Pediatric Belly Pain: Is it Just Constipation?

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No disclosures

Case

- 13 yo M with abdominal pain
- T 38.2°C, P 102, R 16, BP 100/78, 99% RA

Presentation challenges

- Atypical presentation
- Unable to verbalize
- Unable to localize
- Parental expectations
- Difficult exam

Physical exam pearls

- Palpate during inspiration
- Keep in parent's lap
- Parent examination
- Stethoscope
- Jump/ bounce
- Lift head off table
- GU, pharynx and lungs
- Rectal exam?

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- 11 yo M with abdominal pain and fever
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- 4 yo F with vomiting
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Case

- 4 yo M with vomiting, abdominal pain
- T 37.8°C, P 114, R 18, BP 90/62, 98% RA

Appendicitis

- Most common abdominal surgical emergency
- 60K-80K dx annually
- Second most common dx malpractice claims

Suspected appendicitis

Signs and symptoms

Finding	Appendicitis, %	No Appendicitis, %
Anorexia	59.6	47.4
Nausea/ vomiting	71.1	55.7
Migration	50.2	27.5
Max RLQ tenderness	67.8	53.4
Guarding	63.6	42.3
Temp ≥38°C	17.3	19.7
Absence of diarrhea	82.9	78.4
Pain duration <48h	82.2	74.1
Gradual onset	55.3	55.4

Adapted from Lipsett and Bachur, *Pediatr Emerg Care*, 2017
Adapted from Becker et al, *Acad Emerg Med*, 2007

Labs

WBC

CRP

ANC

PCT

Scoring systems

Low-Risk Appendicitis Rule Refinement

Pediatric Appendicitis Score (Samuel)

Modified Alvarado Scoring System

Ohmann score

Ruling out Appendicitis in Children: Can We Use Clinical Prediction Rules?

Paul van Amstel[1] · Ramon R. Gorter[1] · Johanna H. van der Lee[2] · Huib A. Cense[3] · Roel Bakx[1] · Hugo A. Heij[1]

Lintula score

Alvarado score (MANTRELS)

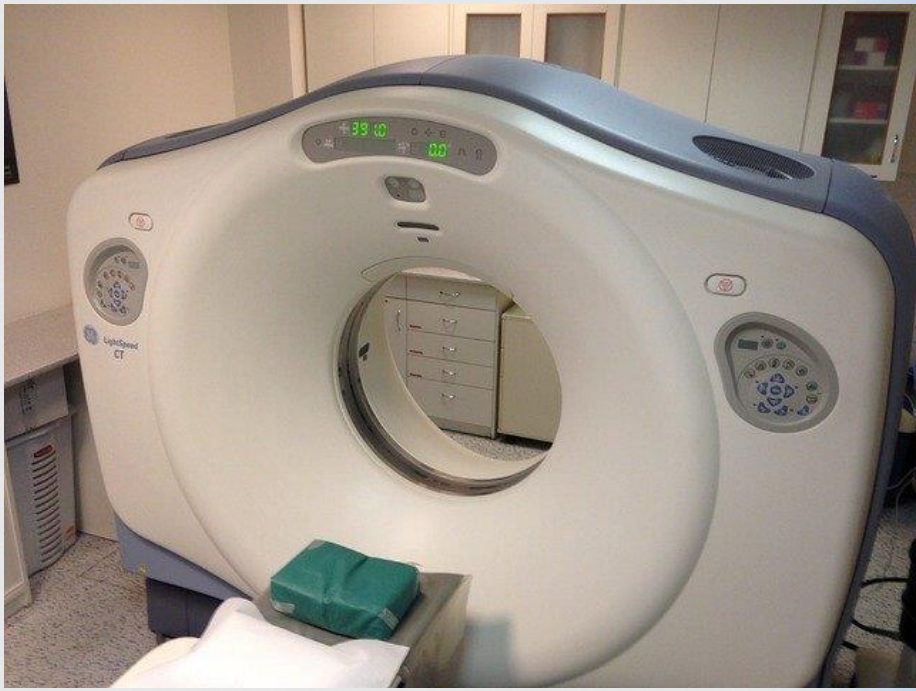
Low-Risk Appendicitis Rule

Modified Alvarado score

Christian score

Imaging

Sens 60-80%, spec 97%



Sens 93%, spec 92%

Imaging

Sens 96%, spec 96%

But….

The Impact of Imaging on Negative Appendectomies for Early Appendicitis in Children

Elizabeth C. Doolin, DO and Edward J. Doolin, MD†*

7%*

- 4.8%
- < 3 days
- Indication = imaging

Pediatr Emer Care, 2021; 37(12)

Time

Time From Emergency Department Evaluation to Operation and Appendiceal Perforation

Michelle D. Stevenson, MD, MS,[a] Peter S. Dayan, MD, MSc,[b] Nanette C. Dudley, MD,[c] Lalit Bajaj, MD, MPH,[d] Charles G. Macias, MD, MPH,[e] Richard G. Bachur, MD,[f] Kelly Sinclair, MD,[g] Jonathan Bennett, MD,[h] Manoj K. Mittal, MD,[i] Macarius M. Donneyong, PhD, MPH,[j] Anupam B. Kharbanda, MD, MSc,[k] on behalf of the Pediatric Emergency Medicine Collaborative Research Committee of the American Academy of Pediatrics

ED to OR: 7.2 hours

IQR: 4.8-8.5

Pediatrics, 139(6),2017

Biases

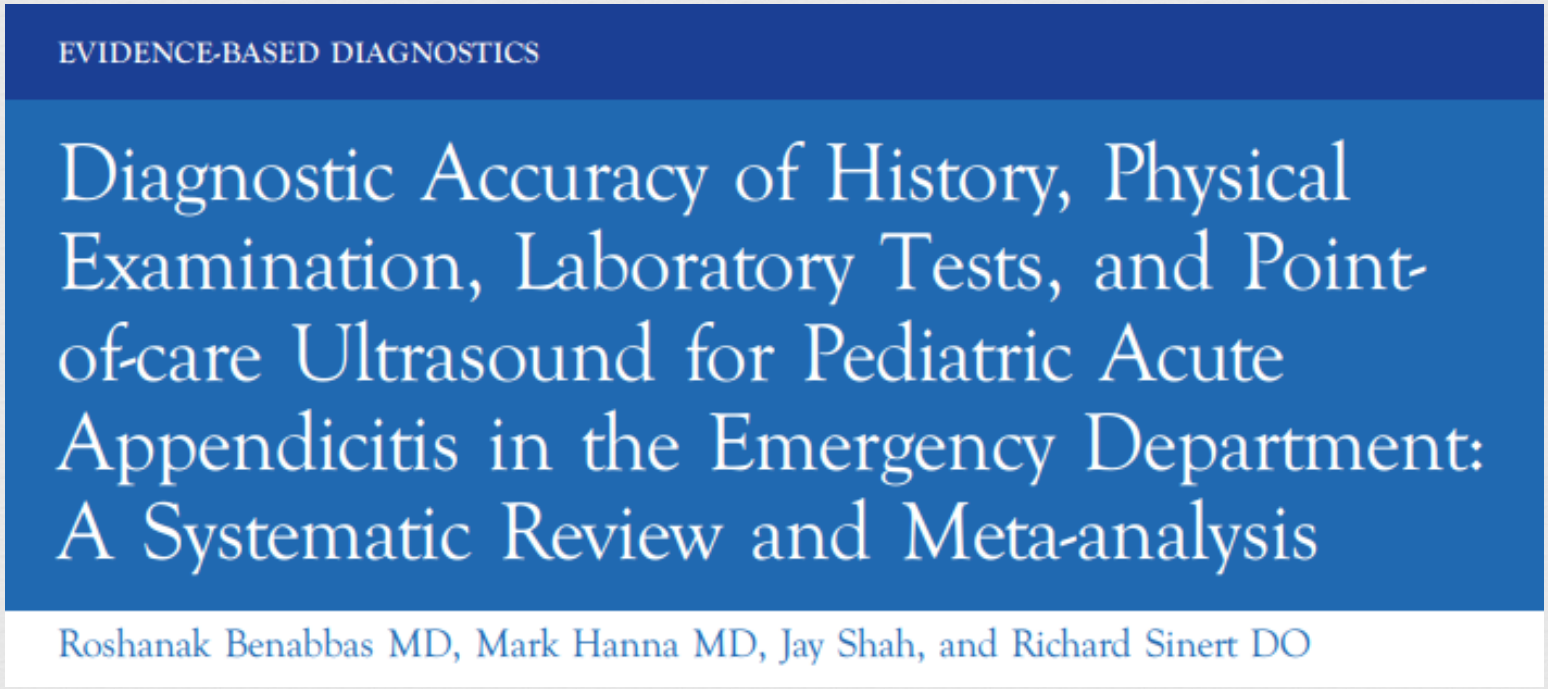
Opioid Analgesia for Acute Abdominal Pain in Children: A Systematic Review and Meta-analysis

Naveen Poonai, MSc, MD, David Paskar, MD, Shauna-Lee Konrad, MLIS, Michael Rieder, MD, Gary Joubert, MD, Rodrick Lim, MD, Asieh Golozar, MD, Sefu Uledi, MMed, Andrew Worster, MD, and Samina Ali, MD

Racial Disparities in Pain Management of Children With Appendicitis in Emergency Departments

Monika K. Goyal, MD, MSCE, **Nathan Kuppermann, MD, MPH**, **Sean D. Cleary, PhD, MPH**, **Stephen J. Teach, MD, MPH**, and **James M. Chamberlain, MD**

Putting it together…


EVIDENCE-BASED DIAGNOSTICS

Diagnostic Accuracy of History, Physical Examination, Laboratory Tests, and Point-of-care Ultrasound for Pediatric Acute Appendicitis in the Emergency Department: A Systematic Review and Meta-analysis

Roshanak Benabbas MD, Mark Hanna MD, Jay Shah, and Richard Sinert DO

Acad Emerg Med, May 2017

"Once AA is suspected, no single history, physical examination, laboratory finding, or score attained on PAS can eliminate the need for imaging studies."

JAMA | Original Investigation

Association of Nonoperative Management Using Antibiotic Therapy vs Laparoscopic Appendectomy With Treatment Success and Disability Days in Children With Uncomplicated Appendicitis

Peter C. Minneci, MD, MHSc; Erinn M. Hade, PhD; Amy E. Lawrence, MD; Yuri V. Sebastião, PhD; Jacqueline M. Saito, MD; Grace Z. Mak, MD; Christa Fox, MSN; Ronald B. Hirschl, MD; Samir Gadepalli, MD, MBA; Michael A. Helmrath, MD; Jonathan E. Kohler, MD; Charles M. Leys, MD; Thomas T. Sato, MD; Dave R. Lal, MD; Matthew P. Landman, MD; Rashmi Kabre, MD; Mary E. Fallat, MD; Jennifer N. Cooper, PhD; Katherine J. Deans, MD, MHSc; for the Midwest Pediatric Surgery Consortium

30% appendectomy @ 1 year

Complications

bowel obstruction

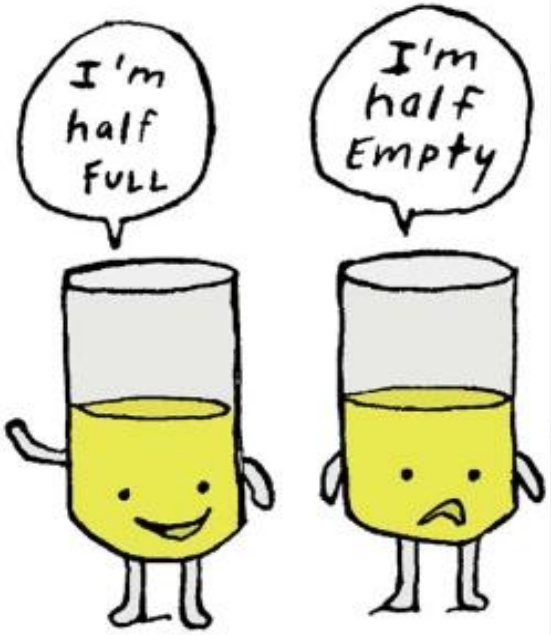
Wound infection

5-15%

intra-abdominal abscess

negative appendectomy (7%)

stump appendicitis



Pros

Pragmatic

Patient oriented

CODA: 30% appendectomy in 3 months
50% appendectomy @ 3-4 years

Future

- Disseminate information into clinical practice
- Expand criteria
- Outpatient management/ follow up

- http://www.appyornot.org/.

Constipation

- Anticipatory guidance:
  - 64 oz/day, dry fruit,
  - “P” juices (sorbitol)
  - PEG 3350 (Miralax) doses
    - 1.5 g/kg/d, max dose of 100 g/d

Donald Trung Quoc Don (Chữ Hán: 徵國單) - Wikimedia Commons

A Randomized Trial of Enema Versus Polyethylene Glycol 3350 for Fecal Disimpaction in Children Presenting to an Emergency Department

Melissa K. Miller, MD, Mary Denise Dowd, MD, MPH,* Craig A. Friesen, MD,† and Christine M. Walsh-Kelly, MD‡*

- Prospective randomized trial
- Enema vs miralax (PEG) x 3 days
- 79 children
- Convenience sample 1-17 years
- Outcome: symptom improvement

Enema vs PEG

- Results
  - Day 1, PEG subjects were less likely to have improved main symptom (OR 0.3)
  - Day 5, no difference between groups
  - 54% in enema arm upset by ED therapy
  - Most treatment failures in PEG arm (83%)

Enema vs PEG

Conclusion:

- Enemas produced more rapid initial symptom improvement and less-frequent stools but resulted in a significant number of upset subjects compared to oral PEG

A word on infants…

- Atypical symptoms: fussiness, distension
- Consider structural causes
- Infectious, e.g. botulism

Back to the cases…

Case

- 13 yo M with abdominal pain
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Ovarian Torsion

- May occur at any age (including fetus); most common during child-bearing years
- 85% associated with ovarian mass (cyst or benign neoplasm)
  - prepubescent children: a normal ovary may torse secondary to a hypermobile adnexa
- Lesions >5 cm are more likely to torse
- Right sided torsion is more common (longer utero-ovarian ligament) sigmoid colon stabilizes left ovary

Ovarian Torsion

- Ultrasound is most useful to evaluate for a mass
- Doppler is insensitive and may be normal, decreased, or absent due to collateral blood supply and intermittent torsion
- Definitive diagnosis is made by surgical exploration with detorsion +/- oophoropexy

Testicular Torsion

- Bimodal (neonatal and teenage)
- US + Clinical diagnosis
- Document testicular exam
- Time is testicle—nearly 100% salvaged at 4 hours
  - 93% at 4-8 hours,
    80% at 8-12 hours,
    40% at 12-24 hours,
    10% if >24 hours of symptoms

TWIST

- **TWIST Score** is a Summation of 5 Clinical Variable:
  - Presence of Testicular Swelling = 2 points
  - Presence of Hard Testicle = 2 points
  - Absence of Cremasteric Reflex = 1 point
  - Presence of High Riding Testicle = 1 point
  - Presence of Nausea/Vomiting = 1 point

TWIST

- **Scores, Risk, and Proposed Management** [*Frohlich, 2017; Sheth, 2016; Brunhara, 2016*]
  - **High Risk = Score of 6 or 7**
    - **NO imaging**.
    - Consider imaging those children who are Tanner Stage 1-2 (who had more confounded exams) – *some advocate for only using TWIST Score in pubertal males*.
  - **Intermediate Risk = Scores of 1-5**
    - Obtain scrotal **ultrasound**
    - Consider alternative diagnoses
  - **"Low" Risk = Scores of 0**
    - BUT Torsion can be deceptive and present atypically… **have a low threshold for obtaining an ultrasound**.
    - Alternative diagnosis is more likely, though, so **consider the rest of the DDx** as well (ex, Epididymitis, Varicoceles, UTI, Nephrolithiasis, Mumps, HSP).

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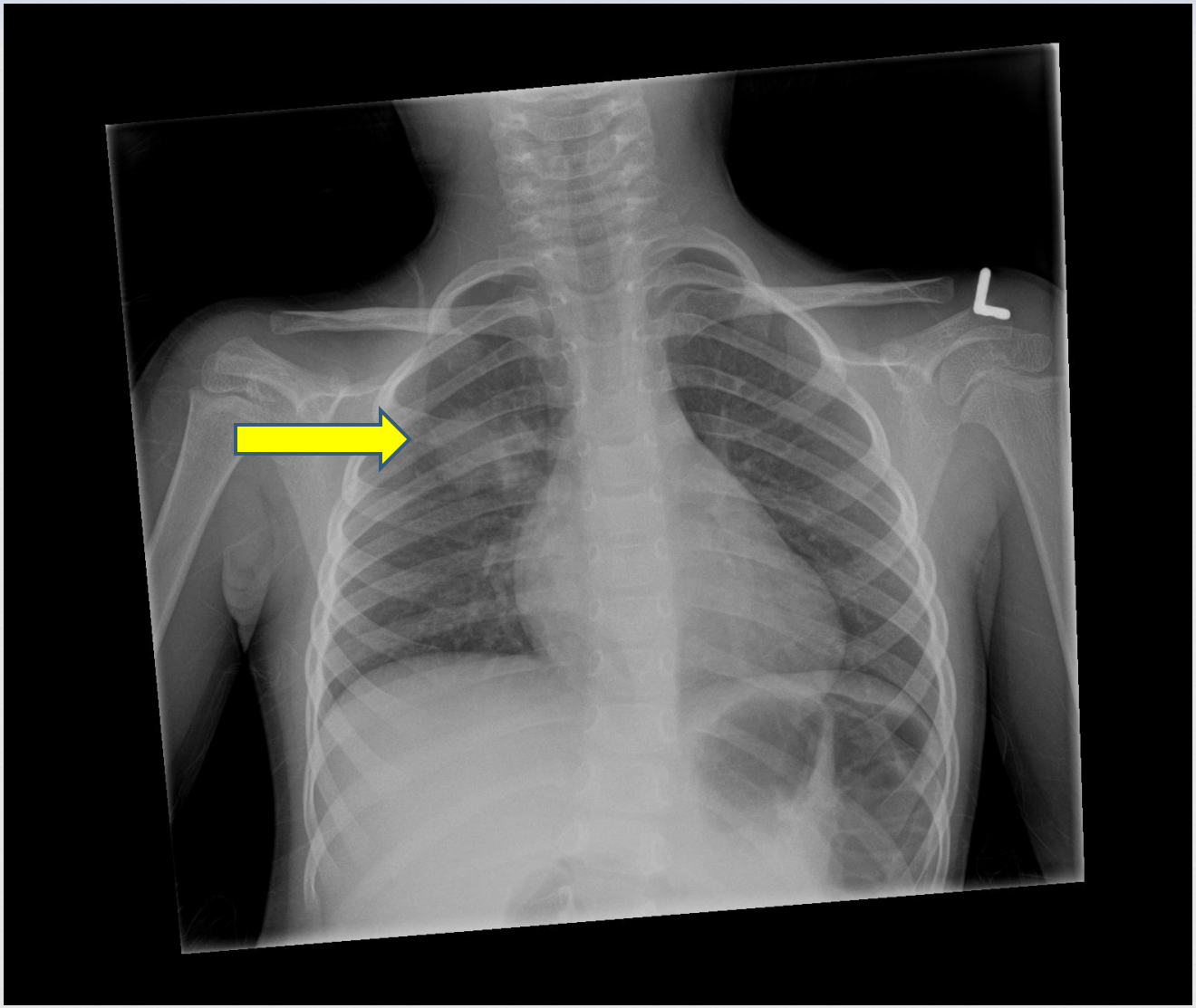


Dx: Pneumonia

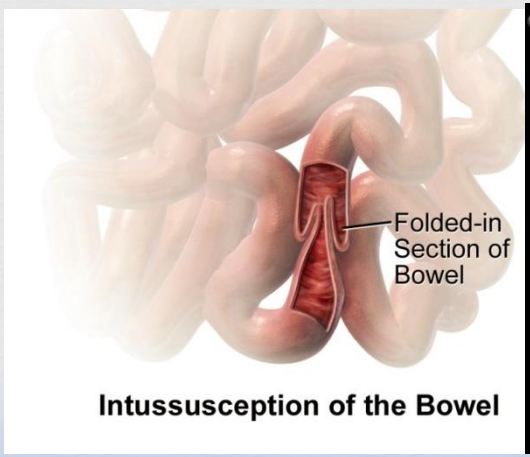
Belly pain is a belly problem

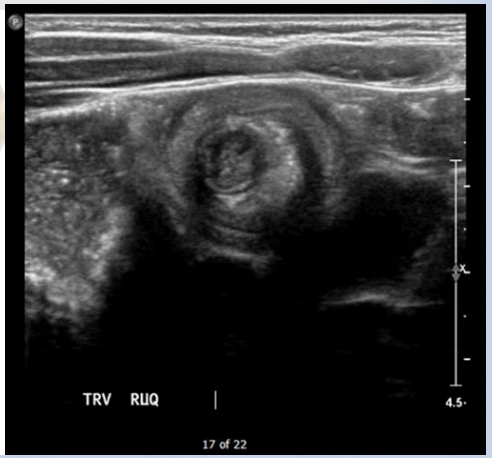
Pitfall

- Pneumonia
- Urinary tract infection
- Inborn errors of metabolism
- Strep pharyngitis
- Ingestion
- Incarcerated hernia
- Meningitis
- Diabetic ketoacidosis
- Abuse
- Trauma
- Torsion
- Pregnancy
- PID

Case

- 4 yo M with vomiting, abdominal pain
- T 37.8°C, P 114, R 18, BP 90/62, 98% RA
- Dx: intussusception





Intussusception

- Most common: ileo-colic
- 3 mo – 5 yrs (peak 6-11 mo)
- Causes:
  - Idiopathic, Meckel's diverticulum, Henoch-Scholein purpura, polyps, tumors
- 20% ALOC

Bottom line?

Summary: Pitfalls

- Relying on normal lab values to rule out abdominal disasters
- Relying on normal imaging to rule out abdominal disasters
- Diagnosing "gastroenteritis" without vomiting ***and*** diarrhea

Summary: Pitfalls

- Assuming belly pain = belly problem
- Failing to administer adequate analgesics
- Failing to ensure follow up
- Failing to consider abuse

Questions?

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