Institutional Implementation of Non-Contrast Rapid MRI for Pediatric Appendicitis: Effects on Workflow and Diagnostic Performance

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Background:
Ultrasound (US) is the first-line imaging modality for suspected pediatric appendicitis, but additional imaging is often required. Rapid MRI (rMRI) is increasingly used as a radiation-free alternative to CT, with growing adoption of non-contrast protocols. However, the impact of eliminating contrast on clinical workflow remains unclear.

Objective:
Compare imaging workflow before and after transition to non-contrast rMRI protocol and assess whether diagnostic accuracy is maintained.

Methods:
Retrospective observational study of contrast studies from December 2016 to December 2021 and non-contrast studies from November 2022 to October 2023.
Clinical and imaging workflow times were extracted from the electronic medical record (EPIC) and DICOM metadata.
After exclusions, time analysis was performed for 55 patients in the contrast group and 101 patients in the non-contrast group.
Diagnostic accuracy was assessed using surgical and pathological reports in EPIC.

Results:
Elimination of contrast was associated with a reduction in overall imaging workflow time, with the greatest decrease observed in time from exam order to scan initiation when analyzed by interval (Figure 1).

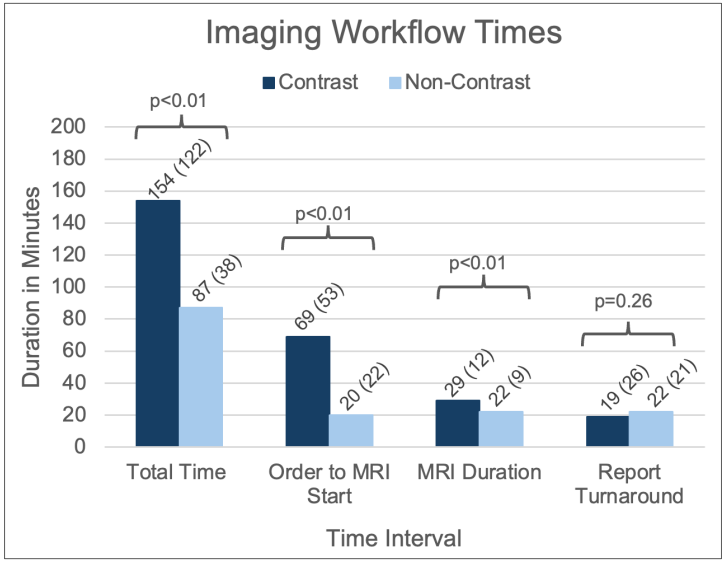

Figure 1

Non-contrast rMRI demonstrated comparable diagnostic performance to contrast-enhanced rMRI (Table 1). The incidence of non-diagnostic (equivocal) interpretations did not increase for non-contrast exams.

Diagnostic Accuracy		
Group	**Sensitivity**	**Specificity**
Contrast	85.7%	97.8%
Non-Contrast	92.3%	98.7%

Table 1

Conclusion:
Transition to a non-contrast rMRI protocol for suspected pediatric appendicitis showed significant improvements in workflow efficiency while maintaining diagnostic accuracy. Overall, a reduction in variability was observed for the non-contrast group, suggesting an improvement in workflow predictability as well.

Potential clinical implications:

- Reduced time to diagnosis, allowing for earlier surgical planning.
- Elimination of routine contrast administration.
- Increased consistency for scheduling.

Limitations:

- Retrospective design
- Single-center context

In future studies, assessment of downstream outcomes including length of stay, time to surgery, cost differences, and insurance company denials will provide greater context to the clinical applicability of this imaging protocol.