

Pediatric Surgery Update:

Current Management of Acute Appendicitis And Pilonidal Disease

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Objectives

1. Basic understanding of the pathophysiology of appendicitis
2. Correlation of presenting timeline and imaging in appendicitis
3. Management algorithm for acute appendicitis
4. Differences in management between non-perforated and perforated appendicitis
5. Recurrent appendicitis after antibiotic management and the role of interval appendectomy
6. Recognition and treatment of pilonidal disease
7. Modern procedures and outcomes in pilonidal disease



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I have no relevant disclosures

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Appendicitis



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Appendicitis

Clinical Presentation
 Perforated vs Non-Perforated
 Surgical Removal vs Interval Treatment
 Post-op Recommendations

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Appendicitis Clinical Presentation

Approximate 10% lifetime risk – highest @8-18yrs

Common symptoms include:

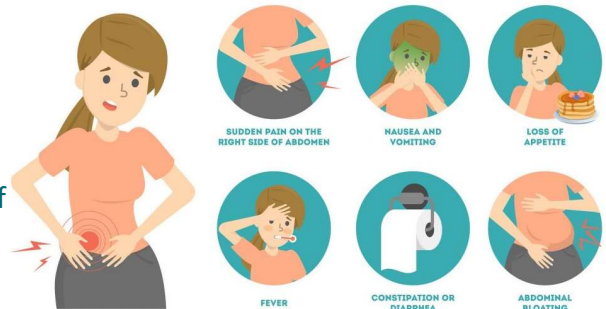
Anorexia – most specific
 Nausea/Vomiting
 Bloating/Constipation/Diarrhea
 Fever

Abdominal pain - Peri-umbilical shifting to the RLQ

Generally 36 hours from initial pain before risk of perforation (7% at 24hrs, increases with time)

50% of kids < 6yo present with perforation

APPENDICITIS SYMPTOMS



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Appendicitis Anatomy

Extends off of cecum

Has its own mesentery

Small opening to colon to drain

Contains goblet cells and bacteria

Various locations of tip

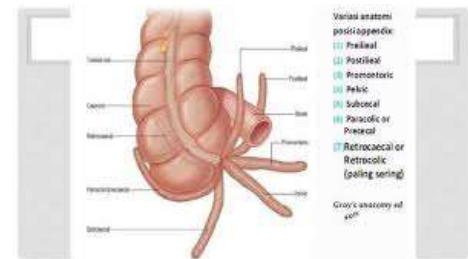
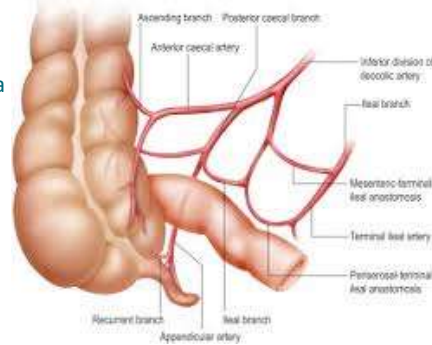
Retrocecal

Pelvic

Subcecal

Pre-ileal

Right paracolic



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Appendicitis Physiology

Caused by blockage of the opening to cecum (2 common reasons)

Appendicolith

Lymphoid hyperplasia

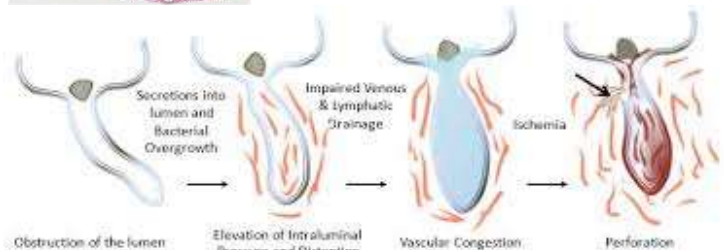
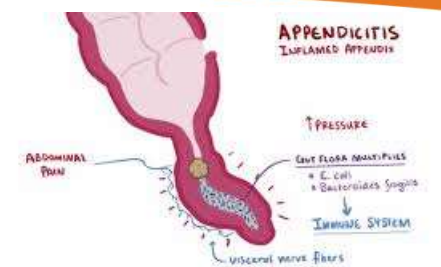
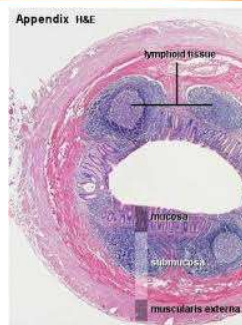
Types of Pain

Sympathetic

Peri-umbilical

Somatic

Right Lower Quadrant (McBurney's)



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Appendicitis Work up

Consistent history

Low grade fevers

Mild elevated WBC (12-14,000)

Other associated symptoms

These findings coupled with tenderness at McBurney's point generally enough to make the diagnosis

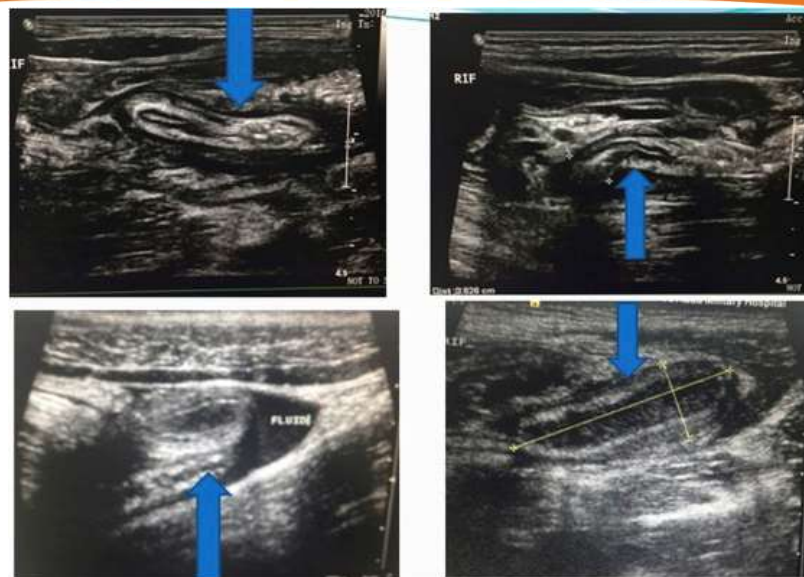
Adjunct tests

Ultrasound *Operator Dependent, less sensitive for perforation*

CT scan *IV Contrast only*

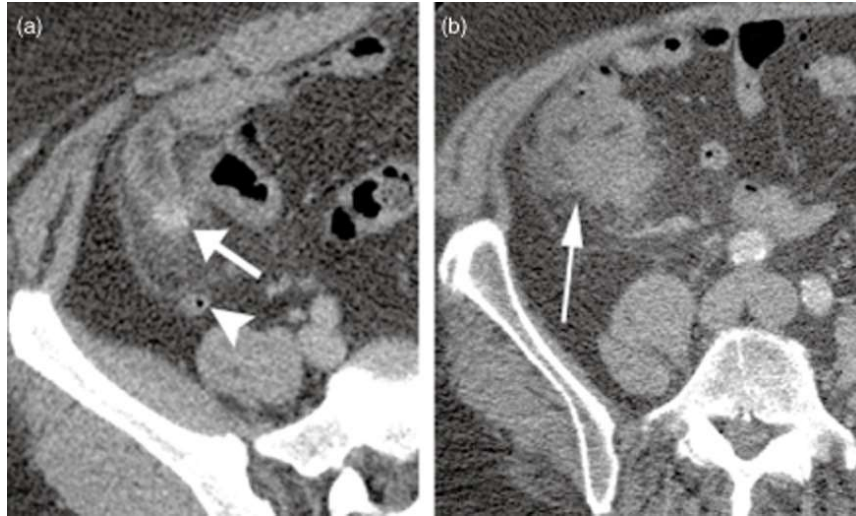
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Appendicitis Ultrasound



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Appendicitis CT Scan

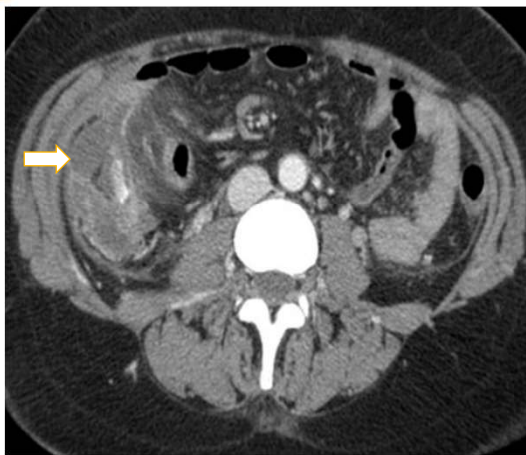


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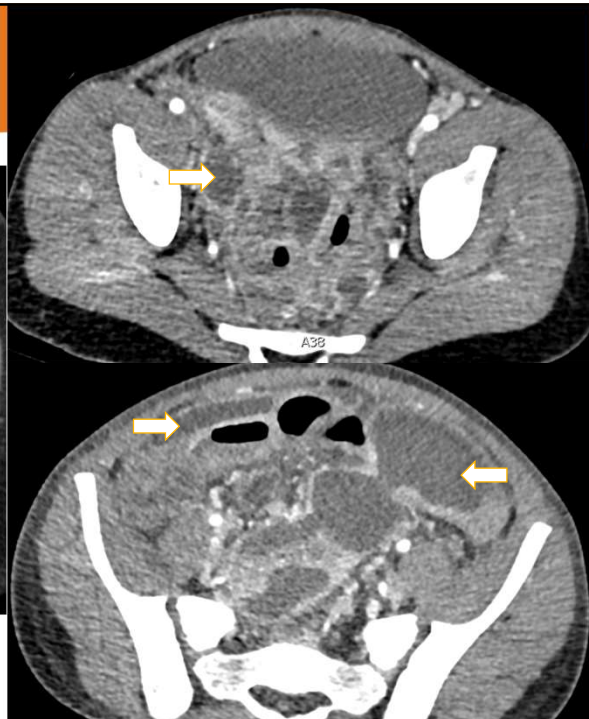
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Perforated Appendicitis CT scan



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Appendicitis When to Operate

If the diagnosis of acute **non-perforated** appendicitis is made, once the patient receives antibiotics, the surgery should be performed within 24 hours.

24 hour dosing antibiotics (per protocol)

Ceftriaxone 50 mg/kg/dose IV q24h (max: 2 g/dose)

Metronidazole 30 mg/kg/dose IV q24 (max: 1.5 g/dose)

Ciprofloxacin 15 mg/kg/dose IV q12h (max: 2 g/dose)

severe allergy (anaphylaxis, angioedema, respiratory distress)



Pediatric Appendicitis Clinical Algorithm

This algorithm was developed for immunocompetent children.
It serves as a guideline only and should not replace clinical judgment.



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Appendicitis Perforated

Perforated appendicitis with a well developed phlegmon or is treated on the interval pathway

Admit to floor unless critically ill

Antibiotics as previously described

IR Consult if there is a drainable collection

Elective Laparoscopic Appendectomy (Interval) performed in 6-8 weeks

25-30% recurrence rate at 1 year



Pediatric Perforated Appendicitis Clinical Algorithm

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It serves as a guideline only and should not replace clinical judgment.



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Interval Appendectomy

Review > [Pediatrics](#). 2017 Mar;139(3):e20163003. doi: 10.1542/peds.2016-3003. Epub 2017 Feb 17.

Efficacy and Safety of Nonoperative Treatment for Acute Appendicitis: A Meta-analysis

Georgiou ¹, Simon Eaton ², Michael P Stanton ¹, Agostino Pierro ³, Nigel J Hall ^{4 5}

Review > [Pediatr Surg Int](#). 2016 Jul;32(7):649-55. doi: 10.1007/s00383-016-3897-y. Epub 2016 May 9.

A systematic review and individual patient data meta-analysis of published randomized clinical trials comparing early versus interval appendectomy for children with perforated appendicitis

Eileen M Duggan ¹, Andre P Marshall ¹, Katrina L Weaver ², Shawn D St Peter ³, Jamie Tice ¹, Li Wang ⁴, Leena Choi ⁴, Martin L Blakely ⁵

Meta-Analysis > [Ann Surg](#). 2019 Dec;270(6):1028-1040. doi: 10.1097/SLA.0000000000003225.

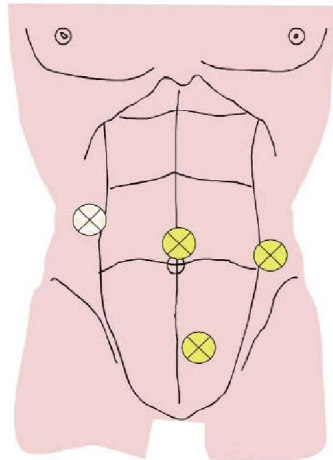
Antibiotic Treatment and Appendectomy for Uncomplicated Acute Appendicitis in Adults and Children: A Systematic Review and Meta-analysis

Mauro Podda ¹, Chiara Gerardi ², Nicola Cillara ³, Nicola Fearnhead ⁴, Carlos Augusto Gomes ⁵, Arianna Birindelli ⁶, Andrea Mullini ⁷, Richard Justin Davies ⁴, Salomone Di Saverio ⁴

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Laparoscopic Appendectomy



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Laparoscopic Appendectomy Post-Operative Course Non-perforated

Must meet discharge criteria for discharge (no further antibiotic treatment)

Ambulating, voiding, tolerating a regular diet

Pain controlled with oral NSAIDs and Tylenol

Implementing an ERAS protocol where all patients >12yo go home the same day

Discharge Instructions

Follow up in 2-3 weeks

Do not submerge incision for 1 week (may shower the night of surgery)

No sports or gym for 2 weeks

Return to school when no longer needing pain medication (2-3 days)

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Perforated Appendicitis

Continue IV antibiotics

Discharge Criteria

Afebrile > 24 hours

Normal bowel function

Tolerating regular diet

Pain controlled with NSAIDs and Tylenol

If discharged to home prior to 4 days of IV antibiotics

Augmentin (amoxicillin/clavulanate): 22.5 mg/kg/dose (amoxicillin component) q12hrs (max: 875 mg q 12hrs)

Follow up in 2-3 weeks

No restrictions

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Questions?

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Pilonidal Disease



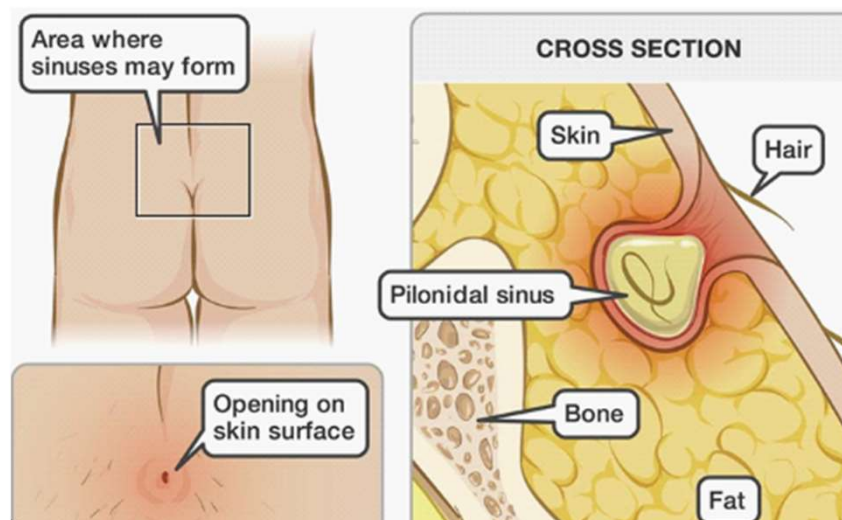
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Pilonidal Disease

Pathophysiology
 Clinical Presentation
 Possible Nonsurgical Interventions
 Possible Surgical Interventions
 Minimally Invasive Gips Procedure
 Post-op Recommendations

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Pilonidal Pathophysiology



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Pilonidal Disease Clinical Presentation

Teens and young adults

4:1 male predominance

Presentations include:

Infection = acute severe pain

Chronic drainage = sinus tract

Asymptomatic = pits/sinuses

Acute infection most common

Abx for cellulitis

Drainage for abscess

Sx referral for

Acute infection, chronic drainage

Non-healing sinus with non-Sx treatment



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Pilonidal Disease Non-surgical Management

Recognition is most important

Visible pits or history of Pilonidal with residual pits

Non-surgical recommendation

Weekly hair clipping

Manual removal of hair in pits

Aggressive hygiene:

Twice Daily showers

Manual exfoliation

Good evidence for laser hair removal, but \$\$\$

50% have resolution of disease

50% require surgical intervention



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Pilonidal Disease Wide Excision

Historical approach = complete excision including:

- Open packing and secondary healing
- Primary closure
- Z-Plasty Closure
- Off-midline excision and primary closure
- Off Midline excision with Z-Plasty closure

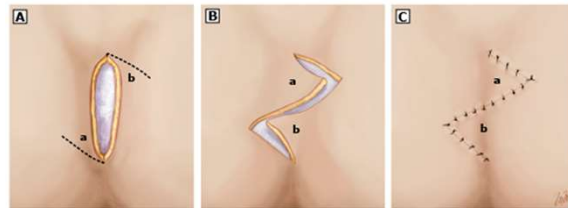
Outcomes

- 30-40% dehiscence/recurrence rates
- 1-2d hospital stay, 3-6 weeks of healing

Aggressive resection with flap closure

- 1-30% failure rate
- 3-14d hospital stay with drains, 18-26 weeks of healing

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Minimally Invasive Pilonidal Excision (Gips or MIPE)

Excise each sinus opening

- 4-5mm Punch biopsy trephine

Excise of hair, tract, pseudocyst

- hemostats
- 1-2d hospital stay, 3-6 weeks of healing

Cauterize remaining lining

- H₂O₂ irrigation
- 4-5 times with 30-60sec dwell time

Clean area

- saline irrigation

Rare packing removed in 48hrs

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Post-operative Care for Pilonidal Procedures

Post-op Care

- Outpatient procedure
- Motrin/Tylenol for pain control
- remove any packing in 48hrs
- no re-packing
- sitz baths bid till 2 week follow up
- sitz bath daily until healed

Total healing time 3-4weeks

20% failure/recurrence rate

Consider Gips for:

- pt s/p I&D with residual sinuses
- failure/recurrence

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Minimally Invasive Pilonidal Excision (Gips or MIPE)

Advantages of Minimally Invasive Pilonidal Excision (MIPE)

<p>Technically Fast and Easy</p>  <p>Skin punch biopsy for pit excision</p>  <p>Removal of hair and granulation tissue</p>  <p>Irrigation with peroxide, open healing</p> <p>Low Recurrence/SSI Rates</p>	<p>Rapid Recovery/Better QoL</p>  <p>Back to school sooner</p> <p>Fewer analgesics </p>  <p>Back to activities/sports sooner</p>	<p>Recurrent/Persistent disease?</p> <p><u>Failure of conservative treatment</u> (including limited excision/sinusectomy)</p> <p>↓</p> <p><u>Wide/En bloc excision (options)</u></p> <ol style="list-style-type: none"> 1. Off-midline closure (Karydak, Limberg, Bascom) 2. Tension-free midline closure 3. Open/secondary healing
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Questions?

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EMMC Pediatric Surgery



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EMMC Pediatric Surgery

All major pediatric general surgical and urologic issues

Exceptions:

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Maine AAP

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