

Title:

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Assessing inter- and intra-rater agreement of four upper digestive endoscopy visibility scores

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Dear Editor,

Although various upper digestive endoscopy visibility scores are available, no comparative studies have directly evaluated them to determine the most effective tool.

A prospective study was conducted to evaluate the inter- and intra-rater agreement of four upper digestive endoscopy visibility scores. A dataset of 32 videos was randomly selected from a collection of complete endoscopy procedures. Eight videos were assessed twice to estimate the intra-rater reliability. Eleven evaluators, four of whom had over five years of experience, independently rated the videos using four different scoring systems: Elvas (1), Kuo (2), Bhandari (3), and Chen (4).

The inter-rater reliability was estimated using intraclass correlation coefficients (ICC) with two-way mixed effects models to measure absolute agreement. Intra-rater

reliability was assessed using Bland-Altman plots, Krippendorff's alpha and Lin's concordance correlation coefficient.

The score proposed by Kuo et al. demonstrated the highest inter-rater agreement, with an ICC of 0.76. This score also performed well among inexperienced evaluators, maintaining a strong ICC of 0.74. In contrast, the Elvas score had the lowest agreement, particularly among less experienced evaluators. No significant differences were found among the scores in terms of intra-rater reliability. All the inter- and intra-rater agreement assessment results are presented in table 1.

Based on these findings, the Kuo score proved to be the most effective tool for assessing gastric visibility due to its consistency across both experienced and inexperienced evaluators. While these scores are not widely used in routine clinical practice, they may be useful in research settings, particularly for assessing quality improvement measures.

In conclusion, for research requiring gastric visibility assessments, the Kuo score appears to be the superior choice, offering high reliability and agreement among evaluators of varying experience levels.

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Table 1: Inter and intra-rater agreement assessment

	Kuo	Elvas	Chen	Bhandari
Inter-rater (Intraclass correlation coefficient (95% CI))				
Overall	0.76 (0.65-0.85)	0.45 (0.30-0.62)	0.61 (0.44-0.76)	0.68 (0.54-0.81)
Experienced evaluators	0.86 (0.78-0.92)	0.37 (0.17-0.58)	0.77 (0.64-0.87)	0.86 (0.77-0.92)
Inexperienced evaluators	0.74 (0.61-0.84)	0.52 (0.33-0.70)	0.52 (0.29-0.72)	0.60 (0.40-0.76)
Intra-rater				
Lin's concordance correlation coefficient	0.68	0.68	0.72	0.73
Krippendorff's alfa	0.70	0.70	0.73	0.72
% of observations beyond limits in the Bland-Altman plot	5.6%	8.3%	7%	7%


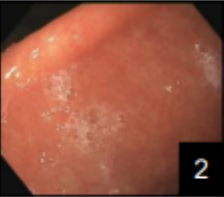
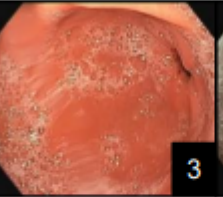
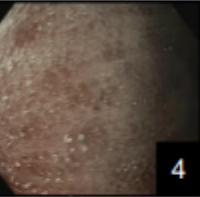

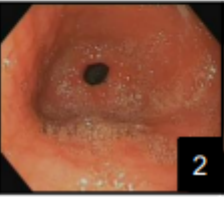
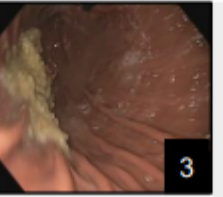






Scoring system: (range of values) / Anatomic regions assessed	Point scale evaluating every anatomic region			
Kuo et al: (4-16) <ul style="list-style-type: none"> • Gastric antrum • Lower gastric body • Upper gastric body • Fundus 	 <p>1</p>	 <p>2</p>	 <p>3</p>	 <p>4</p>
	No adherent mucus	Mild mucus, not obscuring vision	Large amount of mucus obscuring vision (< 30 ml of water for clearance)	Heavy adherent mucus (> 30 ml of water for clearance)
Elvas et al: (3-9) <ul style="list-style-type: none"> • Esophagus • Stomach • Duodenum 	 <p>1</p>	 <p>2</p>	 <p>3</p>	
	Excellent: no adherent mucus and clear view of the mucosa (aspiration allowed)	Adequate: adherent mucus obscuring vision that required flushing with water	Inadequate: thick mucus or food residue not amenable to aspiration	
Chen et al: (6-18) <ul style="list-style-type: none"> • Esophagus • Gastric fundus • Gastric body • Gastric antrum • Gastric angle • Duodenal mucosa 	 <p>1</p>	 <p>2</p>	 <p>3</p>	
	No adherent mucus and clear view	Thin coating of mucus without obscured vision	Adherent mucus obscuring vision	
Bhandari et al (4-12) <ul style="list-style-type: none"> • Oesophagogastric junction • Antrum • Lower body • Upper body of the stomach 	 <p>1</p>	 <p>2</p>	 <p>3</p>	
	No adherent mucus and clear view	Thin coating of mucus, not obscuring vision	Adherent mucus obscuring vision	

Figure 1: Summary of the scores assessed (own elaboration).