

Chasing a Moving Target - Comparing Anti-Peristaltic Agents: Sublingual Hyoscyamine Sulfate and Intravenous Glucagon for Motility Reduction in MR Enterography.



Kimberly Weatherspoon, MD, Abdulmalik Dredar, MD,
Michael Habeeb MD, Dmitry Rakita, MD

University of Massachusetts Medical School (UMMS)-
Baystate Medical Center
Springfield, MA

FINANCIAL DISCLOSURES



None.

INTRODUCTION



- ❧ Magnetic Resonance Enterography (MRE) is an exam used to evaluate the small bowel.
- ❧ An MRE study commonly is used for the diagnosis and monitoring of inflammatory bowel disease as well as its complications.
- ❧ However, accurate and clear diagnosis often suffers from motion artifact.
- ❧ Therefore, anti peristaltic agents have been created to encourage bowel stasis, allowing for better image quality and improved diagnostic yield.

INTRODUCTION (cont.)



✧ The purpose of this study is to compare the effectiveness of two anti-peristaltic medications, IV Glucagon and sublingual (SL) Hyoscyamine Sulfate, and their ability to reduce unwanted bowel motility.

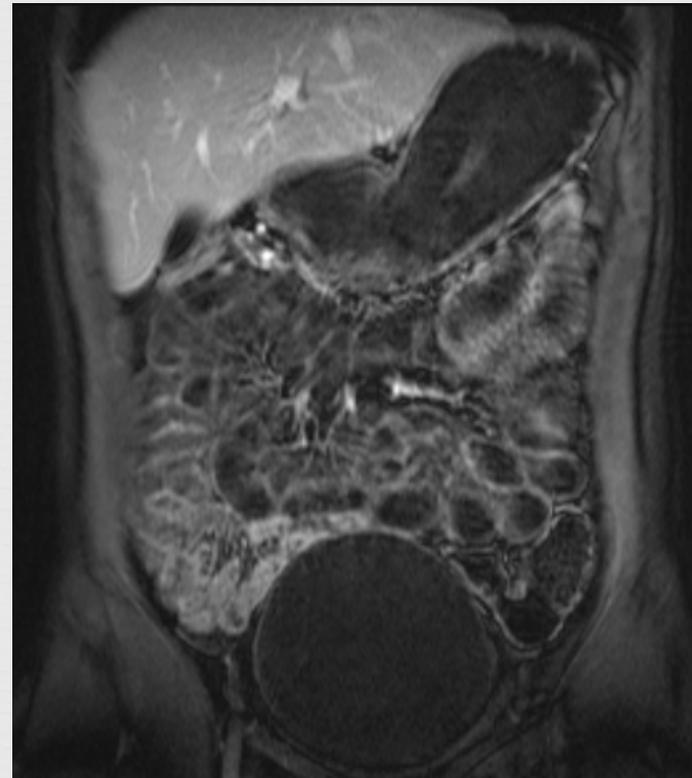
MATERIALS/METHODS USED



- ❧ A retrospective, single-blinded, cross-section study was conducted utilizing MRE cases performed between October 2011 and September 2014.
- ❧ The cases were de-identified and numbered based on a random-computer generated assignment.
- ❧ Two radiologists trained in abdominal imaging, independently evaluated each case, blinded to the anti peristaltic agent administered.



Axial and Coronal T1 VIBE images were evaluated including dynamic peristaltic imaging, and the degree of global bowel motility was graded on a 4-point scale.



Coronal T1 VIBE Post-contrast image from an MRE, given a bowel motility grade of 2 for moderately blurred bowel wall, making the diagnosis challenging and limiting the ability to detect finer detail.

BOWEL GRADING SCALE



- ∞ 4-Point scale for image quality based on ability to delineate the bowel wall.
1. Completely blurred bowel wall making diagnosis almost impossible.
 2. Moderately blurred bowel wall making diagnosis challenging and limiting ability to detect finer detail (sinus tracts and fistulae).
 3. Slight blurring of bowel wall but ability to make diagnosis is not affected.
 4. Perfect resolution and visualization of the bowel wall.

RESULTS



- ❧ Preliminary descriptive data showed a total of 51 patients fit the study criteria.
- ❧ The study population was approximately 1/3 male and 2/3 female.
- ❧ Median participant age was 31.5 years old and mean participant age was 33.4 years old.

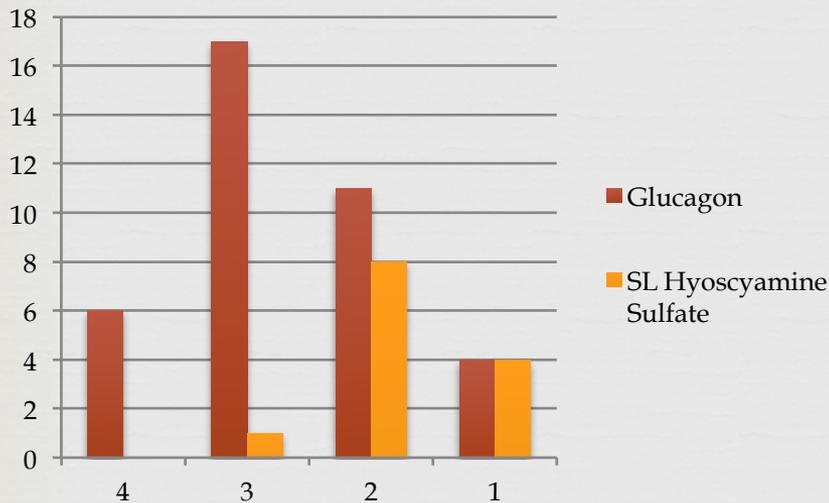
Summary Statistics		
Gender		
	Males	14
	Females	34
Patient Age		
	Min	10
	Max	72
	Median	31.5
	Mean	33.375
Agent Used		
	Glucagon	38
	SL Hyoscyamine	13

RESULTS

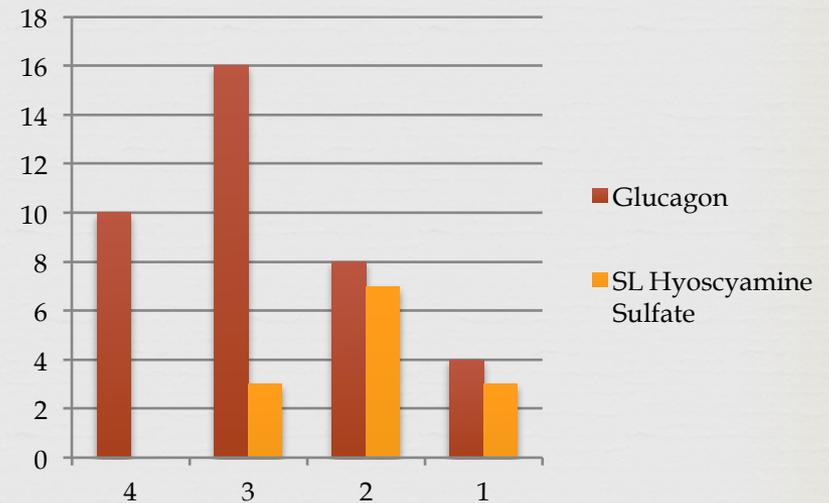


IV glucagon was found to be more effective at reducing bowel motion compared to sublingual (SL) Hyoscyamine Sulfate.

Radiologist 1



Radiologist 2



∞ A simple test of inter-rater reliability between the two evaluating radiologists showed a statistically significant correlation between individual measurements.

Group Comparison of Mean Scores
and Agreement Between Rates

	Radiologist 1			Radiologist 2		
	Group		Total	Group		Total
	G	L		G	L	
N	38	13	51	38	13	51
Mean	2.66	1.77	2.63	2.84	2.00	2.63
SD	0.88	0.60	0.96	0.95	0.71	0.96
ttest	t = 3.38, df=49, p = 0.0014			t = 2.94, df=49, p = 0.0051		
Rater Agreement:						
Interclass Correlation Coefficient (ICC) :						
	Individual	0.64	0.45	0.78		
	Average	0.78	0.62	0.88		
Test that ICC = 0: F (50, 50) = 4.75, p << 0.0001						
Note: ICCs estimate correlations between individual measurements						
and between average measurements made on the same individual.						

DISCUSSION



- ❧ Antispasmodic agents such as IV glucagon have traditionally been used for reducing bowel motion during imaging.
- ❧ IV glucagon has a rapid onset and short half-life. However, side effects such as nausea and vomiting both, immediately and for up to 4 hours after administration, have been associated with IV glucagon.
- ❧ SL Hyoscyamine sulfate is an anticholinergic antimuscarinic agent mainly used to manage functional bowel motility disorders and thus may be an alternative to IV glucagon.

DISCUSSION (CONT.)



- ✧ In a study by Moeller et al., SL Hyoscyamine sulfate was compared to IV glucagon on upper GI series and found subjectively equivalent examinations between the two groups.
- ✧ Likewise, Bova et al. compared the two agents on patient undergoing barium enemas and found similar degrees of colonic distension between both study groups.

LIMITATIONS



- ❧ Small sample size, too small to detect a statistically significant difference between the two groups.
- ❧ No random assignment of the anti-peristaltic agents to patients, patients were routinely given IV glucagon in the early study timeframe and those given SL tablets occurred only due to a change in departmental protocol. Thus results cannot be generalized and given the temporal difference, other underlying differences in imaging may have been confounders.

CONCLUSIONS



- ❧ Our preliminary data show IV glucagon is an effective anti-peristaltic agent, despite its adverse effects and increased cost.
- ❧ Although IV glucagon has been shown to improve MRE examination quality, this does not necessarily translate into a corresponding/realized diagnostic benefit.
- ❧ The choice of anti-peristaltic agents will likely therefore depend on more than the available anti peristaltic agent, but also on the specific clinical question, as well as individual patient factors.

REFERENCES:



- ❧ Ghobrial PM, Neuberger I, Guglielmo FF. et al. Cine MR Enterography Grading of Small Bowel Peristalsis: Evaluation of the Antiperistaltic Effectiveness of Sublingual Hyoscyamine Sulfate. *Acad Radiol* 2014, 21:86-91.
- ❧ Fidler J. MR imaging of the small bowel. *Radiol Clin North Am* 2007; 45:317-331.
- ❧ Chernish SM, Maglinte DD. Glucagon: Common untoward reactions – review and recommendations. *Radiology* 1990;177 (1): 145-146.
- ❧ Moller G, Hughes JJ, Mangano FA et al. Comparison of L-hyoscyamine, glucagon, and placebo for air-contrast upper gastrointestinal series. *Gastrointest Radiol* 1992; 17:195-198.
- ❧ Bova JG, Jurdi RA, Bennett WF. Antispasmodic drugs to reduce discomfort and colonic spasm during barium enemas: Comparison of oral hyoscyamine, i.v. glucagon, and no drug. *AJR Am J Roentgenol* 1993; 161: 965-968.