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# Stumped?

It could be stump appendicitis.

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# Disclosures

- The authors have no financial disclosures, or conflicts of interest to declare in relation to this poster.
- Written informed consent was obtained for the inclusion of both cases presented, and IRB/HREC endorsement was granted.



# Learning Objectives

- Improve awareness of stump appendicitis.
- Demonstrate ultrasound is a useful diagnostic tool in identifying an inflamed appendiceal stump.



# Introduction

- Stump appendicitis is rare, with 61 cases identified in the literature between 1945 and 2005.<sup>1</sup>
- Of the two common techniques of appendectomy, ligation and invagination, the former can leave a residual stump with a potential lumen for the pathophysiological process of appendicitis to recur.
- Remnant stump lengths of greater than 5 mm are considered to have a higher risk of leading to stump appendicitis, acting as a potential reservoir for a fecalith.<sup>2</sup>



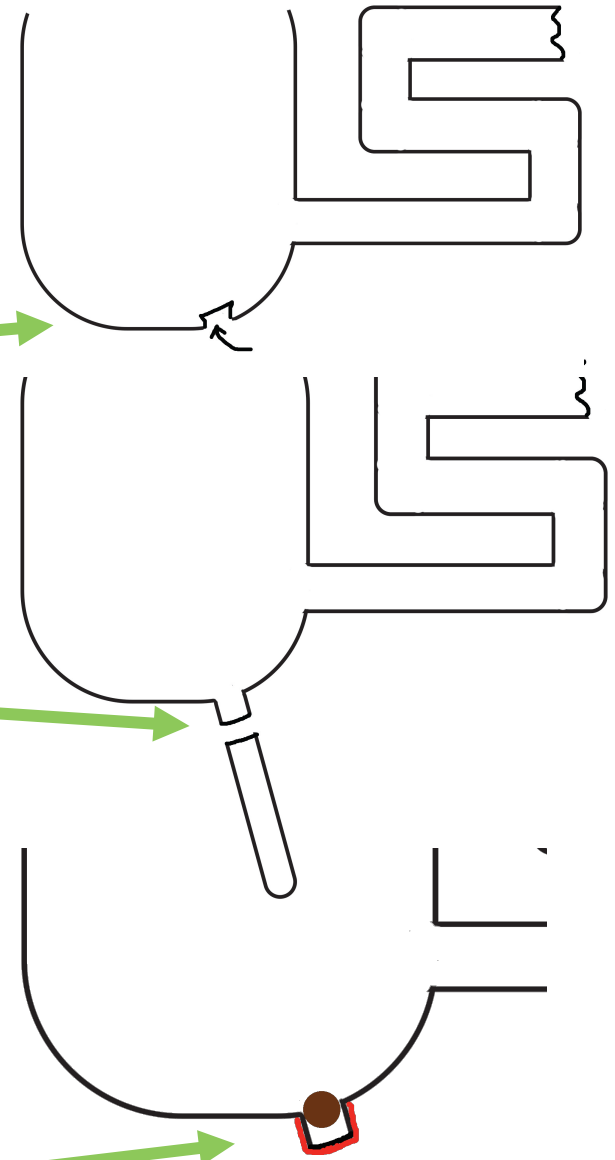
# Background

- Two common appendectomy techniques:

- **invagination**  
(tucking stump into caecum)

- **ligation (*these cases*)**  
(tie/clip stump at base)

- Residual stump can permit recurrence of appendicitis pathogenic process through **obstruction of stump lumen**



# Introduction

- Whilst ultrasound has been commonly used to diagnose acute appendicitis for over 30 years,<sup>3</sup> its utility in pre-operative identification of stump appendicitis in patients post-appendectomy has only been documented more recently.
- Traditional sonographic criteria for diagnosing acute appendicitis have been applied to the appendiceal stump, with a transverse diameter greater than 6 mm, non-compressibility and wall hyperemia all being concerning for stump appendicitis.<sup>4</sup>
- Secondary sonographic signs of acute appendicitis, such as echogenic peri-appendiceal mesentery, can also indicate stump inflammation.<sup>5,6</sup>



# Ultrasound Technique

- 12-5 MHz Linear transducer
- Graded compression technique
- Identify caecum and terminal ileum
- Be aware of secondary sonographic signs of inflammation



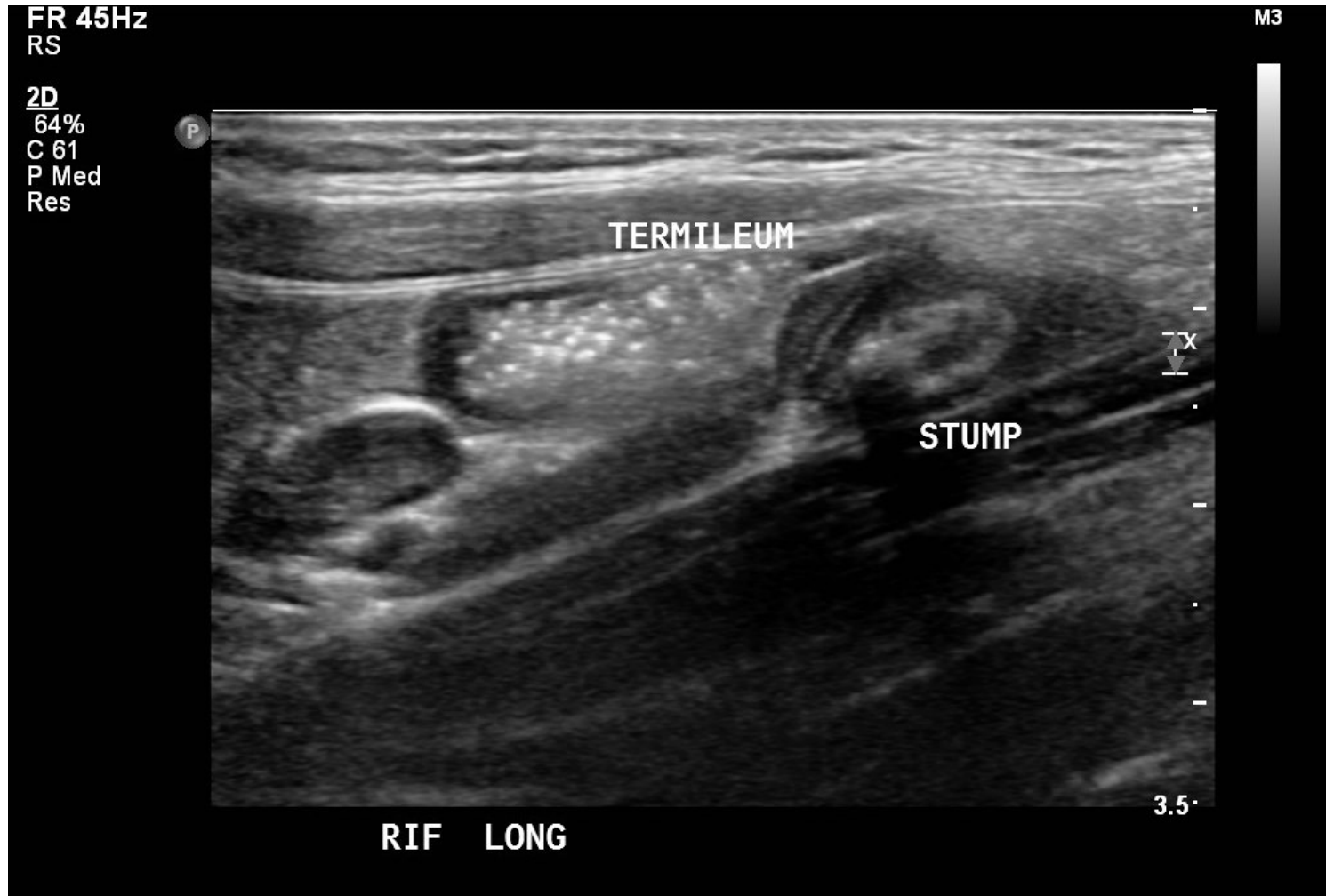


# Case 1- History

- 9 year-old male
- 13 days post laparoscopic appendectomy
- Histologically confirmed acute appendicitis
  - no evidence of perforation
- Focal right iliac fossa pain for past 6 days
  - Afebrile
  - CRP <2.0 mg/L
  - WCC  $4.4 \times 10^9/L$

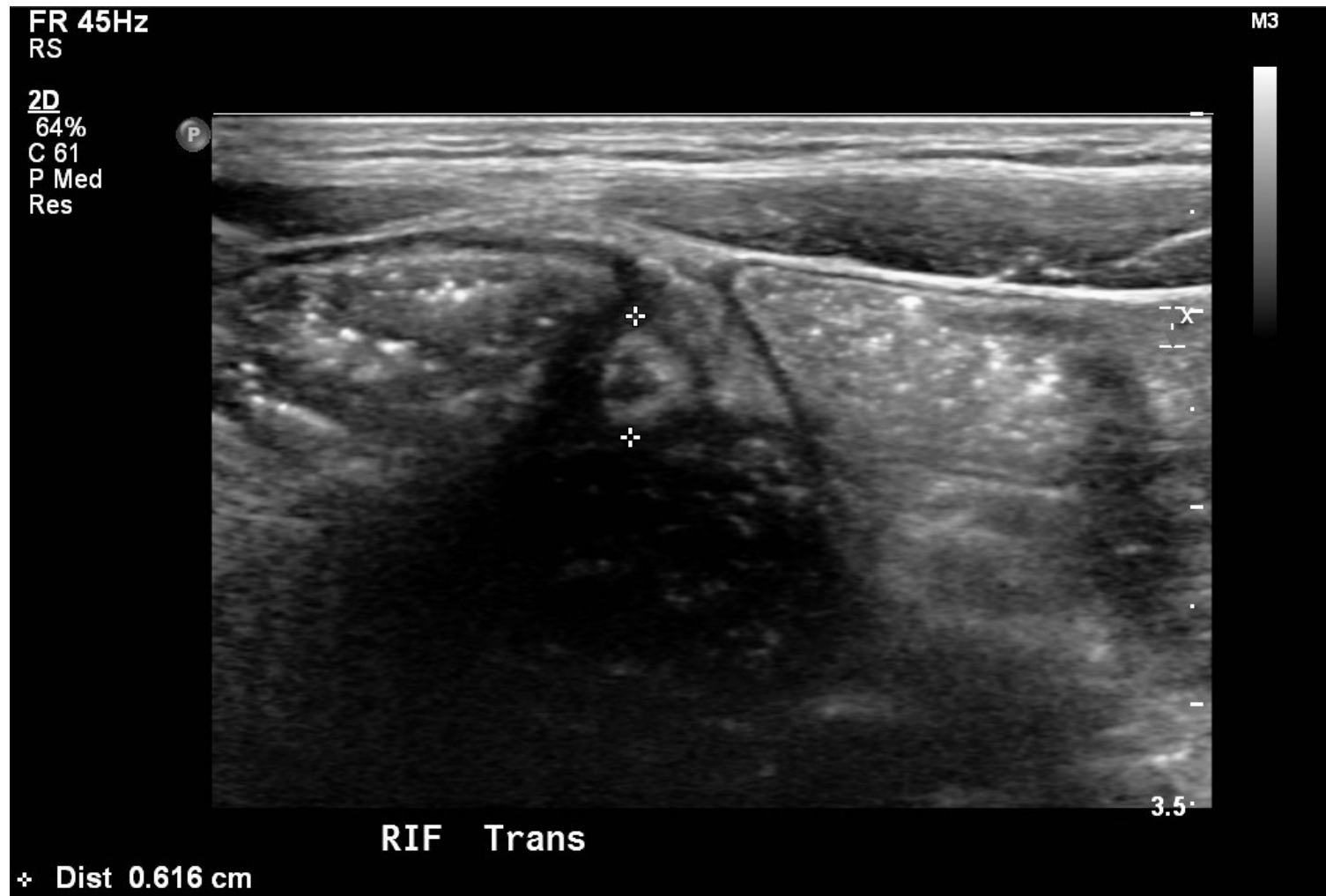


# Case 1 - Ultrasound Examination



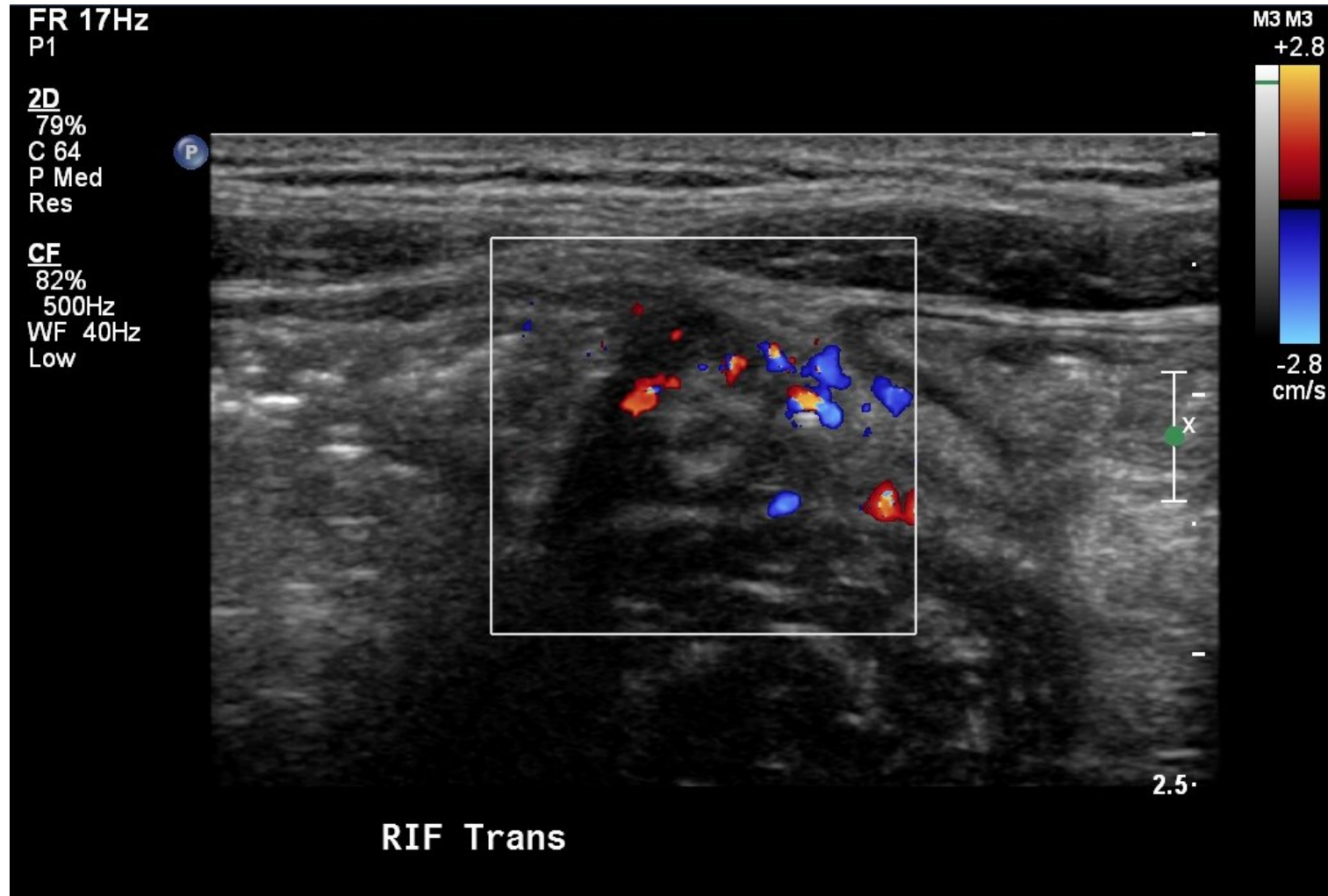
Appendiceal stump in longitudinal, inferior to the ileum (10 mm long)

# Case 1 - Ultrasound Examination



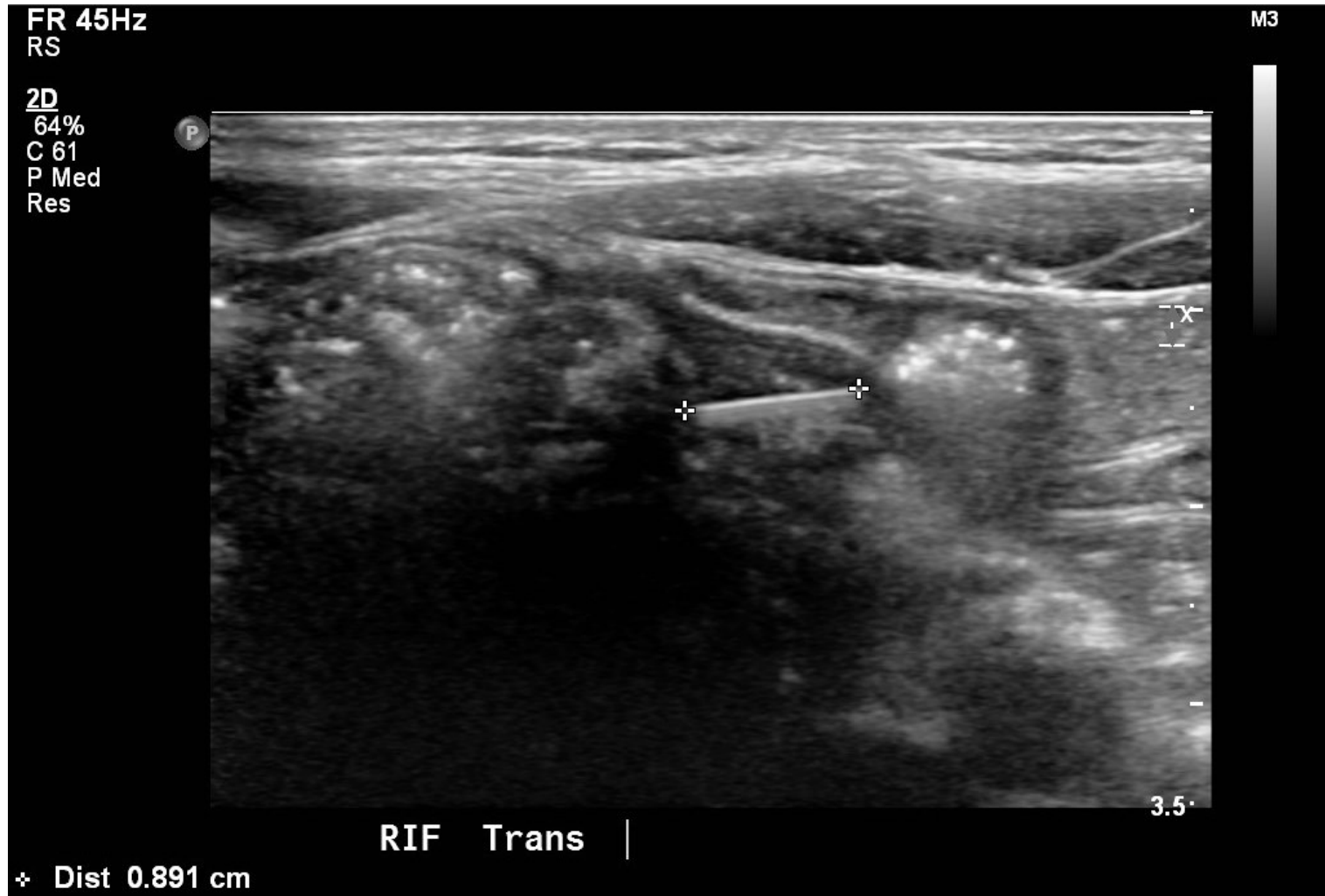
Appendiceal stump in transverse  
(*electronic calipers*)

# Case 1 - Ultrasound Examination



Appendiceal stump in transverse with color Doppler

# Case 1 - Ultrasound Examination



Appendiceal stump in transverse with linear echogenicity representing a surgical clip  
(*electronic calipers*)

# Case 1 - Conclusion

- Treated conservatively
- 48 hours of IV, followed by 5 days of oral antibiotic therapy
- No further symptoms at 3-month follow-up

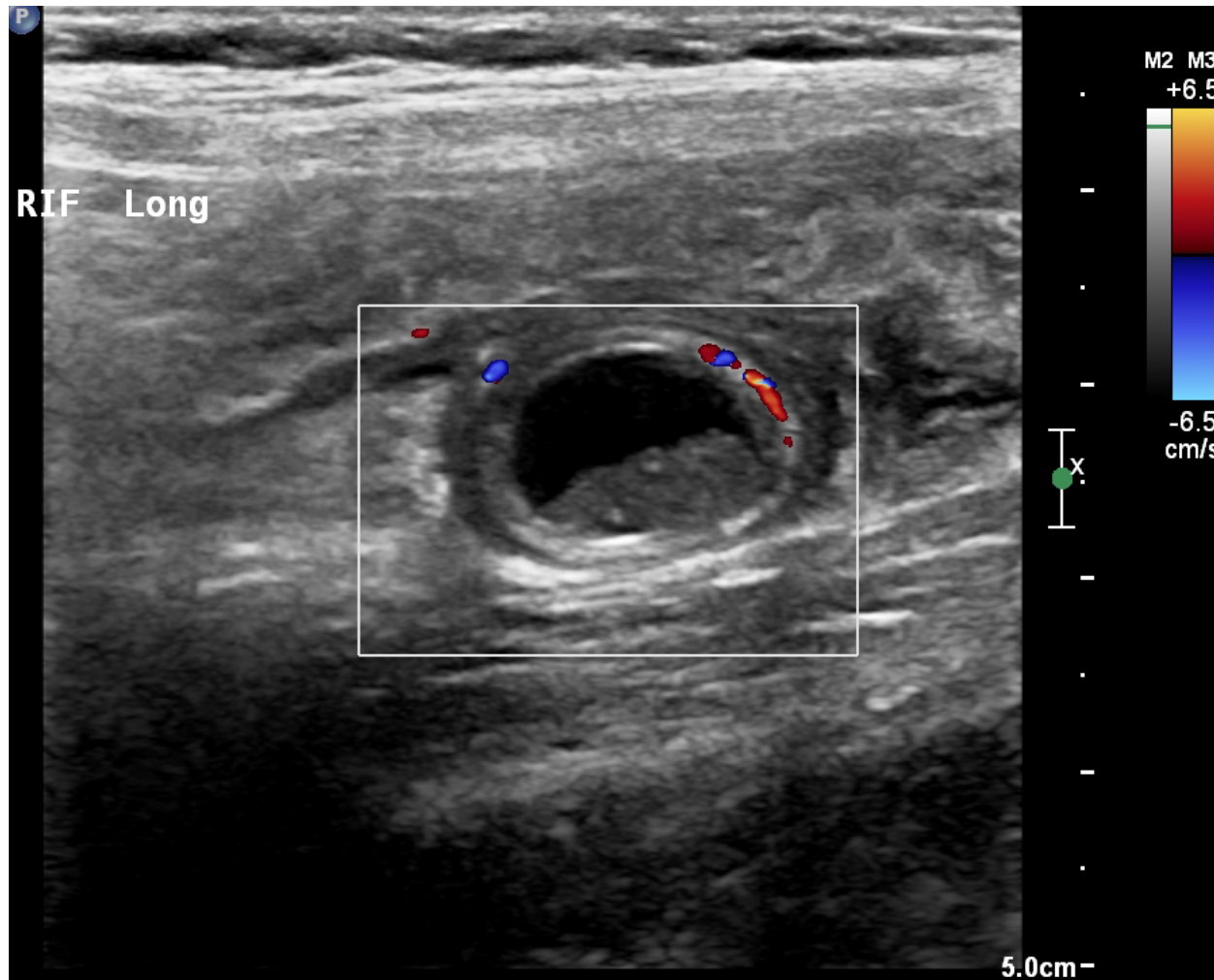


## Case 2 - History

- 9 year-old male
- 25 days post laparoscopic appendectomy
- Histologically confirmed acute appendicitis
  - no evidence of perforation
- Completed 5 day post-op course of oral anti-biotics
- Presented after 24 hours of RIF pain, vomiting, fever



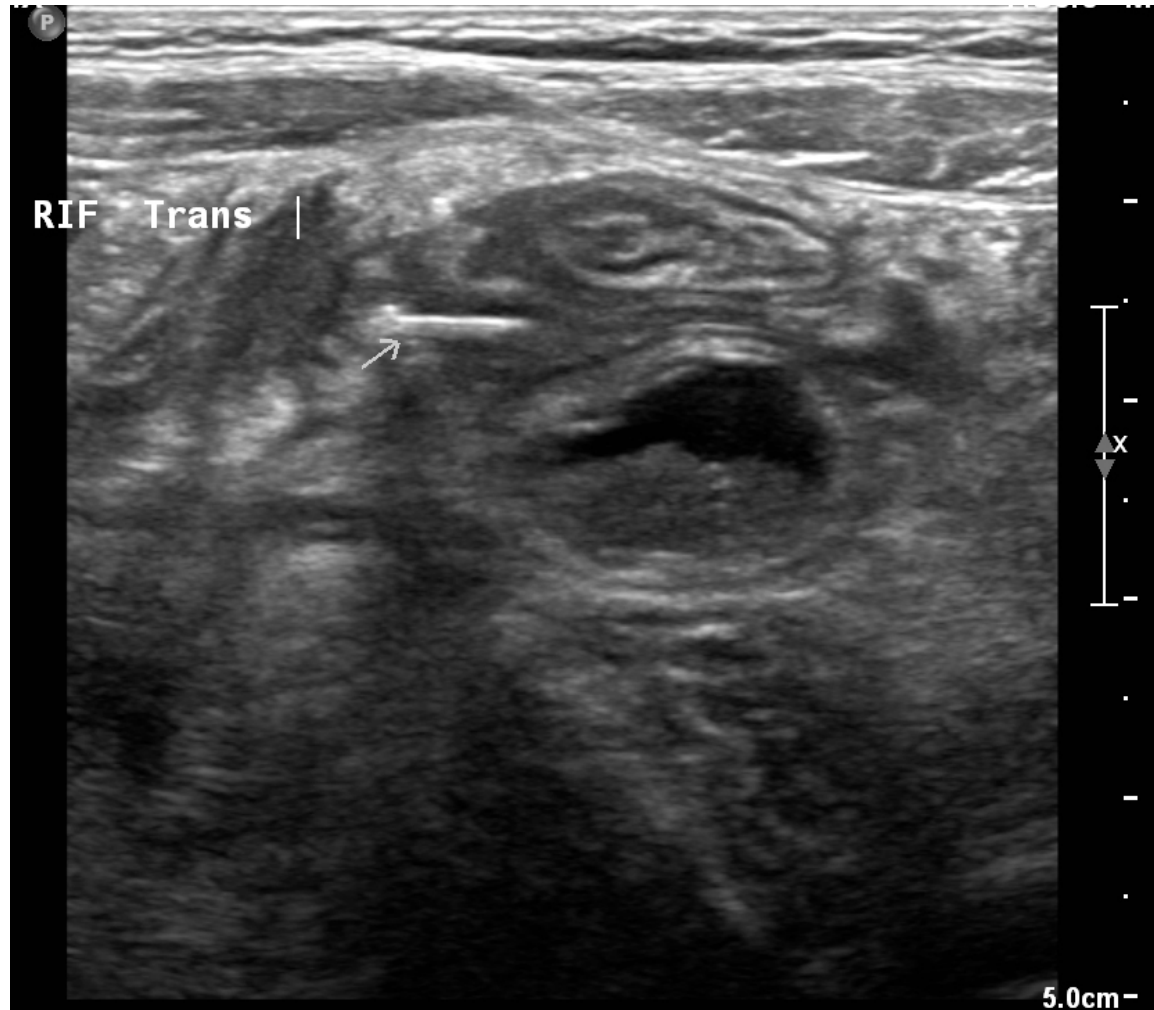
## Case 2 - Ultrasound Examination



Longitudinal image of appendiceal stump, note internal fluid and dependent debris, and some peripheral hyperemia



## Case 2 - Ultrasound Examination



Appendiceal stump in transverse, note echogenic endoclip (arrow) and ileum superficially

## Case 2 - Conclusion

- Diagnostic laparoscopy performed, stump removed and site revised
- Turbid peritoneal free fluid and ileal adhesions identified
- Fluid washout revealed *E. coli* bacteria
- Stump histology revealed acute on chronic inflammation
- 3 days of IV, and 5 days of oral anti-biotic therapy



# Discussion

- Inflammation of the base or stump of a surgically removed appendix is an uncommon, and likely under-recognised condition in both children and adults with cases reported in patients aged between 8 and 72 years of age.<sup>7</sup>
- The paucity of documented cases in the literature make it difficult to determine its incidence, although it is estimated to occur in 1:50 000 appendectomy patients.<sup>8,9</sup>
- Both methods of appendectomy, ligation or invagination, have been associated with stump appendicitis.



# Discussion

- True de novo cases of stump appendicitis occur once tissue granulation is complete, usually after eight weeks, and have been documented up to 50 years post-appendectomy.<sup>10</sup>
- Suspicion of the condition and prompt diagnosis can potentially reduce the risk of serious complications because of delayed treatment (perforation, abscess formation), or misdiagnosis (constipation, gastroenteritis).



# Main Points

- Use established sonographic criteria for acute appendicitis applied to the residual stump<sup>6</sup>
- Secondary sonographic signs of acute appendicitis<sup>5</sup> have also been demonstrated in cases of stump appendicitis<sup>4</sup>
- Appendicitis is usually dismissed in patients with a history of appendectomy.
- Sonographers and Radiologists should be aware of stump appendicitis in post-appendectomy patients that present with right iliac fossa pain.



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