Appendicitis

Operate
or
Antibiotics?

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World War 2

The first successful instances of the nonoperative medical treatment of appendicitis occurred on board US Navy submarines during combat patrol in World War II.

Campbell. J Amer College Surgeons 2004; 198: 822-30

First Randomized Trial

Cefotaxime + tinidazole	**20 pts**
Operated for failure	1 pt
Discharged at 2-3 days	
Recurrence by 1 year	7 pts
Appendectomy	**20 pts**
Negative appe	3 pts

Erikson. Br J Surgery 1995; 82: 166-9

Next Randomized Trial

Cefotaxime + tinidazole	**128 pts**
Operated for failure	15 pts (12%)
Disch at 2-3 days	
Recurrence by 1 year	15 pts (14%)
Appendectomy	**124 pts**
Negative appe	4 pts (3%)
Complications	17 pts (14%)

Styrud. World J Surgery. 2006; 30: 1033-7

Randomized Trial but Pts Could Change Asssignment

Antibiotic Treatment		119
Appendectomy within 48 hrs		11 (9.2%)
Appendectomy within 1 yr		12/108 (11%)
		23/119 (19.3%)
Ave L.O.S.	Antibiotics	Surgery
	2 days	3 days

Hansson. Br J Surgery 2009; 96: 473-81

Prospective Randomized Trial
APPAC Trial

Appendectomy	272
Antibiotics	256
Ab failure → Surgery	15 (6%)
Appendectomy within 1 yr	70/256 (27%)

but 5 of 55 late operations did not have appendicitis

Salminen. JAMA 2015; 313: 2340-8

7 Year Follow-Up of APPAC

- 39% of antibiotic patients had had appendectomy.
- “Satisfaction” was slightly higher in appendectomy group patients.
- Difference was determined by antibiotic patients who had progressed to appendectomy.
- “Quality of life” was equal in both groups.

Sippola. JAMA Surgery 2020; 155: 283-9

Randomized Trial in L.A.

Ertapenem→oral	**16 pts**
Operated for failure	0 pts
Disch at 2-3 days	
Recurrence Rx w Antibiotics	1 pt
Recurrence→appendectomy	1 pt
Appendectomy	**14 pts**
Negative appe	1 pt
Complications	2 pts

Talan. Ann Emergency Med. 2017; 70: 1-11

IDSA Guideline Review
Pre-Publication - 2018

- Analysis of 8 randomized clinical trials and 22 observational studies comparing immediate appendectomy vs. initial antibiotic administration with appendectomy as needed depending on response to antibiotics

IDSA Guideline Review

Pre-Publication – 2018

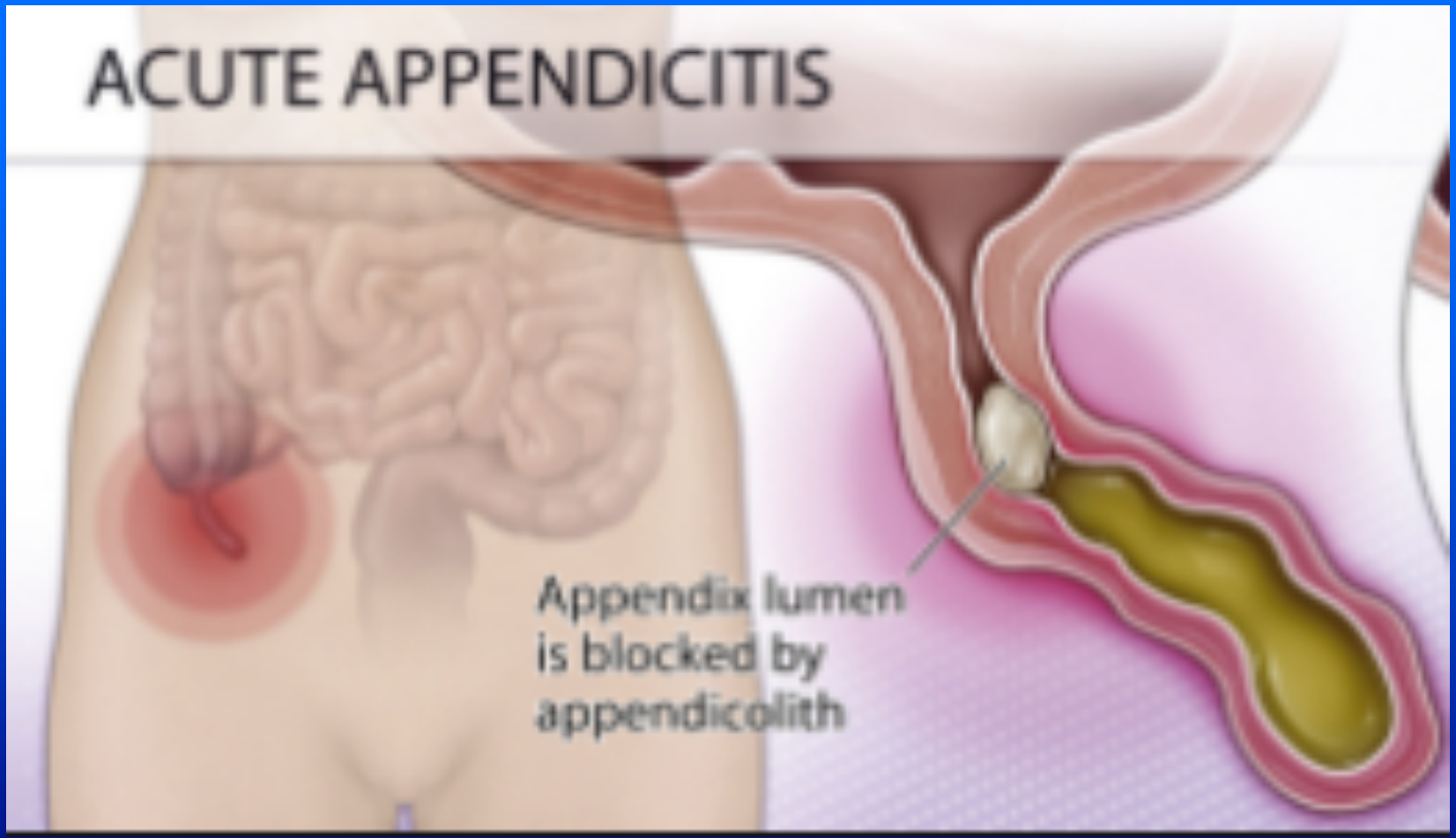
Antibiotic Treatment Compared to Appendectomy

Failure at 1 month	11.3% (7.4 – 15.9)
Fewer major complic	1% (3 – 0)
Fewer SSI	6% (7 – 5)
Recurrence at 1 year	23% (16 – 30)
Increase length hosp stay	0.4 (0.3 – 0.6)
Earlier return to work	3.6d
Increased failure with appendicolith, Odds ratio	6.9 (2.8 – 17.1)

Appendicolith

Appendicolith

Appendicolith



IDSA Guideline Review
Pre-Publication – 2018

PICO Question:

Can acute appendicitis be treated with antibiotics alone without appendectomy?

Recommendation:

1. In patients with uncomplicated appendicitis, we suggest antibiotics rather than immediate surgery (weak recommendation).

2. In patients with uncomplicated appendicitis with an appendicolith, we suggest appendectomy rather than antibiotics (weak recommendation).

Comparison of Outcomes of Antibiotic Drugs & Appendectomy CODA Trial

25 clinical sites

1552 patients

1 year follow-up

CT and/or Ultrasound and/or MRI for dx

Appendicolith seen in 27%

47% antibiotic patients disch from E.D.

Flum. NEJM 2020; 383: 1907-19

Comparison of Outcomes of Antibiotic Drugs & Appendectomy CODA Trial

Appendectomy in antibiotic group	
48 hrs	11%
30 days	20%
90 days, all pts	29%
with appendicolith	41%
no appendicolith	25%

Flum. NEJM 2020; 383: 1907-19

Appendicites Treated with Antibiotics in Pregnancy

Retrospective, 54 pregnant pts

- appendectomy 20
- antibiotics 34
  - one recurrence, 3d trimester
  - 2 recurrences after delivery

No difference between groups in pregnancy outcomes

Liu. Asian J Endoscopic Surgery 2020; epub

Patient Activation Tool and Decisions for Appendicitis Treatment Children, 7 – 17 years

200 pts/caregivers received standardized discussion of appendectomy vs. antibiotics for treatment and then chose their option.

73 chose antibiotics & 127 appendectomy.

Antibiotic failure at 30 days	12/72 (17%)
Antibiotic failure at 1 year	24/68 (35%)

Minneci. JAMA Network Open 2019; 2 (6): e195009

Patient Activation Tool and Decisions for Appendicitis Treatment

- Patients/caregivers expressed high decisional self-efficacy at discharge and 30 days.
- Demographic, socioeconomic, & clinical characteristics similar, Antibiot & Surgery Grps.
- More non-whites & more non-English speakers in NonOp Grp.
- Nonop pts had fewer disability days at 1 year.
- Nonop pts had higher Qual of Life at 1 year.

Minneci. JAMA Network Open 2019; 2 (6): e195009

NonOp Mgmt vs. Lap Appe in Children with Uncomplicated Appendicitis

Child/family offered choice	
Chose surgery	698
Chose nonop	370
NonOp success, 1 year	**70.2%**
Disability days, 1 year	
NonOp	6.6
Surgery	10.9

Minneci. JAMA 2020; 324: 581-93

Oral or Intravenous Antibiotics for Appendicitis?

Oral moxifloxacin, 7 days	295
Ertapenem, 2 d→ Levoflox+Metronidazole, 5 days	288
Success at 1 year	
I.V./oral	73.8%
Oral only	70.2%
Hospital stay	29 (23 – 43) hours

Sippola. JAMA 2021; 325: 353-62

IDSA Guideline Review

Pre-Publication – 2018

Antibiotic Treatment Compared to Appendectomy

Limited data are available to inform our judgments of patients' values and preferences. We believe that most patients would place a relatively higher value on avoiding surgery and a lower value on risk of recurrence of appendicitis. Patients who are less averse to surgery, or who place a relatively higher value on early definitive management are likely to choose appendectomy. There is probably a large degree of variability in patient values and preferences, thus emphasizing the need for shared decision-making. When chosen by the family, non-operative management, by comparison with laparoscopic appendectomy, has been an effective strategy for children with uncomplicated acute appendicitis.

IDSA Guideline Review

Pre-Publication – 2018

Antibiotic Treatment Compared to Appendectomy

- Future research should focus on characterizing patient values and preferences and ways to empower patients to engage in shared-decision making.
- The optimal antibiotic regimen and duration requires further study.