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Glasgow-Blatchford and Rockall score utility in predicting findings on video capsule endoscopy in patients admitted with overt small bowel bleeding

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ABSTRACT

Background and study aims Glasgow-Blachford (GBS) and Rockall scores are recognized tools to prioritize patients with upper gastrointestinal bleeding. Their utility in predicting findings on capsule endoscopy (CE) in patients with overt small bowel bleeding (OSBB) remains unclear. The aim was to assess use of these scores in predicting relevant findings on CE and outcome among patients with suspected OSBB.

Patients and methods A retrospective analysis was performed from January 2019 to June 2022. Clinical parameters and scores were collected at presentation and at 24 hours. Univariate analysis used simple logistic regression, chi-squared test or Mann-Whitney as needed. ROC analysis was performed selecting the optimal cut-off point maximized by the Youden index.

Results Seventy-nine patients were included, 62% of whom had relevant findings. The predictor showing the highest discrimination ability was the initial GBS (area under the curve [AUC] 0.625; 95% confidence interval [CI] 0.49–0.76). The optimal cut-off point was at least 4, with sensitivity 98%, specificity 30%, and accuracy 72%. Multivariable regression analysis showed inpatient status on CE (odds ratio [OR] 117.27; 95% CI 11.32–4492.93; $P = 0.001$), shorter time to CE (OR 1.02; CI 1.01–1.04; $P = 0.018$), higher initial GBS (OR 1.22; CI 1.06–1.43; $P = 0.009$), and higher GBS within 24 hours (OR 1.19; CI 1.04–1.37; $P = 0.013$) were predictive factors for relevant findings on CE, with a model AUC 0.802, sensitivity 91.8%, and specificity 63.3%.

Conclusions GBS and Rockall scores were useful in predicting relevant findings on CE in this cohort of patients with suspected OSBB. In patients with GBS 5 or higher, early CE during the same admission is warranted.

Introduction

Use of validated risk stratification scores, the Glasgow-Blachtford score (GBS) or the Rockall score, can support early discharge of patients with low-risk upper gastrointestinal bleeding (UGIB) and can reduce need for endoscopy and hospital admission, improving resource utilization without increasing patient risk [1, 2]. Their use in management of patients with UGIB has been widely recommended [3]. A GBS > 1 has been shown to accurately predict need for hospital-intervention, endoscopic

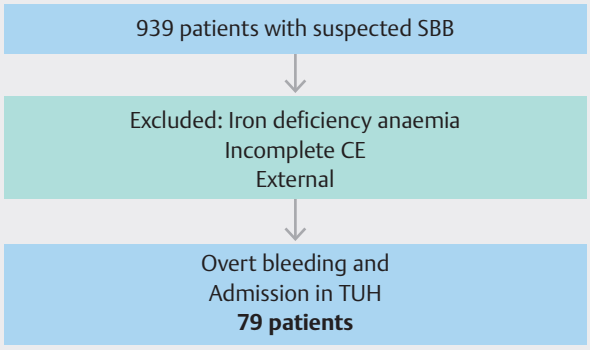
therapy, blood transfusion, and surgery (area under the receiver operating curve [AUC-ROC] 0.86) [4].

It has been estimated that 5% to 15% of patients referred with UGIB have a SB source. Reported lesion detection rates for capsule endoscopy (CE) in patients with suspected SB bleeding (SBB) range from 40% to 80% [5, 6, 7, 8]. Suspected SBB previously has been divided into those presenting with overt bleeding, with obvious clinical symptoms and signs of bleeding such as melena or hematochezia, and occult bleeding, a more insidious presentation with symptoms mainly related to anemia and subclinical blood loss, detected on fecal tests only. Multiple studies have been published which aimed to identify predictive factors for relevant findings on CE in patients with overt or occult SBB. Age, low Hb, overt bleeding, early CE, and current hospitalization at time of capsule are all consistent risk factors for identifying a bleeding source [6, 9, 10, 11].

However, only two validated clinical risk scores for use specifically in suspected SBB have been developed. Ohmiya et al. developed the Ohmiya Score, a weighted index based on various comorbidities that were associated with development of SB vascular diseases and recurrent bleeding [12]. Marya et al proposed another scoring system, the Suspected Small Bowel Capsule Dx Score, to predict a positive diagnosis on CE in patients with overt and occult SBB. This score is useful for identifying patients who are unlikely to have a diagnosis on CE and, therefore, may only impact a limited number of patients with SBB [13].

Future studies are needed to validate current systems and identify a SBB score predictive of significant SB lesions with higher sensitivity and specificity. Any SBB score should also be assessed as part of an algorithm to optimize resource allocation and determine if early detection of pathology does translate into better patient outcome and cost effectiveness. The effectiveness of either the GBS or Rockall score in SBB is less clear. Shual et al. found that the GBS, Rockall, and AIMS65 scores were all useful for predicting rebleeding and further intervention with an area under the curve (AUC) of 0.790 in a retrospective study of patients admitted with overt SBB [14]. There are no data available currently about the ability of either score to predict relevant findings on CE or mortality. Clinical familiarity with these scores, often incorporated into care bundles and used worldwide in day-to-day practice, would be a major advantage over any novel SB-specific score. In addition, because suspected SB bleed is only considered after a negative upper gastrointestinal endoscopy and colonoscopy in patients presenting with gastrointestinal bleeding, these patients will already have been triaged with these scores at time of referral for CE. As such, being able to extrapolate their need for urgent SB investigation and intervention based on their initial risk stratification by either score, rather than apply a novel and unfamiliar one retrospectively, would be clinically useful.

In this study, we aimed to determine the ability of both GBS and Rockall scores to predict relevant findings on CE, need for transfusion, need for further intervention, rebleeding, and mortality in a cohort of patients admitted with overt SBB.



▶ **Fig. 1** Patient selection flow chart.

Patients and methods

We conducted a retrospective study of patients admitted with overt SBB between June 2019 and June 2022 at our public hospital, Tallaght University Hospital ([TUH], Dublin, Ireland), which serves a catchment of 650,000 people and in collaboration with Trinity College Dublin. The Endoscopy Department at TUH provides specialist CE services across Ireland with an average of 580 SB capsules and 35 panenteric capsules performed per year.

CE investigations are performed using PillCam SB3 for SB or CCE2 for panenteric studies (Medtronic, Dublin). Each case was analyzed by a single experienced gastroenterologist using Rapid Reader Version 8 software (Medtronic, Dublin). All readers were qualified in CE and reports are approved at a capsule review board attended by an expert reader (> 500 CEs).

This study was approved by the St James's Hospital and TUH Joint Research and Ethics Committee (Ref. 2659), Dublin, Ireland.

Patient selection

We identified 939 patients undergoing CE for suspected SBB from the TUH CE database. We included all patients admitted at TUH with overt bleeding. We excluded cases with occult gastrointestinal bleeding, incomplete CE, and patients admitted to other hospitals as we could not access all their clinical data. ▶ **Fig. 1** illustrates the patient selection flow chart.

Definitions and data collection

Overt gastrointestinal bleeding was defined as visible bleeding episodes with melena, hematochezia, and/or hematemesis at time of hospital admission or during hospitalization. Suspected overt SBB was considered when patients had a previous non-diagnostic high-quality gastroscopy and colonoscopy [15, 16]. Relevant data were collected from the Endoscopy Department database and hospital electronic patient records. Because patients with active bleeding can deteriorate over time, we recorded clinical parameters and scores (GBS, Rockall) on admission and at 24 hours. Data collected included: demographics, initial blood pressure (BP) and lowest BP within 24 hours (BP24), initial heart rate (HR) and highest heart rate within 24

hours (HR24), prior treatment with nonsteroidal anti-inflammatory drugs (NSAIDs), antiplatelet agent or anticoagulant use, comorbidities and Charlson comorbidity index [17], bleeding presentation (hematemesis, melaena or hematochezia), CE timing from episode of bleeding, blood results (initial hemoglobin [Hb] and lowest within 24 hours (Hb24), initial urea and highest within 24 hours (Urea24) and transfusion history. GBS and Rockall scores were calculated at time of admission (Initial GBS and Rockall) and at 24 hours (GBS24 and Rockall24). We recorded presence of SB lesions and bowel preparation quality on CE. The definition of ulcerative and inflammatory and vascular lesions employed followed the published International Delphi Consensus and detected lesions were considered a relevant finding if they were moderately or highly likely to be the source of bleeding (Saurin P1 or P2) [18, 19]. Rebleeding was defined as presence of hematemesis and/or melena and /or hematochezia plus hemodynamic instability (systolic BP < 100 and/or HR > 100) and/or drop in Hb level > 2 g/dL after initial CE. Further intervention after capsule was defined as a therapeutic endoscopic procedure (enteroscopy, gastroscopy or colonoscopy) or interventional radiology or surgery aimed at treating the source of bleeding.

Statistical analysis

Mean, median, and interquartile range were used to describe quantitative variables. Qualitative variables are described with a number and percentage (%). Univariable analysis used simple logistic regression as well as chi-squared test and Mann-Whitney test for qualitative and quantitative potential predictors, respectively. Receiver operating curve analysis was performed and the optimal cut-off point was maximized by the Youden index. The Youden index was defined as the sum of sensitivity and specificity minus 1. Multivariable logistic regression model was fitted with the most significant predictors and restricting the number to the number of events divided by 10 to avoid model overfitting. The estimated odds ratios (ORs) and their 95% confidence interval (CIs) were provided. All the reported *P* values were two-sided. R software was used [20] and a significance level of 0.05 was applied.

Results

In all, 79 patients were included. Baseline data are shown in ▶ **Table 1**. Most of the patients had an initial GBS > 1, but in six (8%) it was ≤ 1. One of the patients with an initial GBS ≤ 1 presented with hypotension and drop of Hb level within the first 24 hours, which made his GBS24 h increased. Hence five patients presented a GBS24 ≤ 1.

In 62 patients (78.5%) blood transfusion was required. Clinical characteristics, scores, and CE results are shown in ▶ **Table 2**. Most of the CE studies were performed while the patients were in the hospital and seven patients (9%) had a CE done within 3 days of the bleeding episode. There was a relevant finding in 49 patients (62%).

The most common CE finding was SB angiodysplasia in 13 of 49 patients (27%). Fresh blood or active bleeding was seen in 23% of cases. SB ulcers and neoplasia were detected in 12% and 8% of cases, respectively. Other less frequent findings included portal hypertensive enteropathy, Dieulafoy lesions and diverticulae.

▶ **Table 1** Baseline data.

Characteristic	Median [Max;Min]/n (%)
Age	71 [64;78]
Gender: Female/Male	22 (27.8)/57 (72.2)
Smoking: Yes/No/Ex-smoker	16 (20.3)/27 (34.2)/36 (45.6)
Alcohol intake: Yes/No/ Ex-drinker	22 (27.8)/48 (60.8)/9 (11.4)
Chronic kidney disease: Yes/No	14 (17.7)/65 (82.3)
Aortic restenosis: Yes/No	5 (6.3)/74 (93.7)
Antiplatelet: Yes/No	37 (46.8)/42 (53.2)
Anticoagulant: Yes/No	33 (41.8)/46 (58.2)
NSAID: Yes/No	8 (10)/71 (90)
Steroids: Yes/No	3 (3.8)/76 (96.8)
Charlson score: < 3/3–4/ ≥ 5	38 (48.1)/27 (34.2)/14 (17.7)
Type of bleeding:	
First episode/Rebleeding	55 (69.6)/24 (30.4)
Presentation of bleeding:	
Melena/Hematochezia/Hematemesis	58 (73.4)/16 (20.3)/5 (6.3)
Bleeding site: Inpatient/ Outpatient	8 (10.1)/71 (89.9)

NSAID, nonsteroidal anti-inflammatory drug.

Of those with relevant CE findings, 22 of 49 (45%) underwent further intervention: 12 patients enteroscopy (10 anterograde and 2 retrograde), seven either repeat gastroscopy or colonoscopy, two required surgery and one arteriography + embolization. The rest were managed medically. Of those that required any type of endoscopy (N = 19), 12 (63.1%) required endoscopic treatment.

In all, 22 patients (27.8%) rebled and 14 patients (17.7%) died within 1 year of follow-up. Two patients died because of comorbidities accelerated by the bleeding, three patient deaths were related to COVID-19 infection and nine were associated with underlying comorbidities unrelated to the bleeding episode.

Relevant finding on CE

▶ **Table 3** includes the GBS and Rockall score-related variables for the cohort and predictive factors for relevant findings on CE. The factor with the highest discrimination ability was Initial GBS, with an AUC of 0.625 (95% CI 0.49–0.76). The optimal cut-off point for the Initial GBS, maximizing the Youden index, was ≥ 4, with a sensitivity of 98%, specificity of 30%, and accuracy of 72%.

▶ **Table 2** Biological data, scores, and CE data.

Biological data	Mean(SD)/Median [Max;Min]
BP/BP24	124.3 (21.8)/106 [96.5;118]
HR/HR24	80 [72.0;93.0]/88 [80.0;101]
Hb/Hb24	8.0 [6.60;9.85]/7.8 [6.50;8.60]
Urea/Urea24	8.5 [5.80;14.2]/8.9 [6.10;14.4]
Scores	Median [Max;Min]/n (%)
Rockall	3.00 [3.00;4.00]
Rockall24	4.00 [3.00;5.00]
Rockall < 3/ ≥ 3	15 (19)/64 (81)
GBS	10.0 [7.00;11.0]
GBS24	10.0 [7.00;12.0]
GBS ≤ 1/ > 1	6 (7.6)/73 (92.4)
GBS24 ≤ 1/ > 1	5 (6.3%)/74 (93.7)
Capsule data	**Median [Max;Min]/n (%)**
Capsule type SB3 /CC3	54 (68.4) /25 (31.6)
Time capsule (days)	9.00 [6.00;23.5]
Time capsule range	
▪ ≤ 7 days	28 (35.4)
▪ 7–30 days	34 (43.0)
▪ ≥ 30 days	17 (21.5)
Quality preparation	
▪ Good or excellent	16 (20.2)
▪ Adequate	53 (67)
▪ Poor	7 (9)
▪ N/A	3 (3.8)

BP, blood pressure; CE, capsule endoscopy; GBS, Glasgow-Blachtford score; Hb, hemoglobin; HR, heart rate.

Multivariable regression analysis showed that inpatient status on CE (OR 117.27; CI 11.32–4492.93; $P = 0.001$), shorter time to CE (OR 1.02; CI 1.01–1.04; $P = 0.018$), higher initial GBS (OR 1.22; CI 1.06–1.43; $P = 0.009$) and higher GBS within 24 hours (OR 1.19; CI 1.04–1.37; $P = 0.013$) were all predictive factors for relevant findings on CE with a model AUC of 0.802, sensitivity of 91.8%, and specificity of 63.3%. ▶ **Fig. 2** shows accuracy testing for GBS and GBS24.

Need for transfusion

Factors on univariable analysis associated with blood transfusion were: male gender ($P = 0.015$), presentation with melena ($P < 0.001$), BP24 ($P = 0.039$), Initial HR and HR24 ($P = 0.028$ and $P = 0.038$, respectively), Initial Hb and Hb24 ($P = 0.001$ and $P = 0.004$ respectively), Initial Urea and Urea24 ($P = 0.031$ and $P = 0.032$ respectively). Initial Rockall ($P = 0.022$), Rockall24 ($P = 0.003$), Initial GBS ($P < 0.001$), and GBS24 ($P < 0.001$) were also all predictive of transfusion. Initial GBS and GBS24, which include Hb level in their calculation, showed an AUC of 0.925 (95% CI 0.847–1) and 0.936 (95% CI 0.874–0.998), respectively. The optimal cut-off point for both, maximizing the Youden index, was ≥ 7, with a sensitivity of 95% and a specificity of 82% for Initial GBS and a sensitivity of 96% and a specificity 76% for GBS24.

Further intervention after CE

With reference to further intervention, only Initial Hb ($P = 0.043$), Hb24 ($P = 0.031$) and inpatient status at the time of CE ($P = 0.027$) were predictive factors. Hb24 showed the highest accuracy with an AUC of 0.662 (95%CI 0.52 – 0.805).

Rebleeding

Initial urea and Urea24 ($P = 0.008$ and $P = 0.010$ respectively), Initial Rockall and Rockall24 ($P = 0.012$ and $P = 0.014$ respectively), Initial GBS and GBS24 ($P = 0.019$ and $P = 0.008$ respectively) and relevant findings on CE ($P = 0.021$) were predictive of rebleeding on univariable analysis. Factors with the best discrimination were the GBS24 and Rockall24 with an AUC of 0.690 (95% CI 0.561–0.820) and 0.670 (95% CI 0.547–0.799), respectively. For GBS24, the optimal cut-off point, maximizing the Youden index, was ≥13, with a sensitivity of 46% and a specificity of 84%. For Rockall24, the optimal cut-off point was ≥ 5, with a sensitivity of 56% and a specificity of 78%.

Mortality

Urea24 ($P = 0.021$), Initial Rockall ($P = 0.014$), and Rockall24 ($P = 0.021$) were all predictive of mortality on univariable analysis. Initial Urea ($P = 0.055$) and chronic kidney disease (CKD) ($P = 0.069$) were close to statistical significance. Initial GBS ($P = 0.87$) was not statistically significant. The factor showing the highest discrimination ability was the Initial Rockall score, with an AUC of 0.700 (95% CI 0.562–0.835). The optimal cut-off point for the initial Rockall, maximizing the Youden index, was ≥ 4, with a sensitivity of 78% and a specificity of 57%.

No multivariable regression model improved discrimination of the best simple (univariable) regression model in predicting need of transfusion, further intervention after CE, rebleeding, or mortality.

A classification tree was created to determine the value of identified variables on predicting outcome. Relevant finding on CE was the only outcome with a positive predictive classification tree after pluning by CV error. Inpatient status at time of CE and initial GBS were the two variables identified as nodes on which to base the decision process. Seventy-three percent of patients had their CE during their hospital admission, 81% of whom showed a relevant finding on CE, representing 61% of the whole cohort. ▶ **Fig. 3** illustrates the classification tree.

Discussion

The reported diagnostic yield of CE in patients with suspected SBB ranges from 55% to 80%. The patients in our cohort were carefully selected and only patients admitted with overt bleeding were included. In the majority (73.4%), CE was performed

▶ **Table 3** Predictive factors for relevant findings on CE.

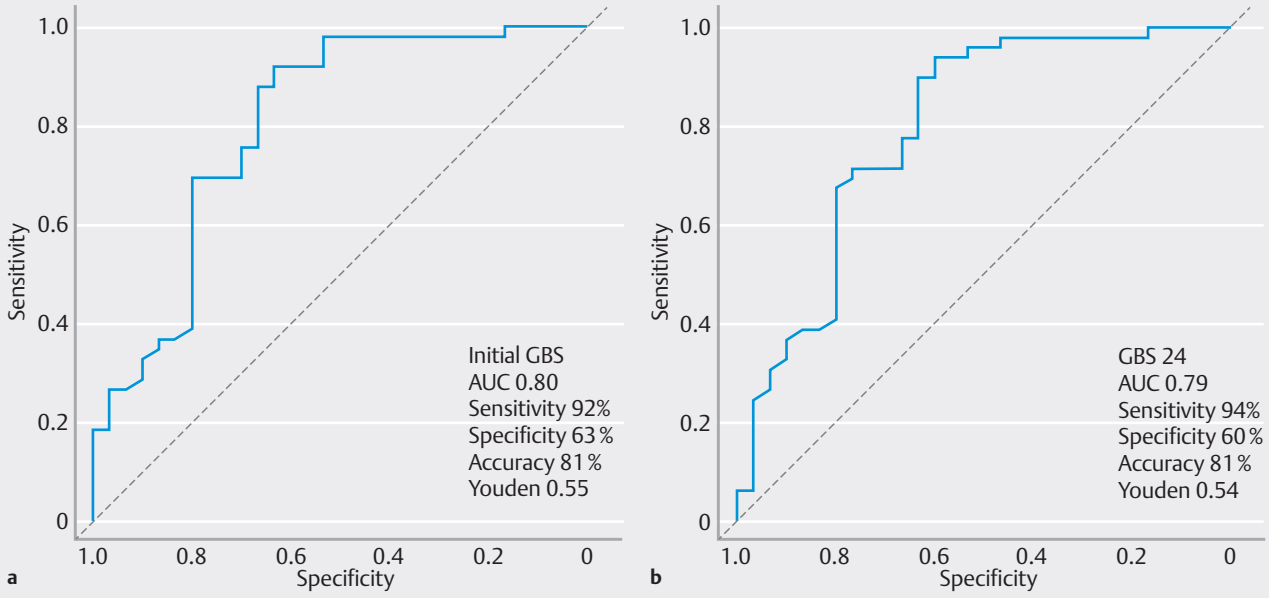
	No finding	Relevant finding	*P* value
BP initial	122 (19.9)	126 (23)	0.478
BP24	108 [98.8;120]	106 [96.0;117]	0.798
HR	80.0 [72.2;92.8]	80.0 [96.0;117]	0.478
HR24	88.5 [80.0;102]	87 [82;100]	0.369
Hb	8.10 [6.95;12.0]	7.80 [6.50;9.50]	0.094
Hb24	8.10 [6.82;11.9]	7.60 [6.50;8.40]	**0.012**
Urea	7.55 [5.32;13.1]	8.80 [6.00;14.8]	0.573
Urea24	8.10 [5.73;13.2]	8.90 [6.20;14.8]	0.554
Time to capsule: ≤ 7	6 (21.4%)	22 (78.6%)	**0.027**
Time to capsule: > 7	24 (47.1%)	27 (52.9%)	
Time to capsule: ≤ 7	6 (21.4%)	22 (78.6%)	**0.016**
Time to capsule: 7–30	14 (41.2%)	20 (58.8%)	
Time to capsule: > 30	10 (58.8%)	7 (41.2%)	
Patient status on capsule:			**0.001**
Inpatient	15 (25.9%)	43 (74.1%)	
Outpatient	15 (71.4%)	6 (28.6%)	
Rockall before	3.00 [2.00;4.00]	4.00 [3.00;4.00]	0.063
GBS	7.50 [3.00;11.0]	10.0 [7.00;11.0]	**0.024**
Rockall before: < 3	10 (66.7%)	5 (33.3%)	**0.016**
Rockall before: 3–8	20 (31.2%)	44 (68.8%)	
Rockall24	4.00 [2.25;5.00]	4.00 [3.00;5.00]	0.085
Rockall24: < 3	8 (72.7%)	3 (27.3%)	**0.017**
Rockall24: 3–8	22 (32.4%)	46 (67.6%)	
GBS	7.50 [3.00;11.0]	10.0 [7.00;11.0]	**0.024**
GBS24	8.00 [3.25;12.0]	11.0 [8.00;13.0]	**0.025**
GBS24: ≤ 1	5 (100%)	3 (27.3%)	**0.006**
GBS24: > 1	25 (33.8%)	46 (67.6%)	

CE, capsule endoscopy; Glasgow-Blachtford score; Hb, hemoglobin; HR, heart rate.

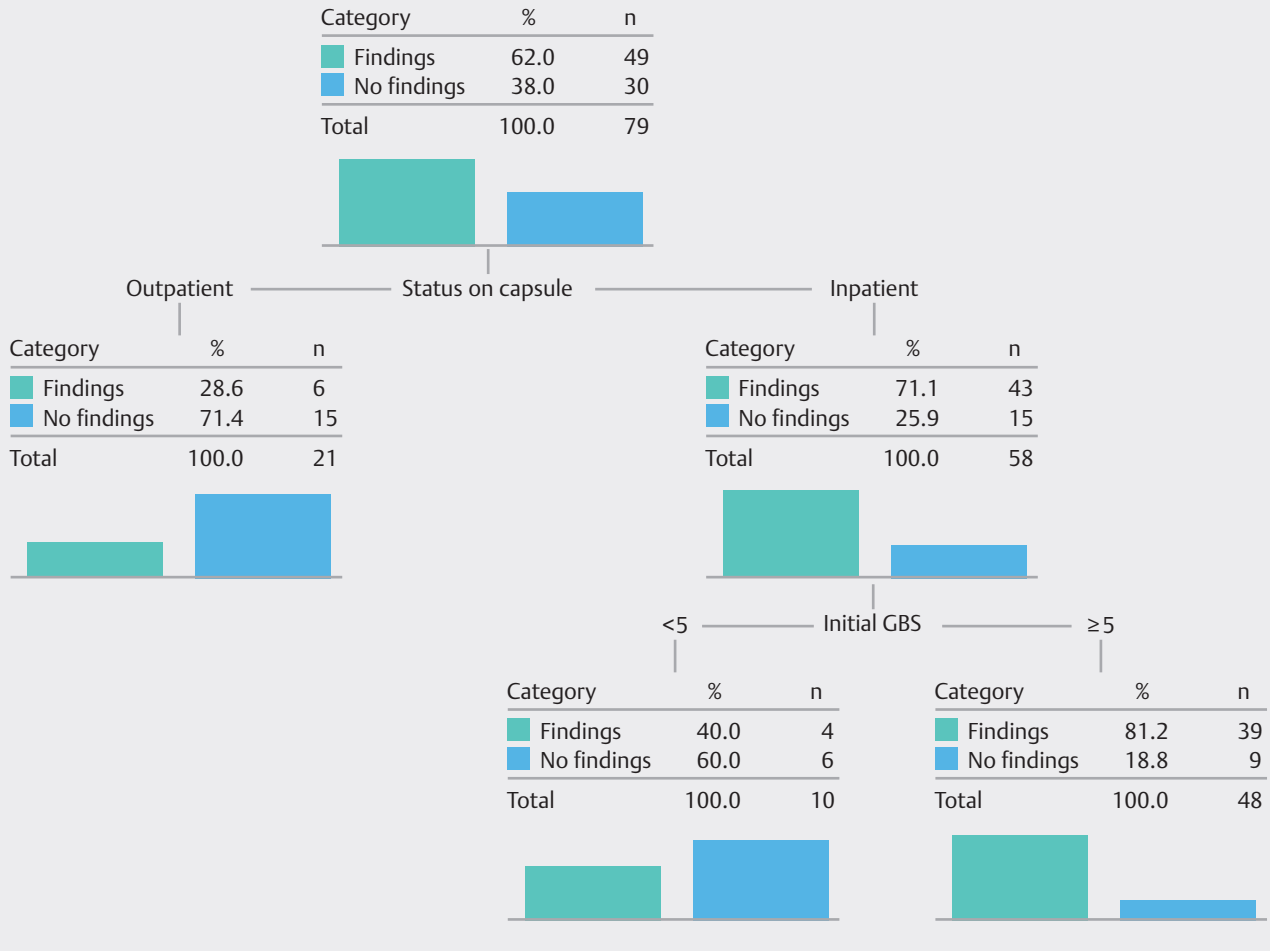
during hospital admission, with an acceptable interval from the episode of bleeding to CE (median 9 days). Although, 9% of patients had CE done within the first 72 hours, this did not affect the final aims of the study, because GBS and Rockall do not include time to capsule in their calculations (neither time to gastroscopy in the UGIB setting). Moreover, scientific evidence has shown that when CE is performed early, diagnostic and therapeutic yield increases. But whether this translates into higher therapeutic intervention or better prognosis is still debatable. In addition, the capsule images were carefully assessed and reviewed by adequately trained readers using the highest technological advances. These are all factors known to increase diagnostic yield, and explains why the yield in our cohort (62%) was at the higher end of those previously reported or even better than other studies, where CE was performed earlier [7, 8].

Our rebleeding rate was 30.4% (n = 24) over 1 year of follow-up. This rate is also similar to previous studies, with rates from 22.8 to 40% depending on multiple factors such as CE findings, time to CE after bleeding, comorbidities, and level of Hb [21, 22, 23].

In terms of therapeutic intervention after CE, in this series, 22 of 49 patients (45%) with a relevant finding on CE underwent further intervention such as endoscopy, interventional radiology, or surgery and the rest were managed medically. If we look at the literature, it is difficult to identify the general therapeutic intervention rate, because it depends on the type of lesion encountered [24, 25, 26, 27]. Alsahafi et al, found that 65.2% of



▶ **Fig. 2** Accuracy testing for GBS and GBS24.



▶ **Fig. 3** Classification tree.

patients underwent further therapeutic interventions; however, their cohort was slightly smaller (41 patients with overt bleeding) and all were inpatients [28]. In our cohort, the most common intervention was balloon-assisted enteroscopy, with 12 of 49 patients (24.5%) having relevant findings on CE. However, in seven cases (14.2%), a lesion was identified in the stomach or colon and these patients went on to have a gastroscopy or colonoscopy. Again, these results are in line with previously published series, in which lesions outside the SB could be detected in up to 30% of cases [29, 30, 31, 32, 33, 34].

To our knowledge, this is the first study published that aimed to assess use of GBS and Rockall score to predict findings on CE in patients admitted with overt SBB. Both GBS and Rockall scores, on admission and at 24 hours, were predictive of relevant findings on CE on univariable analysis. Initial GBS and GBS24 were also independent predictive factors on logistic regression, together with inpatient status and shorter time to CE. Our study suggests that the initial GBS could accurately be included in a decision-making process with up to 81% of patients admitted with overt bleeding and a GBS ≥ 5 predicted to have relevant findings on CE. Conversely, 71.4% of patients already discharged at time of CE are predicted to have negative findings. This result likely reflects the effect of a delay in performing the CE study because in general, inpatients tend to get CE earlier than outpatients. Nevertheless, the novelty of this study is the addition of a clinical score to the decision-making process, and even in admitted patients, it can help to prioritize CE tests and allocate resources.

As expected, in our cohort, only six patients (8%) had an initial GBS ≤ 1. Current guidelines for UGIB indicate that these patients can be safely discharged directly from the Emergency department with subsequent endoscopic procedures performed on an outpatient basis. Similarly, none of our patients with a GBS ≤ 1 had a relevant finding on CE or rebled. One patient on antiplatelets and anticoagulant therapy required transfusion due to a drop in Hb level within the first 24 hours and another patient died 11 months afterwards because of comorbidities unrelated to the bleeding episode. As such, despite the small number, we suggest that patients with overt suspected SBB with a GBS ≤ 1 behave similar to those with upper gastrointestinal bleeding, and in these cases, close monitoring as opposed to early CE can be considered.

Marya et al [13], in their proposed scoring system, showed that age < 54 years, Hb < 6.4 g/dL, and inpatient status with overt bleeding were independent predictors for identifying a significant diagnosis on CE (AUC-ROC 0.70). A cut-off value ≥ 0 was found to have the highest specificity (30.6%) while having a sensitivity of at least 90%. In our case, the initial GBS also predicted findings on CE with an AUC of 0.625 and cut-off 4, with a sensitivity of 98% and a specificity of 30%. Both suggest these scores can be used to identify patients who are unlikely to have relevant findings on CE. The benefit of using GBS over other scores is its familiarity and its availability from the very early admission stage in the Emergency Department.

Shual et al. [14] assessed the clinical scores GBS, Rockall, and AIMs65 in prediction of rebleeding, interventions, and length of stay in a retrospective cohort of 162 patients with overt bleeding, 152 of whom underwent CE with a median follow-up of 4 weeks. They found that GBS (AUC 0.790; cut-off 7; sensitivity 63% and specificity 81%) and Rockall (AUC 0.693; cut-off 2; sensitivity 71% and specificity 67%) were useful for prediction of rebleeding. They also found that GBS (AUC 0.825, 95% CI 0.725–0.901) and Rockall (AUC 0.726, 95% CI 0.616–0.819) performed reliably in predicting need for intervention. However, they considered transfusion, endoscopy, and surgical therapy together as intervention with no separate assessment and no assessment either in terms of CE findings or mortality was reported. Our results are similar, but we assessed the outcomes separately. Both Initial GBS and GBS24 and Initial Rockall and Rockall24 were very good predictors of transfusion (cut-off 7 for both, sensitivity of 95% and a specificity of 82% for Initial GBS and sensitivity 96% and specificity 76% for GBS24). Both GBS24 (cut-off 13; sensitivity 46% and specificity 84%) and Rockall24 (cut-off 5; sensitivity 56% and specificity 78%) showed the highest ability to predict rebleeding. However, in our cohort, none of the clinical scores were predictive of further intervention after CE. In this case, low Hb within the first 24 hours was predictive of need for intervention. Finally, the Initial Rockall showed the greatest ability to predict mortality and although it showed an AUC of 0.700 (95%IC 0.562, 0.835) with an optimal cut-off point of 4, sensitivity and specificity only reached 78% and 57%, respectively. The mortality rate in our series was low, so these results should be taken with caution.

Our study has some drawbacks. It is a single-center retrospective study with a relatively small sample size. However, the sample was homogeneous because all the patients included had only overt suspected SBB. In addition, the necessary clinical data at presentation and follow-up were available. Also, as a single-center study, the capsule procedures were standardized as was the approach to reading and reporting, in accordance with best practice.

Although our results suggest GBS and Rockall score at presentation and at 24 hours are reliable predictive tools in patients with suspected overt SBB, a separate and prospective study to validate these results would have to be performed before it could be recommended for clinical use.

Conclusions

The popular GBS and Rockall score were useful in predicting relevant findings on CE and outcome in this cohort of patients with suspected overt SBB. Patients with worse GBS and Rockall score require close monitoring and an early CE and intervention as appropriate. Particularly in patients with GBS ≥5, an early CE during the same admission is warranted.

Conflict of Interest

The authors declare that they have no conflict of interest.

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