Title:

Applicability of the International Bowel Ultrasound Segmental Activity Score (IBUS-SAS) to ulcerative colitis: preliminary data

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Background and aims:

Although several intestinal ultrasound (IUS) scores have been proposed for ulcerative colitis (UC), none has been formally implemented into official recommendations of international scientific societies. We aimed to compare an IUS score validated for Crohn's disease (CD), the International Bowel Ultrasound-Segmental Activity Score (IBUS-SAS)[1], with other IUS scores specifically developed for UC, in terms of correlation with endoscopic activity.

Methods:

Adult patients with UC undergoing partial or full colonoscopy between April 2023 and June 2024 were prospectively included. Endoscopic evaluation of at least the sigmoid colon was mandatory for inclusion. Endoscopic activity was scored with both the Mayo Endoscopic Subscore (MES) and the Ulcerative Colitis Endoscopic Index of Severity (UCEIS). IUS was performed within 4 weeks of endoscopy. The IBUS-SAS[1], the Milan Ultrasound Criteria (MUC)[2], the UC-IUS score[3], the US Score from Parente et al.[4], and the Hata index[5] were included in the analysis. Applicability of the Civitelli index[6], an IUS score developed for pediatric patients, was also evaluated. The Spearman's rank coefficient [rho=ρ] was used to perform correlations, while receiver operating characteristic (ROC) curves were compared with the Hanley&McNeil method. This study was approved by the local Ethics Committee and each patient signed an informed consent form.

Results:

Collectively, 137 patients were included, with more than half of them having an active disease at endoscopy (59.8% using MES and 53.3% using UCEIS). IUS examination was performed at a median time of 7 days (IQR 0-15) after endoscopy. All the investigated scores were significantly able to distinguish between the 3 grades of severity of colonic inflammation, using both MES and UCEIS as

a reference. The IBUS-SAS showed a strong correlation with endoscopic activity, both with MES (ρ=0.72, p<0.01) and UCEIS (ρ=0.73, p<0.01) assessments. The Area Under the Curve (AUC) of IBUS-SAS to detect a moderate or severe endoscopic activity (MES≥2 and UCEIS≥5) was 0.86 and 0.87, respectively. The optimal cutoff to detect a MES≥2 and UCEIS≥5 was >20 (sensitivity 78% and specificity 83%) and >32 (88% and 80%), respectively. Both cut-offs showed progressive increase from mild to severe activity, with IBUS-SAS maintaining a consistently high AUC at different thresholds (**Figure, panel A**). Consistently, all the investigated UC-developed IUS scores correlated with both the MES and the UCEIS (p<0.01). **Figure (panel B)** shows the ROC curves with AUC values for all the investigated scores to detect a MES≥2 and UCEIS≥5, while **Table** shows pairwise comparisons between each score.

Conclusions:

The IBUS-SAS has an optimal performance in predicting endoscopic activity not only in patients with CD but also with UC. We provided a successful validation of the IBUS-SAS and 5 other scores specifically developed for UC.

[*2919/3000 characters, including spaces*]

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Figure. ROC curves with AUC and optimal cut-offs to detect 3 grades of severity of colonic inflammation with IBUS-SAS (A), and ROC curves with AUC values for all the investigated scores to detect an at least moderate endoscopic activity (B)

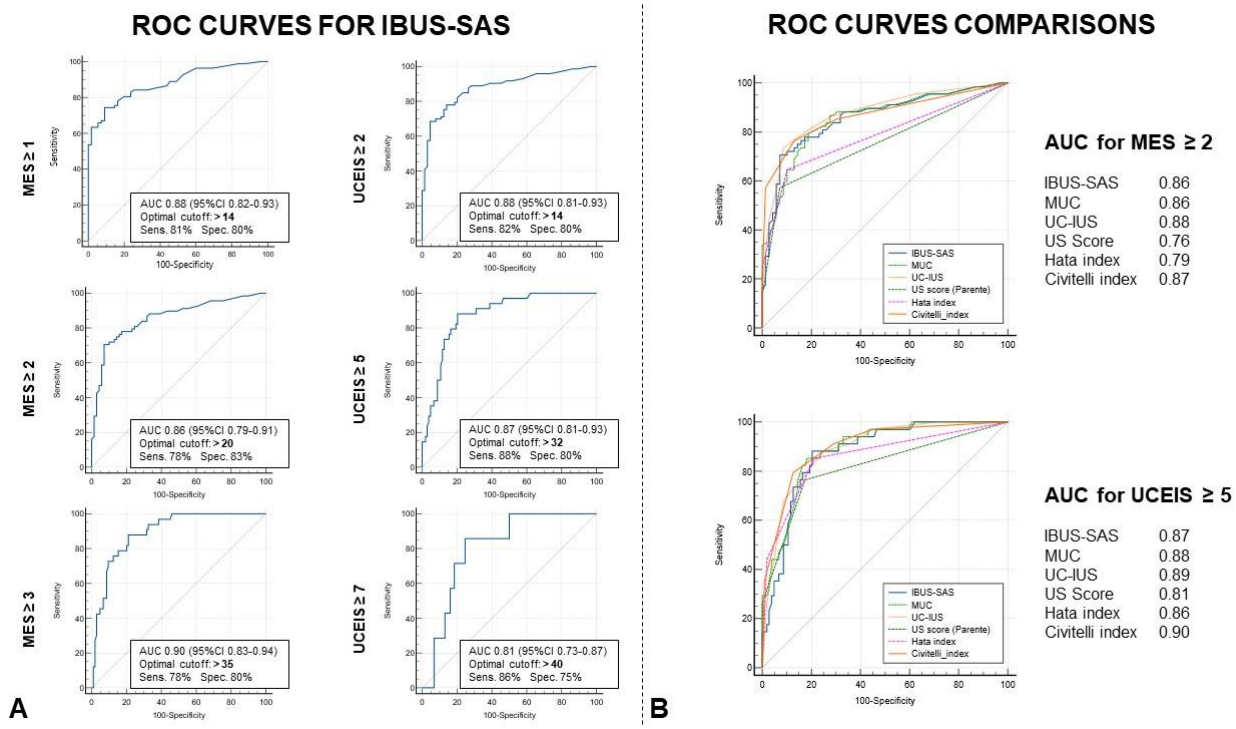

Table. Relative comparisons between the AUC of each score to detect a MES≥2 (A, top-right) and an UCEIS≥5 (B, bottom-left) are reported.
Grey rows and columns: AUC values (with 95%CI).
White cells: p-values obtained via the Hanley and McNeil method (significant p-values are shown in bold).

A) AUC for MES ≥ 2	**IBUS-SAS** 0.86 (0.79-0.91)	**Civitelli index** 0.87 (0.80-0.92)	**Hata index** 0.79 (0.71-0.85)	**US Score** 0.76 (0.68-0.83)	**UC-IUS** 0.88 (0.81-0.93)		
MUC 0.86 (0.79-0.91)	0.93	0.66	**0.04**	< **0.01**	0.29		
UC-IUS 0.88 (0.81-0.93)	0.28	0.67	< **0.01**	< **0.01**		0.37	**Civitelli index** 0.90 (0.84-0.95)
US Score 0.76 (0.68-0.83)	< **0.01**	< **0.01**	0.36		0.15	0.69	**Hata index** 0.86 (0.79-0.91)
Hata index 0.79 (0.71-0.85)	**0.04**	< **0.01**		0.30	0.05	0.19	**US Score** 0.81 (0.74-0.88)
Civitelli index 0.87 (0.80-0.92)	0.73		0.07	0.40	0.69	0.40	**UC-IUS** 0.89 (0.83-0.94)
		0.92	**0.04**	0.42	0.66	0.60	**MUC** 0.88 (0.82-0.93)
		UC-IUS 0.89 (0.83-0.94)	**US Score** 0.81 (0.74-0.88)	**Hata index** 0.86 (0.79-0.91)	**Civitelli index** 0.90 (0.84-0.95)	**IBUS-SAS** 0.87 (0.81-0.93)	**B) AUC for UCEIS ≥ 5**