**Using MRI to diagnose appendicitis: Is it worth it?**

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Appendicitis is the most common condition in children requiring emergency abdominal surgery. The goal for children diagnosed with appendicitis is to identify the diagnosis early in order to avoid complications such as perforation. It occurs in 19-28 per 10,000 children less than 14 years old annually, with boys more commonly affected than girls. The current accepted practice for children presenting with RLQ pain is to first order an ultrasound, and if results are equivocal, to then order a CT scan. Ultrasound is a good imaging modality because it is readily available, cheap, and does not expose children to radiation. Its drawbacks include that it is highly operator dependent, and if the child has a retrocecal appendix or is obese, the appendix cannot be readily visualized. CT scan is less operator dependent, with high sensitivity and specificity in identifying appendicitis, but it exposes children to radiation, contrast administration (both oral and PO) and sometimes sedation. As we know, children are highly radiosensitive and have longer life expectancies in which they can develop radiation induced cancers. Thus, it would be prudent to avoid radiation when we can in children. This lead me to my PICO question: In children with acute RLQ abdominal pain, can MRI be used in place of other imaging modalities to diagnose appendicitis?

Hormann et al. (1998) was a prospective descriptive study which showed that MRI is a viable imaging modality for diagnosing appendicitis in children, but it had a selection bias in which only children with positive ultrasounds underwent MRI. None of the 45 children enrolled in this study required contrast or sedation. Aspelund et al. (2014) performed a retrospective chart review which aimed to show that ultrasound followed by MRI would not change clinical end points (negative appendectomy rate, perforation rate, time from triage to treatment and discharge home) compared with CT. They showed that US/MRI is comparable to CT, but the main question was not of diagnostic accuracy, and only about 80% of patients were followed up after negative imaging. No cost analysis was done. Moore et al. (2012) did another retrospective chart review which aimed to describe the development of a program in which MRI was used as the only imaging modality for children with suspected appendicitis. The sensitivity and specificity for MRI found in this study was found to be comparable or even higher than the sensitivity and specificity reported for US and CT in other studies. Again, no IV or PO contrast was used and no sedation was administered. Cost was analyzed, but this can vary depending on institution. Johnson et al. (2012) preformed a prospective study which aimed to evaluate the feasibility of using ultrafast 3T MRI to diagnose appendicitis. This study was valid and showed that MRI sensitivity and specificity is comparable to US/CT and feasible to use in cases of suspected appendicitis. All MRI scans took less than 8 minutes, 45 seconds, and no contrast or sedation was administered. Cost was not analyzed and it required a 3T magnet which is not readily available at all institutions.

In conclusion, these studies showed that MRI is comparable to CT in terms of effectiveness, accuracy and time. MRI avoids unnecessary radiation, contrast administration and sedation, and is probably best used in combination with ultrasound. There is a need for more multi-center prospective studies with larger patient cohorts and in depth cost analyses.

**Works Cited**

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