

# Quality Assessment of Fluoroscopic Imaging Obtained during Neonatal Contrast Enema Exams

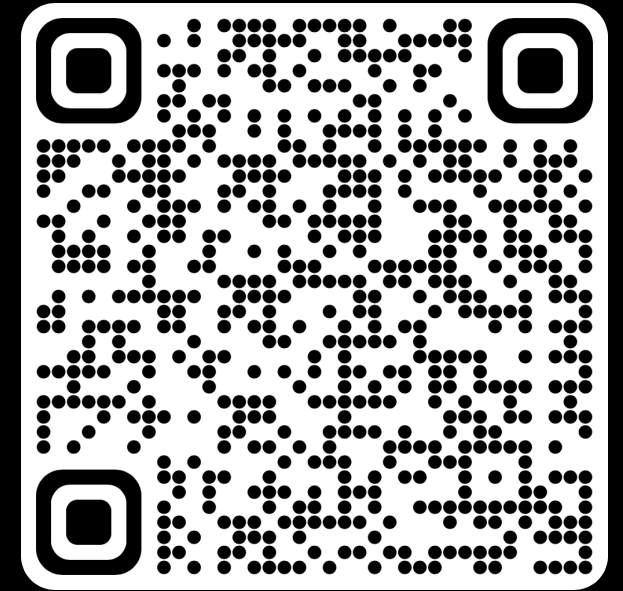
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# Background

- Neonatal contrast enema (CE) is a common fluoroscopic exam performed by pediatric radiologists to evaluate for colonic and distal small bowel disease
- The American College of Radiology and Society for Pediatric Radiology publish practice parameters for pediatric CE studies
- The purpose of this QI study was to assess adherence to neonatal CE practice parameters at a tertiary care pediatric hospital



Scan here to view the  
2021 ACR-SPR Pediatric  
CE Practice Parameters  
by Darge et al.

# Methods: Quality Metrics

- The following dichotomous objective and subjective quality metrics were defined based upon ACR-SPR CE practice parameters:

## Objective:

1. Scout image present
2. Lateral rectal view includes visualization of sacrum
3. Radiation exposure indices documented
4. Fluoroscopy time documented
5. Case performed without direct exposures
6. Post-evacuation image present
7. Case performed without complication

## Subjective:

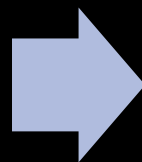
1. Small-caliber rectal tube used
2. True lateral rectal view obtained
3. Lateral rectal view obtained at early filling
4. Rectosigmoid ratio able to be assessed
5. Entirety of colon visualized through to cecum
6. Appendix and/or terminal ileum visualized

# Methods: Quality Review

- Retrospective quality review of CEs performed on children  $\leq 2$  days old between February 2019 and August 2022 (N = 70)

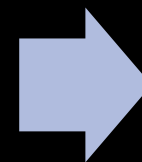
## Objective quality review:

One pediatric radiologist reviewed all CEs for adherence to 7 objective quality metrics



## Subjective quality review:

Two pediatric radiologists independently reviewed all CEs for adherence to 6 subjective quality metrics

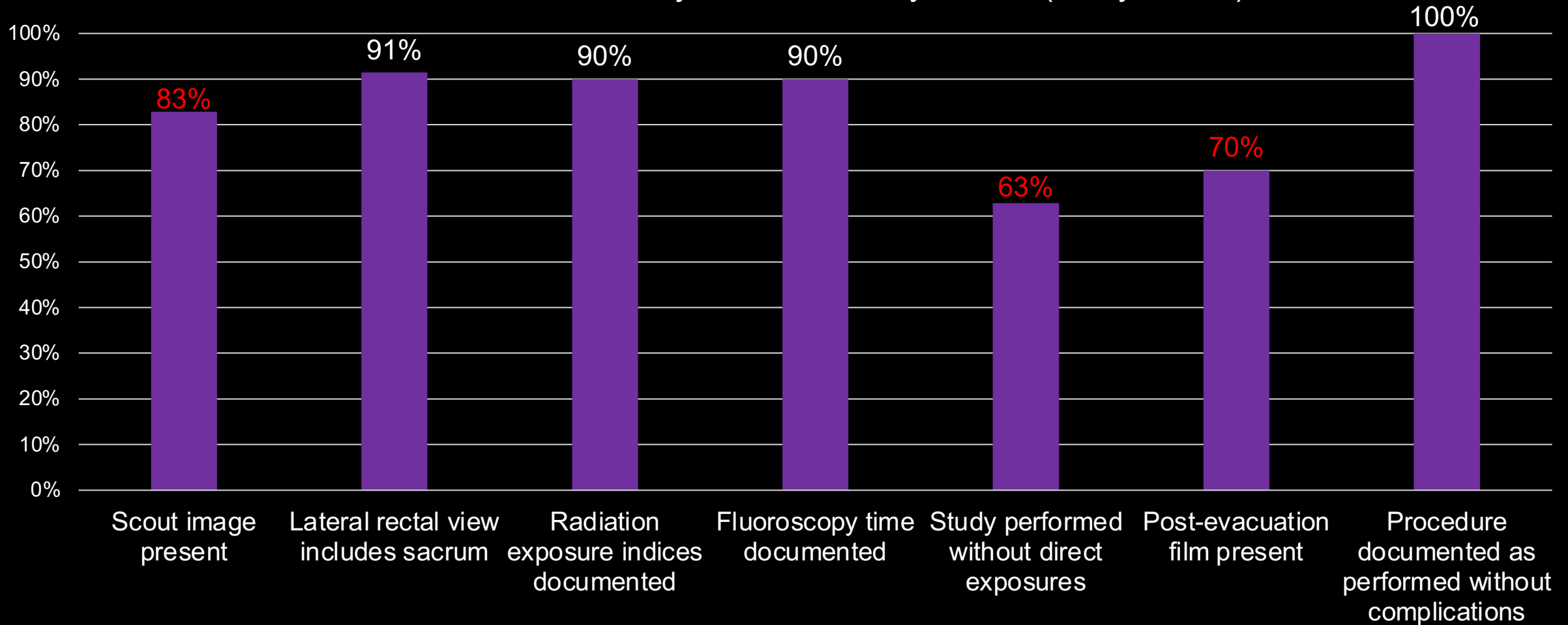


## Statistical analysis:

Data were summarized as counts and percentages; inter-reviewer agreement  $p_o$  was calculated for subjective metrics

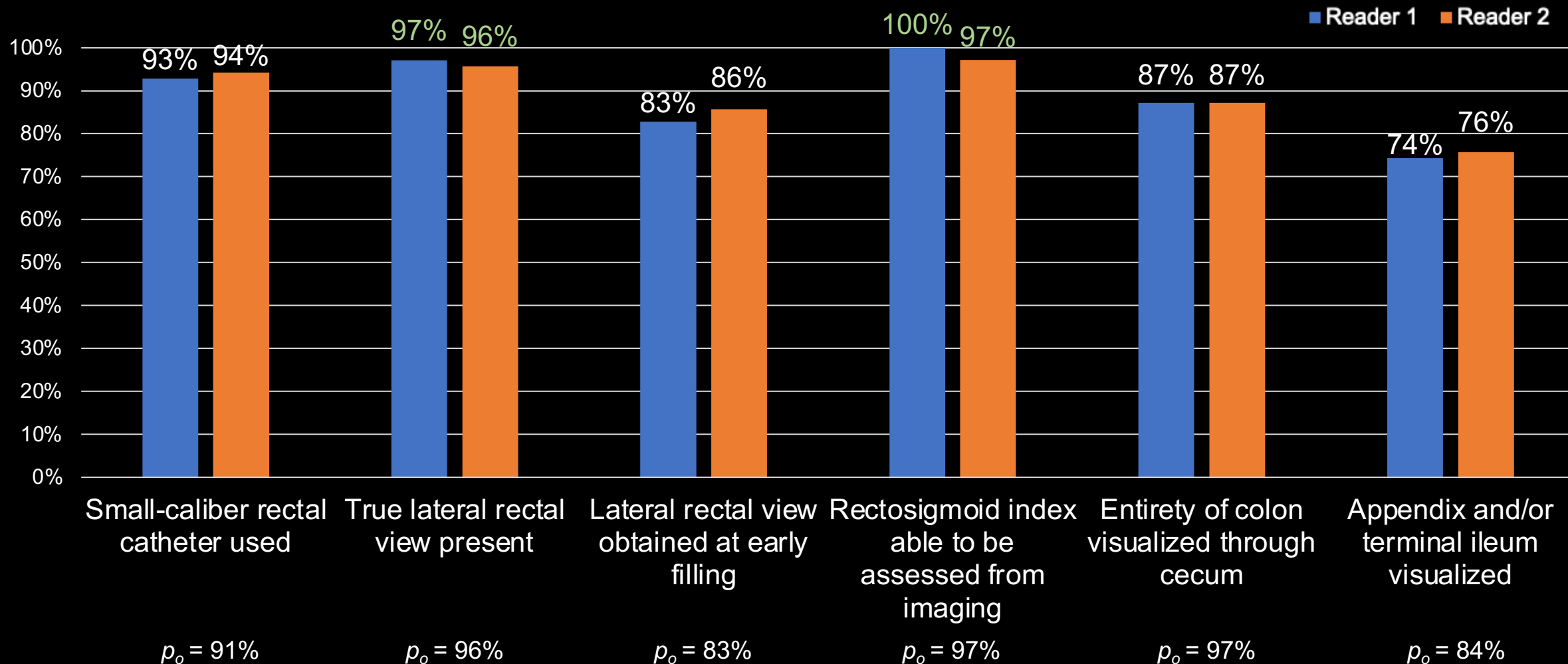
# Results: Objective Quality Metrics

Adherence Rates for Objective CE Quality Metrics (Study N = 70)



# Results: Subjective Quality Metrics

Adherence Rates for Subjective CE Quality Metrics By Reader (Study N = 70)



# Results: Low-Quality CE Examples

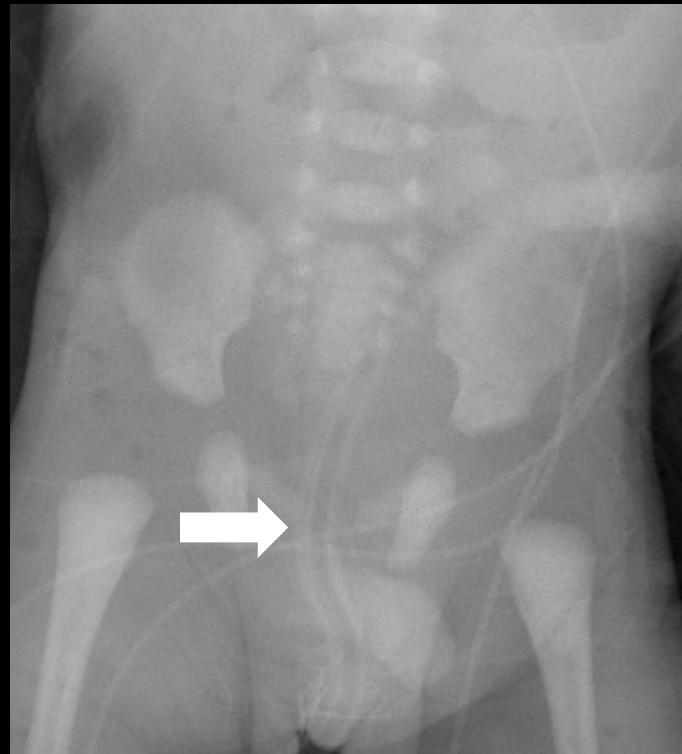
Case 1:

Not a true lateral view; iliac crest seen (arrow)



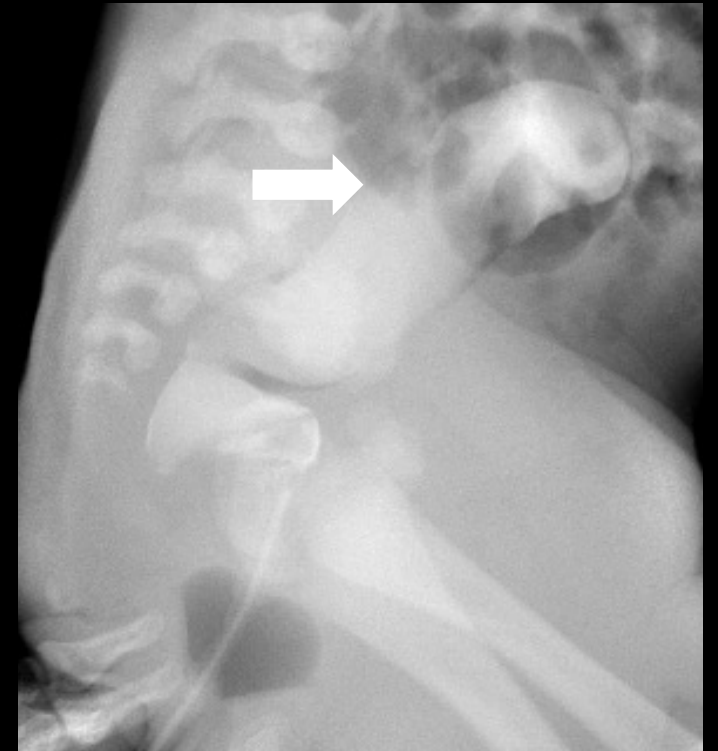
Case 2:

Large-caliber rectal catheter (arrow) seen in place in the AP view



Case 3:

Initial lateral rectal image not timed to early filling; contrast already beyond sigmoid (arrow)



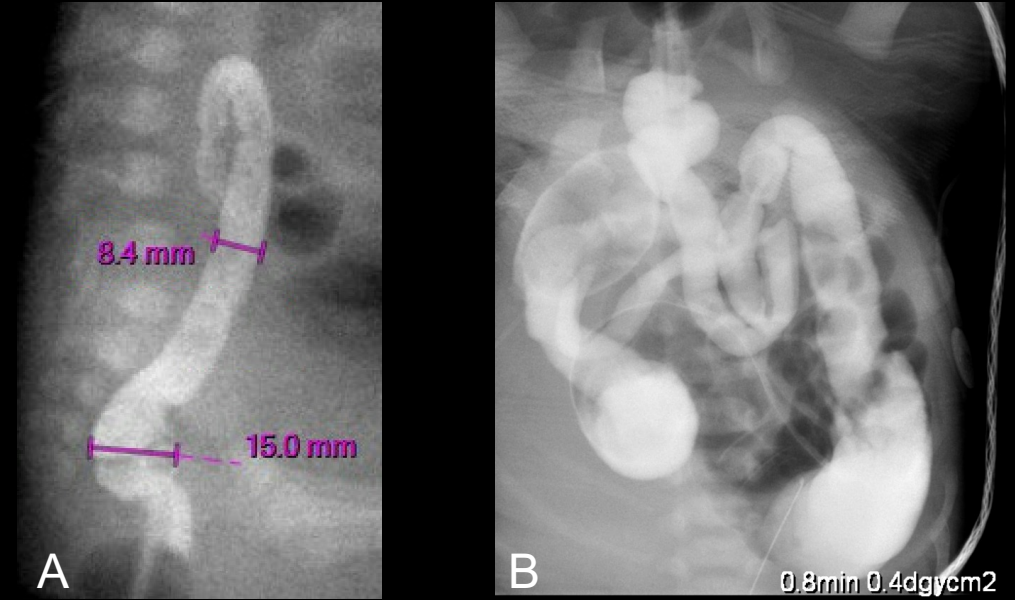
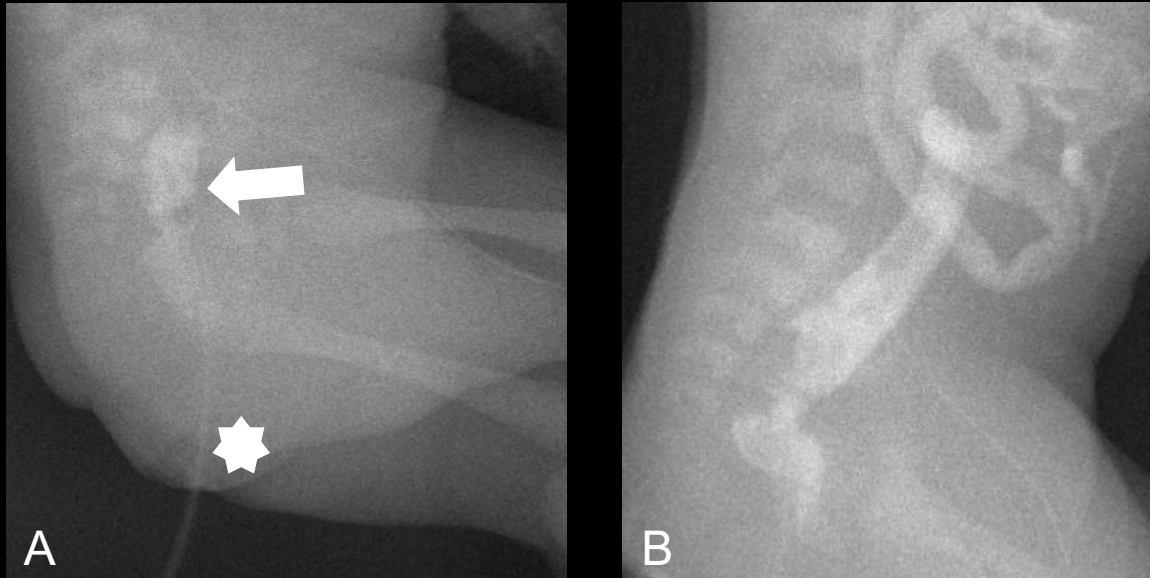


# Results: High-Quality CE Examples

Case 4: 1-day-old girl with failure to pass meconium

Panel A: small-caliber catheter in place (star); initial assessment correctly demonstrates early opacification of the rectum (arrow)

Panel B: true lateral view with correct hip alignment and visualization of the sacrum



Case 5: 1-day-old girl with concern for low bowel obstruction

Panel A: normal rectosigmoid ratio visualized in lateral view

Panel B: post-evacuation image present, demonstrating evacuation of contrast from rectum; radiation exposure indices and fluoroscopy time present



# Discussion and Conclusions

- Low adherence (<85%) to three objective quality criteria was unexpected given tertiary pediatric hospital setting
- Majority of subjective quality metrics, including the most diagnostically relevant elements, had  $\geq 85\%$  adherence with high inter-reviewer agreement
- Important quality gaps identified include:
  - Lack of scout images, post-evacuation images, and radiation indices for studies
  - Initial lateral rectal image acquisition not properly timed to early filling
  - 37% of cases included at least one direct exposure!  
(Exposures may be necessary according to radiologist discretion, but many exposures in this sample were considered unwarranted by reviewers)
- Results demonstrate need for continuous quality assessment of common studies even at large pediatric referral centers with subspecialist radiologists

# Key Takeaways for CE Quality Improvement

## Checklist for All Neonatal CE Studies:

- ✓ Obtain scout image
- ✓ Use smallest possible soft rectal catheter
- ✓ Visualize and record initial lateral rectal view at early filling
- ✓ Attempt opacification of entire colon to visualize appendix and/or terminal ileum, if possible
- ✓ Obtain post-evacuation image
- ✓ Document fluoroscopy time and radiation exposure indices

Before obtaining a direct exposure during a CE, ask yourself:

Can I visualize the abnormality adequately using last-image hold?

If yes, exposure is not warranted.