

## CLINICAL RELEVANCE OF THE NON-VISUALISED APPENDIX ON ULTRASONOGRAPHY OF THE ABDOMEN IN CHILDREN

Sanjena Kumar Amuddhu<sup>1</sup>, Sophia Sihui Ong<sup>1</sup>, Wei Xiang Lim<sup>1</sup>, Candy SC Choo<sup>2</sup>, Te-Lu Yap<sup>2</sup>, Phua Hwee Tang<sup>2</sup>, Shireen Anne Nah<sup>2</sup>

<sup>1</sup>*Yong Loo Lin School of Medicine National University Singapore, Singapore, Singapore,* <sup>2</sup>*KK Women's and Children's Hospital, Singapore, Singapore*

**Aim:** Ultrasonography(US) is advocated for assessment of children with acute abdomen as it involves no radiation. However, clinicians face a conundrum when the appendix cannot be visualized. We evaluate the clinical relevance of the non-visualised appendix on US assessment of abdominal pain where acute appendicitis is a differential diagnosis.

**Methods:** With ethical approval, we reviewed all children admitted for abdominal pain in the paediatric surgical unit between January-December 2013 who had abdominal US for evaluation of right-sided and lower abdominal pain. We excluded those imaged for suspected intussusception, or obvious genitourinary symptoms. Demographic data, US findings, final diagnosis and histological reports were recorded. As part of institutional protocol, all patients are contacted 3 days after discharge to evaluate persistent symptoms. We defined the following: 1) non-visualised appendix: appendix that was sought for but could not be seen, 2) completely visualized appendix: appendix could be followed from caecal attachment to tip.

**Results:** Of 1359 admissions, 810 had US abdomen and/or pelvis. We excluded 131 with suspected intussusception. Another 38 did not mention evaluating the appendix, leaving 641 reports (Table) for children aged 10.8 years (median, range 1.8-21.3) with 297 (46.3%) boys.

Non-visualised appendix (n=160): Seventeen (17/160, 10.6%) patients underwent appendectomy. Of the 17, 14 had US findings suggesting intra-abdominal inflammation (1 of whom had histologically normal appendix), and 3 (3/160, 1.9%) had normal US reports (all 3 had histologically proven appendicitis).

Partially visualized appendix (n=51): In these, the segment of appendix that could be seen was clearly normal in 34, obviously inflamed in 13, and equivocal in 4.

Overall, 232 children underwent appendectomy, of whom 58 had no US done, and 5 had histologically normal appendix (overall negative appendectomy rate 2.2%).

**Conclusion:** In the non-visualised appendix with no evidence of intra-abdominal inflammation on ultrasound, the likelihood of appendicitis is less than 2%. In the partially visualized appendix, those abnormal or equivocal on ultrasound are positive for appendicitis. Clinicians may safely use these reports to supplement their clinical assessment.

Table: Ultrasound reports of the appendix in 641 children evaluated for abdominal pain

Ultrasound findings	Eventual diagnosis		Total
	Appendicitis	Not appendicitis	
Appendix not visualised	17	143	160
Appendix fully visualised	140	290	430
Abnormal appendix	124	0	
Equivocal	14	17	
Normal appendix	2	273	
Appendix partly visualized	17	34	51
Abnormal appendix	13	0	
Equivocal	4	0	
Normal appendix	0	34	
<b>Total</b>	<b>174</b>	<b>467</b>	<b>641</b>