pain, bruises
- VS- T 37.6, P 160, RR 28, HR 140/67,
  - O_2 sat 94-97%\
- History- Mom noticed a bruise to patient's left eye during the night. Today patient very fussy and noticed some bruises to abdomen. Child was in the care of mom's old boyfriend the previous day while she worked.

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Case study-cont.

- PE- multiple areas of bruising noted to upper abdomen, chest, and over left eye. Child is alert but irritable and grunting.
- Are you concerned?
- What diagnostics would you order?

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Diagnostics

- Moved patient to acute care area of ED
- CBC with Diff, LFTs, PT, Ptt, Type and Screen, Chest, Head and Abdominal CT
- IV and O2 per nasal cannula
- Normal Saline bolus
- Social Service consult

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Results

- CBC with Diff
  - WBC 15.4
  - RBC 2.77
  - Hgb 8.5
  - Hct 23.7
  - MCV 85.6
  - MCH 30.6
  - MCHC 35.8
  - RDW 13.1
  - Plat count 263
- LFTs
  - Alb 4.0
  - Tot prot 6.7
  - AST 10350 (20-60 norm)
  - ALT 3876 (norm 145-320)
  - Bili C 0.3
  - Bili U 1.9
  - A/g 2/7
  - GGT 127

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Results

- Differential – normal
- O positive
- Head Ct Normal
- Abdominal CT
  - Grade II liver lac
  - Pulmonary Contusion
  - Left Hemi-pneumothorax
  - Multiple Rib fractures
- Admitted to the ICU

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Case study 3

- 13-year-old male
- Abdominal pain for 3 days
- VSS
- No vomiting or diarrhea
- History- asked about testicular pain
  - Had pain for 3 days as well, with swelling of right testicle (never told his mom)
- Side lying testicle with swelling and discoloration
- Mild diffuse lower abdominal pain

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Pearls

- Any male with abdominal pain needs Testicular exam
- Small window of time < 6 hours
- Symptoms for 2-3 days
  - Scrotum erythematous, and hard
  - Abdominal pain along with Nausea and vomiting may be present

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Scrotum/testicular pain

- Suspect torsion
  - Unilateral, edematous scrotum
  - High with lateral lie
- Need immediate attention
- Urinalysis
- Examination includes assess for cremasteric reflex
- Urology consult
- Scrotal ultrasound
- Surgical Intervention may be necessary

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Case Study 4

- 6-year-old boy
- Abdominal Pain
- Afebrile with severe diffuse abdominal pain in the ED.
- Vomiting and diarrhea 7 days prior to ED visit.
- On day prior to admission, recurrent abd. Pain with few episodes of NBNB emesis
- PMHX- none, in utero had something questionable with kidney but parents think it resolved.

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Differential Diagnosis

- Appendicitis
- UTI
- Constipation
- Mesenteric Lymphadenitis

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Diagnostics

- What would you order?
  - UA
  - CBC with Diff
  - Abdominal x-ray
  - IV fluids
  - Serial Abdominal Exams

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Results

- WBC 20.3
- UA
  - Small Blood
  - 2+ bacteria
  - 5-9 WBC
- Continued Diffuse Pain
- Now What???
  - Order an Abdominal CT

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CT Results

- Left Hydronephrosis
- Possible left UPJ obstruction
- Urology Consulted
- Admitted

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Uteropelvic Junction Obstruction

- Narrowing of the junction between the renal pelvis and the ureter
- Can cause a distinct clinical syndrome
  - Severe abdominal pain
  - Nausea and vomiting
  - Intermittent hydronephrosis
- Surgical Intervention may be necessary

Tsai et al. (2006)

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Case study 5

- 17-year-old female presents to the ED with right sided abdominal pain (RUQ), guarding
- Tachycardia, Pulse-130, tachypnea, RR-30, chest discomfort when she sits forward. Breath sounds decreased throughout. Difficulty taking a deep breath
- Temp 103
- HEENT clear. All other systems negative
- No sign PMH, Family history. Social Hx- "A" student, end of the quarter finals start tomorrow, accepted to two local colleges, + sexual activity in the past. Denied drugs or alcohol use

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Differential Diagnosis

- RLL pneumonia
- Fitz U Curtis/ Perihepatitis
- Gastroenteritis
- Hepatitis
- Gall stones

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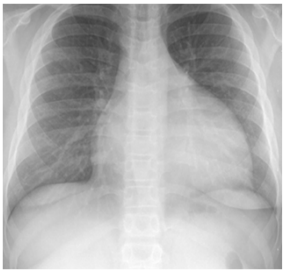
Chest X-Ray



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The rest her of the story

- Cardiology consult
- ECHO in ED-moderate to large pericardial effusion
- Cardiac rub noted
- CICU admit- 370cc serosanguinous fluid from pericardiocentesis
- Rheumatology consult
- Final dx- SLE (Lupus)

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Conclusion

- One of the most common complaints.
- Understand the origin of the pain
- Determine acute vs chronic
- History and physical exam
- Diagnostics
- Management

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