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Comparison of Glasgow-Blatchford Score and Rockall Score in Patients with Upper Gastrointestinal Bleeding

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ABSTRACT

Introduction: Upper gastrointestinal bleeding can be a life-threatening condition and requires careful evaluation from the very first episode in order to reduce the risk of rebleeding, hemorrhagic shock and death. The outcome of a patient with upper gastrointestinal bleeding depends on resuscitation measures taken during admission to the hospital and an adequate assessment of the patient's risk level. **Aim:** The aim of the study is to compare Glasgow Blatchford score and Rockall score and to identify the most accurate score used in predicting unfavorable outcomes and the need for intervention. **Methods:** This study involves 237 patients with upper gastrointestinal bleeding. The accuracy of the scoring systems was assessed by plotting receiver-operating characteristic curves (ROC curves) and was calculated for GBS and RS with 95% confidence interval (CI). **Results:** As for mortality prediction, RS was superior to GBS (AUC 0.806 vs. 0.750). The GBS had a higher accuracy in detecting patients who needed transfusion units and was superior to the RS (AUC 0.810 vs.0.675). In predicting the need for intervention, RS was superior to GBS (AUC 0.707 vs. 0.636. **Conclusion:** GBS and RS are developed to help clinicians to triage patients appropriately in order to assess endoscopic therapy within a suitable time frame, as well as identify low risk patients for possible outpatient management. High accuracy of the GBS in predicting a need for transfusion represents an important endpoint to assess. RS was superior to GBS in predicting a need for intervention as well as mortality. Currently, a combination of these scoring systems is the best way for proper assessment.

Keywords: Glasgow Blatchford score, Rockall score, upper gastrointestinal bleeding.

1. INTRODUCTION

Upper gastrointestinal bleeding can be a life-threatening condition and requires careful evaluation from the very first episode in order to reduce the risk of rebleeding, hemorrhagic shock and death. The outcome of a patient with upper gastrointestinal bleeding depends on resuscitation measures taken during admission to the hospital and an adequate assessment of the patient's risk level.

Risk assessment scoring systems for upper gastrointestinal bleeding have been devised to identify which patients are at high risk of mortality, rebleeding, the need for blood transfusion or immediate intervention, and those at low risk who can be safely discharged and managed as outpatients, thus reducing health care costs (1, 2).

The most widely used system is the Rockall score which is based on age, the presence of shock, medical comorbidity and endoscopic findings. It is simple to calculate, performs well for both non-variceal and variceal bleeding. The Rockall score can only be calculated after endoscopy has been undertaken. The Glasgow Blatchford score is based on simple clinical observations, haemoglobin and blood urea concentrations and does not require endoscopy results. The Glasgow Blatchford score has the advantage that it can be calculated at an early stage after hospital admission and predicts the need for urgent intervention (3, 4).

An improvement of the overall survival of patients with upper gastrointestinal bleeding has also been reported in cases where before mentioned scores were included in clinical practice, based on the notion that a high score predicts, with great probability, the need for medical intervention and admission in intensive care units. Numerous comparative studies have demonstrated varied level of accuracy and benefit of these scoring systems.

2. AIM

The aim of this study is to compare the two scores and identify the most accurate score used in predicting unfavorable outcomes and the need for intervention (5, 6).

3. METHODS

This study involves 237 patients admitted to University Clinical Center Sarajevo who were presenting with melena or haematemesis. The study was conducted for a period of eighteen months. All patients had undergone esophagogastroduodenoscopy as an emergency procedure in the first 24 hours after admission, confirming the diagnosis of hemorrhage in the upper gastrointestinal tract. Clinical and laboratory data were collected retrospectively, including endoscopic findings, laboratory findings, treatment and clinical follow-up.

The Rockall score (RS) and Glasgow Blatchford score (GBS) were calculated using the calculator available on MDCalc, including several variables: initial heart rate, systolic blood pressure, presentation with melena or syncope, level of hemoglobin, blood urea nitrogen, coexistent hepatic disease, heart failure or other significant comorbidities, age and the results of endoscopic examination.

During the research we monitored specific clinical outcomes - mortality, the need for transfusion and the need for intervention. Mortality refers to death during the hospital stay or within the 60-day follow-up period. The ″need for transfusion″ units refers to patients with haemoglobin levels lower than 7g/L, who were receiving fresh-frozen plasma and deplasmated erythrocytes during hospitalization. The term ″need for intervention″ was used to define patients who needed endoscopic hemostasis or surgical intervention, as well as those who were rebleeding during hospitalization.

Statistical analysis

The statistical analysis was performed with SPSS. Categorical variables were tested for significance by using Fisher's exact test. The significance level was $\alpha = 0.05$. The accuracy of the scoring systems in detecting patients who needed clinical intervention, transfusion units, or died was assessed by plotting receiver-operating characteristic curves (ROC curves) and was calculated for GBS and RS with 95% confidence interval (CI).

4. RESULTS

Figure 1 shows that the most common cause of upper gastrointestinal haemorrhage were peptic ulcers verified in 148 patients, 13.9% Forrest I, 24.9% Forrest II and 23.6% Forrest III respectively. Oesophageal varices were verified in 15.6% of patients, while gastric cancer was found in 5,5% of patients. Erosive gastritis and GERD were verified in 7.2% and 2.5% of patients respectively, Mallory-Weiss in 5.1% and polyps in 1.7% of patients. The endoscopic treatment was implemented in 81 patients (34.2%). Endoscopic treatment consisted of injection therapy (epinephrine 1:10.000), endoclips and band ligations. Fifteen patients needed surgical treatment to stop the bleeding - seven of these had gastric cancer and

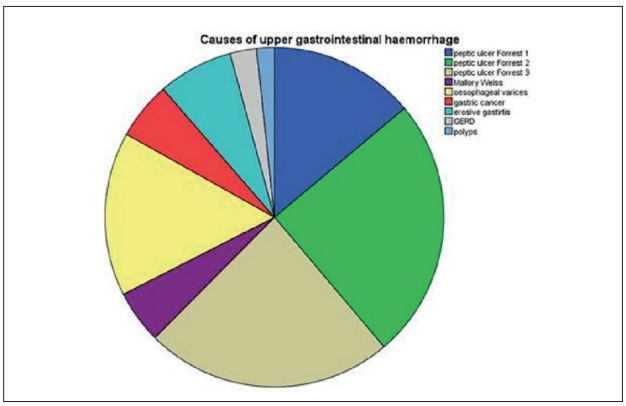

Figure 1. Causes of upper gastrointestinal haemorrhage- procentual representation

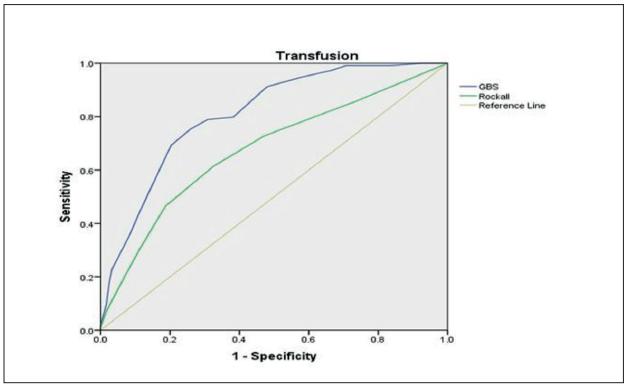

Figure 2. Comparison of the GBS and RS with AUC curves for the prediction of transfusion

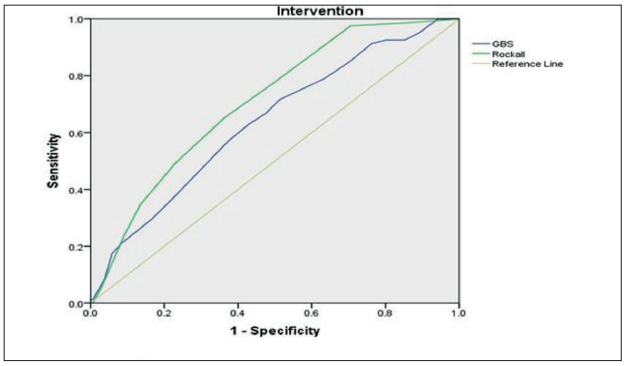

Figure 3. Comparison of the GBS and RS with AUC curves curves curves curves curves for the prediction of intervention

eight had peptic ulcer. Mortality rate was 5.9%, while 114 patients (48.1%) needed transfusion.

Median age in the study group was 60 years (range, 21-83 years). Melena was the main symptom of patients with upper gastrointestinal bleeding (182 patients - 76.79%), hypotension was the second most common symptom verified in 94 patients (39.66%) at the time of presentation to the urgent center. The mean level of hemoglobin was9.4 g/L (range, 3.8-14.9).

Figure 2 presents the comparison of GBS and RS with AUC curves for the prediction of transfusion (GBS 0.810 and RS 0.675). A Glasgow Blatchford score of >6.5 was the optimum threshold to predict the need for transfusion (sensitivity 91.2%, specificity 52%) compared to the Rockal score of >3.5 as the optimum threshold to predict

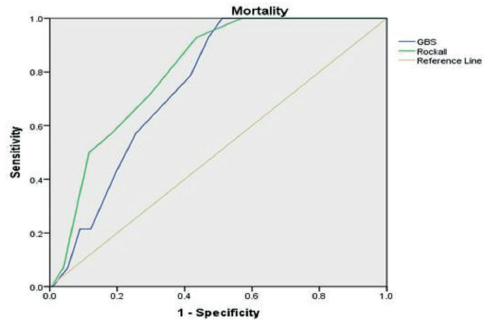

Fig. 4 Comparison of the GBS and RS with AUC curves for the prediction of mortality (GBS 0.750 and RS 0.806). A Glasgow Blatchford score of >9,5 was the optimum treshold to predict the mortality (sensitivity 92,9%, specficity 52,9%) compared to the Rockal score of >4,5 as the optimum treshold to predict the mortality (sensitivity 92,9%, specficity 57,5%).

Figure 4. Comparison of the GBS and RS with AUC curves for the prediction of mortality

the need for transfusion (sensitivity 72.8%, specificity 52.8 %).

Figure 3 displays comparison of the GBS and RS with AUC curves for the prediction of intervention (GBS 0.636 and RS 0.707).A Glasgow Blatchford score of >7.5 was the cutoff to predict endoscopic treatment (sensitivity 71.6%, specificity 48.7%), while the Rockal score of >3.5 was the cutoff for same outcome (sensitivity 77.8%, specificity 50 %).

Figure 4 shows comparison of the GBS and RS with AUC curves for the prediction of mortality (GBS 0.750 and RS 0.806). A Glasgow Blatchford score of >9.5 was the optimum threshold to predict the mortality (sensitivity 92.9%, specificity 52.9%) compared to the Rockal score of >4.5 as the optimum threshold to predict the mortality (sensitivity 92.9%, specificity 57.5%).

For the prediction of mortality, RS (area under the curve AUC 0.806; 95% CI, 0.719-0.892) was superior to GBS (AUC 0.750; 95% CI, 0.662-0.839), p<0.05.

The GBS had a higher accuracy in detecting patients who needed transfusion units (AUC, 0.810; 95% CI, 0.756-0.864) and was superior to the full RS (AUC, 0.675;95% CI, 0.606-0.744), p<0.05.

We calculated the AUCs for predicting the need for intervention. For this outcome, the RS (AUC, 0.707; 95% CI, 0.641-0.774) was superior to the GBS (AUC,0.636; 95% CI, 0.562-0.709), p<0.05.

5. DISCUSSION

Despite advancement in technology, the management of upper gastrointestinal bleeding remains a challenge. By comparing GBS as pre-endoscopy and RS as post-endoscopy score, we tried to investigate the optimal approach to asses the risk ofpatients with upper gastrointestinal bleeding. It is very important for clinicians to identify those at high risk who need endoscopic intervention within 24 hours of admission, in order to hospitalize them in an intensive care unit. If patients can be identified as unlikely to need transfusion or endoscopic intervention, clinicians would be comfortable discharging patients for outpatient management. Management of upper gastrointestinal haemorrhage has a significant impact on resources. The cost of blood transfusion in the management of these patients is significant and misuse of blood products has been documented. The mortality is rarely related to the presence of bleeding but significantly associated with associated comorbidities (7).

According to considerable financial costs of treating upper gastrointestinal bleeding clinicians should think about economic impact of novel and existing interventions for upper gastrointestinal bleeding, as well as length of inpatient stay and need for transfusion (8).

In our study the GBS was superior compared to RS in predicting the need for blood transfusion in hospitalized patients with upper GI hemorrhage and inferior in predicting the need for endoscopic therapy, surgical intervention and death. The results are opposite to the study of Bryant RV and al. where GBS was equivalent to RS in predicting the need for endoscopic therapy, rebleeding and death (9). Robertson M., et al. described AUC for the prediction of mortality 0.76 and 0.78 for GBS and RS respectively, which is in accordance with our results. In this study GBS was superior to all other scores for predicting blood transfusion (10).

In an international multicentric prospective study GBS was the best at predicting intervention (AUC 0.86) compared to RS (AUC 0.70), while RS was superior in predicting mortality (AUC 0.72) compared to GBS (AUC 0.64) (11).In our study GBS had lower accuracy (AUC 0,63) and RS equal accuracy (AUC 0,70) in predicting intervention. Both scores had higher accuracy in predicting mortality (AUC 0.75 for GBS; AUC 0.80 for RS). The cause may be a small sample of patients, as well as the fact that the average age of patients was higher and that the patients had comorbidities and anemia prior to gastrointestinal hemorrhage, which made the score higher in the group of patients without the need for intervention. Only patients having gastroscopy as an emergency procedure were taken in consideration, excluding those with suspected upper gastrointestinal hemorrhage who did not undergo gastroscopy in the first 24h from admission to the hospital. The patients who developed upper gastrointestinal bleeding during hospital stay were excluded from the study. Cheng DW et al. concluded that modified GBS may be easier to use and therefore more easily implemented into routine clinical practice, eliminating the subjective components of the GBS- chronic disease and major comorbidities (12). Despite higher accuracy of GBS in the previously mentioned study, AUC for major endpoints were less than 0.80, presenting their clinical utility for these outcomes limited (11). In the study of Kim MS et al., transfusion was required in 62.3% patients and the AUC values were 0.87 for GBS compared to 0.74 for RS. Endoscopic intervention was required in 58.8% patients, with AUC values 0.61 for GBS and 0.56 for RS (13). In our study, transfusion was required in 48.1% patients with AUC values 0.81 for GBS and 0.67 for RS. Endoscopic intervention was required in 65.4% patients, with AUC values 0.63 for GBS and 0.70 for RS. A study conducted in South Korea showed RS as a useful tool for predicting mortality with AUC 0.79 (14).

In our study, RS was superior to GBS in predicting mortality with AUC 0.80. Death events were rare and occurred in only 14 patients (5.9%).

It has been suggested in some studies that low risk threshold for GBS could be extended from 0 to 2, identifying patients who would not require intervention or die, with a sensitivity of 98.6% (15, 16, 17).In our study 12.3% of patients had a GBS score of 2 or less, compared with 3.8% of patients having a score of 0, which is not negligible, marking thrice the number of patients for outpatient treatment.

An observational study of Yaka E. et al. suggested that patients with a GBS score greater than 12 have decreased mortality if endoscopy is undertaken less than 13 hours after presentation, as well as the fact that a GBS score of 7 or more in combination with other scores have the highest sensitivity and specificity for predicting endoscopic treatment despite low positive predictive value (18). Another study showed lower-risk patients had GBS score < 12 (19). In our study, 68.6% of patients had GBS score 7 or more. The GBS of >7.5 was the cut off to predict endoscopic treatment with sensitivity 71.6%, GBS >6.5 was the optimum threshold to predict the need for transfusion with sensitivity 91.2% and GBS >9.5 was the optimum threshold to predict the mortality with sensitivity of 92.9%.The cutoff values in the earlier mentioned study were GBS>8 in predicting mortality, GBS>11 predicting rebleeding and intervention, and GBS >10 in predicting admission to an intensive care unit (14).

Budimir I. et al. concluded that there is no one 'perfect score' and the best option is to use more than one scoring system concomitantly. RS is the best predictor of mortality and GBS is the best predictor of a need for blood transfusion (20).

Sometimes it is difficult to apply scoring systems by the busy clinician in routine clinical practice due to their complexity and limitations. RS requires endoscopic data for calculation, which is impossible to apply at the time of presentation, while GBS requires data concerning comorbidities and chronic diseases which may lead to overestimation and erroneous stratification of patients. The usefulness of risk scores that require endoscopy is limited because endoscopy is often delayed for up to 24 hours or more, whereas clinicians generally want risk stratification early after presentation.

Our study showed that a GBS of 6.5 or more is accurate at predicting the need for transfusion, compared to an RS of 3.5 or more. Accuracy in predicting the need for intervention and mortality are relatively low in both GBS and RS. A GBS of 2 or less is the optimum threshold for identifying very low-risk patients suitable for outpatient management. This can help in management of very low-risk patients with upper gastrointestinal bleeding, but further studies are required to clarify their role in directing management of higher risk patients.

6. CONCLUSION

Upper gastrointestinal bleeding is one of the most common medical emergencies, with a significant impact on survival. Risk stratification tools such as GBS and RS are developed to help clinicians triage patients appropriately in order to assess endoscopic therapy within a suitable time frame, as well as identify low risk patients for possible outpatient management.

Accuracy of the GBS in predicting need for transfusion is high and represents important endpoint to assess. RS was superior to GBS in predicting need for intervention and mortality. At present, a combination of these scoring systems is the optimal approach to proper assessment and it provides us with significant guidance in emergency treatment.

- **Patients Consent Statement**: The first author confirms that patients consent to enroll in the study was obtained. The authors certify that they have obtained all appropriate patient consent.
- **Author contribution**: The first author I.S. and D.A. have made significant contributions to the design, study design, data collection and analysis. I.S. and M.T. participated in the development of the work and the critical review of the content. Each author gave final approval of the version to be published and they are agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Final proof reading was made by the first author.
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