



## EM CASES SUMMARY

### Episode 53 – Pediatric POCUS Ch.3 Abdominal POCUS - Appendicitis and Intussusception

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#### Pediatric POCUS for Appendicitis

Appendicitis is notorious for its variability in clinical presentation which can make it challenging to diagnose. The current guidelines stipulate that ultrasound should be first line imaging modality for suspected pediatric appendicitis.

Both the emergency medicine and radiology literature show a high degree of variability in the sensitivities and specificities of ultrasound for appendicitis, depending on the experience of the sonographer, the time since onset of symptoms and the BMI of the patient.

However, in a recent single centre prospective study from Annals of Emergency Medicine by Adam Sivitz et. al entitled 'Evaluation of Acute Appendicitis by Pediatric Emergency Physician Sonography',

13 pediatric emergency sonographers performed 264 focused right lower quadrant ultrasounds on children with suspected appendicitis. They found that POCUS had a sensitivity of 85% and specificity of 93% with a +LR of 11.7 and -LR of 0.17 for appendicitis. These sensitivities and specificities are comparable to the those found in the radiology literature.

#### Which Patients Require Further Imaging after POCUS?

Given that our pre-test probability may lead us to either under or over diagnose appendicitis, our experts indicate that the decision to pursue formal radiologic testing depends on the patient's initial level of risk. Thus, a high risk patient in whose appendix is not clearly seen on a bedside scan will require more definitely imaging. On the other hand, a low risk patient who is otherwise well and who has a negative POCUS for appendicitis likely does not require further imaging. The medium risk patient (often the most diagnostically difficult) may require further testing based on a number of clinical factors that are unique to each patient.

#### How Does Pediatric POCUS Effect Length of Stay and CT Utilization?

Elikashvili et. al studied the effect the effect of POCUS on ED length of stay and CT utilization in children with suspected appendicitis. POCUS was effective at reducing both the mean ED length of stay and CT rate in this patient population.

## POCUS Technique for Suspected Appendicitis

1. In an adolescent patient who can point to pain, place the probe where they point. Younger patients require a more systematic scanning technique
2. Identify the ascending colon in the lateral right side of the abdomen. Move down the lateral wall to make sure you are not missing a lateral or retro-cecal appendix.
3. Move to medial side of the cecum and ascending colon, this is commonly where the appendix comes off of the cecum.
4. To correctly identify the appendix, ensure you are seeing a *tubular non-compressible structure* (Common Pitfall: to misidentify the terminal ileum or another small bowel structure as the appendix.)
5. Once you locate the appendix, trace it all the way to its blind end.



For a challenging case of POCUS for Appendicitis on the EDE blog here:

<http://edeblog.com/2014/07/take-the-appendix-challenge/>

A review with video of pediatric POCUS for Appendicitis:

<http://edeblog.com/2014/02/think-about-the-children-ruling-in-appendicitis/>

## Ultrasound for Intussusception:

In the opinion of our experts, POCUS for intussusception is a fast and easy scan to learn and can rapidly alter the management and disposition of your patient.

### POCUS Technique for Suspected Intussusception

Given that bowel gas can make for a challenging scan, light sedation can be helpful in ensuring all areas have been scanned and in generating a better image. This will also make it more comfortable for the patient.

1. Using the linear probe, start in RUQ
2. Set depth to 6-8cm
3. Scan transversely making sure to visualize all the bowel
4. Flip probe to longitudinal orientation and repeat scan
5. Apply same steps for each abdominal quadrant
6. Finally, look along the flank, in the paracolic gutter (slightly lower than standard FAST view)

## Identifying Intussusception Using POCUS

### Look for the target lesion!

A target lesion can be found in appendicitis, intussusception and pyloric stenosis. In the transverse view you can see one ring within another. In the longitudinal view it may have a layered appearance of bowel stacked onto itself. When measured, the thickness should be greater than 2cm to be clinically significant (anecdotal data).



*Target lesion of intussusception*

**Pearl:** Before jumping to a diagnosis of anything pathologic, **MAKE SURE YOU SEE IT IN TWO PLANES.**

Dr. Samuel Lam illustrates the technique of POCUS for intussusception in the following [video](http://vimeo.com/37877537): <http://vimeo.com/37877537>

For an interesting case of Intussusception picked up by POCUs on the EDE blog go here: <http://edeblog.com/2014/05/bloody-diarrhea-in-a-baby-and-no-us-tech-on-call/>

### References:

Elikashvili, Inna, Ee Tein Tay, and James W Tsung. "The Effect of Point of care Ultrasonography on Emergency Department Length of Stay and Computed Tomography Utilization in Children With Suspected Appendicitis." *Academic Emergency Medicine* 21.2 (2014): 163-170.

Full PDF available at:

<http://www.nyuemsono.com/wp-content/uploads/2012/10/The-Effect-of-POCUS-on-ED-Length-of-Stay-and-CT-Utilization-in-Children-with-Suspected-Appendicitis.pdf>

Fox, J Christian et al. "Prospective evaluation of emergency physician performed bedside ultrasound to detect acute appendicitis."

*European journal of emergency medicine* 15.2 (2008): 80-85. Full PDF available at:

[http://journals.lww.com/euro-zergencymed/Abstract/2008/04000/Prospective\\_evaluation\\_of\\_emergency\\_physician.5.aspx](http://journals.lww.com/euro-zergencymed/Abstract/2008/04000/Prospective_evaluation_of_emergency_physician.5.aspx)

Riera, Antonio et al. "Diagnosis of intussusception by physician novice sonographers in the emergency department." *Annals of emergency medicine* 60.3 (2012): 264-268. Full PDF available at: [http://www.emergencyultrasoundteaching.com/assets/articles/Peds\\_2012\\_Riera\\_Annals\\_EM.pdf](http://www.emergencyultrasoundteaching.com/assets/articles/Peds_2012_Riera_Annals_EM.pdf)

Russell, W Scott et al. "Clinical practice guidelines for pediatric appendicitis evaluation can decrease computed tomography utilization while maintaining diagnostic accuracy." *Pediatric emergency care* 29.5 (2013): 568-573. Full PDF available at: [http://www.emergencyultrasoundteaching.com/assets/articles/Appy\\_2013\\_Russell\\_PEC.pdf](http://www.emergencyultrasoundteaching.com/assets/articles/Appy_2013_Russell_PEC.pdf)

Quigley, Alan J, and Samuel Stafrace. "Ultrasound assessment of acute appendicitis in paediatric patients: methodology and pictorial overview of findings seen." *Insights into imaging* 4.6 (2013): 741-751. Full PDF available at: [http://www.emergencyultrasoundteaching.com/assets/articles/Appy\\_2013\\_Quigley\\_Insights\\_Imaging.pdf](http://www.emergencyultrasoundteaching.com/assets/articles/Appy_2013_Quigley_Insights_Imaging.pdf)