

Examining Magnetic Resonance Imaging (MRI) use in infants with pharyngeal dysphagia

Napiera Shareef, BS¹, Swapna Koppera, BS², Ashley Heilingoetter, MD, MPH¹, Patrick Kennedy, BS¹, Prasanth Pattisapu MD, MPH²

¹ The Ohio State University Wexner College of Medicine, ² Nationwide Children's Hospital

Background:

- During the pharyngeal phase of swallowing, rapid muscle contractions are responsible for propelling the food bolus through the upper esophageal sphincter into the esophagus.¹
- Airway protection is crucial and achieved through the induction of swallowing apnea.
- Pharyngeal dysphagia in infants is frequently attributed to prematurity and various anatomic, neurologic, or genetic abnormalities.
- The Rosenbek Penetration Aspiration Scale (PAS) is a widely used metric to assess dysphagia severity.²

PAS Score	Score Description:	Safety Status:
1	Material does not enter the airway	Safe
2	Material enters the airway, remains above the vocal folds, is ejected from airway	
3	Material enters the airway, remains above vocal folds, is not ejected from airway	Unsafe
4	Material enters the airway, contacts the vocal folds, is ejected from airway	
5	Material enters the airway, contacts the vocal folds, is not ejected from airway	
6	Material enters the airway, passes below vocal folds, ejected from trachea	
7	Material enters the airway, passes below vocal folds, not ejected despite effort	
8	Material enters the airway, passes below the vocal folds, no effort made to eject	

Figure 1. PAS and corresponding swallow safety classifications.²

- Magnetic Resonance Imaging (MRI) can assess neuroanatomical abnormalities in infants with pharyngeal dysphagia; however, it necessitates sedation or anesthesia.
- Compared to older children, infants have a notably higher risk of adverse events due to anesthesia, such as inadequate ventilation, hemodynamic instability, or allergic reactions.³

Objective: Evaluate MRI findings in otherwise healthy infants with pharyngeal dysphagia.

Methods:

Design: Retrospective chart review

Population: Otherwise healthy infants (<12 months of age) who underwent a videofluoroscopic swallow study (VFSS) at a tertiary referral children's hospital from September 2016 through July 2021.

Exclusion Criteria:

- Normal VFSS
- Prematurity (Gestation <35 weeks)
- Major genetic, anatomic, or neurologic comorbidities

Results:

Clinical Characteristics & Outcomes (N=107)				
	No MRI (n=88)		MRI (n=19)	
Median Age at First VSS, months (range)	5.4 (0.6-13.5)		5.2 (0.4-14.2)	
Degree of Dysphagia:	n	%	n	%
Deep Penetration (PAS 3-4)	19	21.6	2	10.5
Aspiration (PAS >4)	69	78.4	17	89.5
Clinical Outcomes:				
*Resolution of Dysphagia	53	60.2	11	57.9
Normalization of VSS	31	35.2	10	52.6
Timeline of Clinical Outcomes:				
Median Age at Dysphagia Resolution, months (range)	14.9 (1.2-38.1)		15.7 (1.8-48.7)	
Median Age at Resolution of VSS, months (range)	13.0 (1.8-31.3)		19.0 (2.2-37.5)	
*Resolution of dysphagia was determined by return to a normal diet.				

MRI Indications & Findings (N=19)		
Median Age at First MRI, months (range)	10.5 (0.5-27.8)	
Indications:	n	%
Dysphagia Only:	13	68.4
Adjunct Indications:	6	31.6
Hypotonia	2	10.5
Hypertonia	1	5.3
Macrocephaly	3	15.8
MRI Findings:	n	%
Normal MRI	6	31.6
*Abnormalities of Unknown Significance:	13	68.4
Minor White Matter Changes	3	15.8
Mild Prominence of the Ventricles	5	26.3
Mild Prominence of Subarachnoid Spaces	5	26.3
Small Arachnoid Cysts (<5mm)	1	5.3
Minor Vascular Changes	1	5.3
Benign Microhemorrhages	1	5.3
*Three patients had two abnormal findings on their MRI.		

Of patients with abnormal MRI findings, **zero** patients had findings that led to changes in their plan of care.

Discussion:

- Rates of aspiration (PAS >4) are higher in the MRI group, suggesting infants undergoing MRI had more severe degrees of dysphagia.
- Dysphagia resolution rates and median ages at resolution were similar between the two groups.
- Half of the MRI patients achieved VFSS normalization; however, the median age at resolution was slightly higher compared to the No MRI group.
- Most patients primarily underwent MRI due to dysphagia, with some having additional indications related to muscle tone and cranial size abnormalities.
- All patients with abnormal MRI findings had findings of unknown clinical significance, and none of the findings were actionable.

Conclusion:

In an otherwise healthy infant with pharyngeal dysphagia, MRI appears to have limited utility. Future research is needed to determine decision thresholds for MRI in infants with pharyngeal dysphagia.

References:

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Contact Information:



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