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Evaluation of the effectiveness of clinical classifications in patients who apply to the emergency department with upper gastrointestinal system bleeding.

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Abstract

Objective: The study was planned to determine the suitability of using Rockall and Blatchford scoring systems in emergency departments by evaluating their success in estimating the need for endoscopy and hospitalization along with mortality possibilities in upper GIS bleedings.

Material and method: Hematemesis, melena, gastrointestinal hemorrhage, hemoptysis, nausea and vomiting, syncope ICD 10 diagnosis codes were entered during the application to the emergency department and 644 patients subject to endoscopy were scanned with 644 patient protocol numbers, 188 patients were included in the study. Rockall and Data about Blatchford scores, patient mortality, hospitalization and discharge were entered into the system. The calculated scores were compared.

Results: The general age average was 65.16 ± 16.61 Rockall score average was calculated as 2.75 ± 1.88, Blatchford score average was calculated as 9.72 ± 3.84. Based on the Rockall scores, 86 (45.7%) of 188 patients were low risk, 102 (54.3%) were high risk; whereas based on the Blatchford scores, 9 (4.8%) of the 188 patients were low risk and 179 (95.2%) were high risk. When the reliabilities of the scores were evaluated, it was determined for the Rockall score that the sensitivity value was 73.9% and the specificity value was 45.6%, whereas sensitivity for the Blatchford score was 96.1%and specificity was 10%.

Conclusion: In conclusion, risk evaluations carried out using laboratory and clinical findings (Rockall, Blatchford) may be used to generate prediction models for defining the hemorrhage risk that is life threatening in patients with upper GIS bleeding. Early and effective evaluation of the patients along with proper medical and support treatment are very important for the prevention of advanced morbidity and mortality that might occur as a result of upper GIS bleeding.

Keywords: Upper GIS bleeding, Rockall scoring, Blatchford scoring, Emergency department.

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Introduction

Upper GIS bleedings comprise an important portion of the patients who apply to the emergency department. Prevalence of upper GIS bleeding is about 40-150 people for every 100,000 people and its mortality rate varies between 6-10% [1,2]. Whereas the ratio of those in the group aged sixty and above among patients who apply to the hospital due to upper GIS bleeding was 10% during the 1920's, this ratio has reached 60% in our day [3-5]. The mortality rates arranged in order are as follows; bleeding esophageal varices, gastric ulcer, duodenal ulcer [6]. The mortality rate of upper GIS bleedings which was 10% has not changed drastically since 1945 despite the discovery of strong anti-secretory drugs and the developments in diagnostic and therapeutic processes. Whereas risk scoring in GIS bleedings is generally based on treatment requirements, some use the mortality and rebleeding probability. Various scorings used for GIS bleedings are Apache, Rockall, SAPS (Simplified Acute Physiology Score), Baylor, Forrest, Blatchford, Child Pugh, MELD (Model for End-Stage Liver Disease), Cedars Sinai. Age, comorbid diseases, existence of shock and endoscopic findings are used in Rockall scoring [7]. It is the most commonly used GIS bleeding scoring today Blatchford risk scoring was prepared in order to put forth whether there is a requirement for the intervention of bleeding control or not [5,8]. Scores of 6 and above indicate that intervention will be required for these patients at a ratio of 50%. In this study, effectiveness was calculated for predicting the mortality probability in upper GIS bleeding by the Rockall and Blatchford scoring systems used frequently in GIS bleeding scoring that depend on clinical and endoscopic parameters.

Material and Method

This retrospective and descriptive study was carried out by the retrospective examination of patients aged above 18 who applied to the Izmir Katip Çelebi University Atatürk Training and Research Hospital Emergency department during 01/08/2013-01/08/2014 with upper GIS bleeding complaints. 644 patients who were admitted to the emergency department, who were defined according to the ICD 10 coding as; K92.0 hemetemesis, K92.1 melena, K92.2 gastrointestinal hemorrhage with diagnosis codes of R04.2 hemoptysis, R11 nausea and bleeding and R55 syncope after which endoscopy was carried out with upper GIS bleeding suspicion. A total of 61 patients with esophageal variceal bleeding, 107 patients with missing vital finding records, 115 patients with unkown comorbid disease history, 129 patients with unquestioned melena or syncope story, 16 patients with suspicious trauma story, and 28 patients under the age of 18 years (total 456 patients) were excluded in the study. 188 patients who meet the criteria were included in the study. A standard data acquisition form was prepared in our study. Protocol numbers, age, gender, vital findings at the time of application (pulse rate, blood pressure), application complaints (melena, syncope), serum hemoglobin (g/dl), urea (mg/dl), the existence of coronary artery disease, liver failure or any other systemic disease, bleeding focus and bleeding finding determined during endoscopy carried out on the patient, Rockall and Blatchford scores, mortality of the patients along with information related with hospitalization or discharge were included in the data acquisition forms.

Data were analyzed into groups for analysis. There were a total of 4 groups for age which started with 18-40 and included the next twenty year age groups respectively; a total of two groups according to gender as female and male and a total of three groups according to the type of outcome as discharge, hospitalization or exitus. The Rockall and Blatchford scores of the patients were calculated. Upper GIS bleeding risk groups were prepared as was put forth by the Rockall score. Accordingly, patients with total Rockall scores between 0-2 were classified as low risk group, patients with total Rockall scores between 3-4 were classified as moderate risk group and patients with Rockall scores of ≥ 5 were classified as high risk group (Table 1) [9]. Whereas in the Blatchford scoring, patients with scores of ≤ 2 comprised the low risk group, patients with scores that vary between 3-5 comprised the moderate and patients with scores of ≥ 6 comprised the high risk group (Table 2) [1]. Blatchford risk score was calculated prior to endoscopy, whereas Rockall risk score was calculated both prior to and after endoscopy. These two scorings were compared with regard to their values of determining mortality risk.

Table 1. *Rockall risk scoring system.*

Parameters	Score
A. Age	
≥ 80	2
60-79	1
<60	0
B. Shock	
Hypotension, systolic blood pressure<100 mmHg	2
Tachycardia, systolic blood pressure ≥ 100 mmHg and pulse 100/min.	1
No shock, systolic blood pressure ≥ 100 mmHg and pulse<100/min.	0
C. Accompanying disease	
Kidney failure, liver failure, common malignity	3
Cardiac failure, ischemic heart disease, no other accompanying disease	2
No major accompanying disease	0
D. Endoscopic diagnosis	
Upper gastrointestinal cancer	2
All other diagnoses	1
No lesion, no new bleeding finding, Mallory-Weisslesion	0
E. Major new bleeding finding	
Blood on the Upper GIS, adherent clot can be observed or spurting bleed	2
Normal or only dark base lesion	0
Score prior to endoscopy: A+B+C.	
Total score: A+B+C+D+E.	
Risk category: high (≥ 5), medium (3-4) and low (0-2)	

Statistical evaluations were carried out using the Statistical Package for the Social Sciences (SPSS) 22.0 software. Using these analyses, the success of risk scoring systems (Rockall and Blatchford) that are frequently used for upper GIS bleedings in determining the need for hospitalization, high risk patient group, low risk patient group as well as estimating in-patient mortality rates along with the factors that were effective on morbidity and mortality were evaluated. SPSS 22.0 software was used for data analysis. Accordance with normal distribution was examined using Kolmogrov Simirnov test for the analysis of quantitative data; parametric methods were used for the analysis of variables with normal distribution, whereas non-parametric methods were used for the analysis of variables without normal distribution. Independent T-test and Mann Whitney U test were used for the comparison of the 2 independent groups. Whereas Pearson Correlation test was used to examine the correlations of quantitative data among each other. Pearson Chi-square and Fisher Exact tests were used for the comparison of categorical data. MedCalc (version 15.4, MedCalc Software, Belgium) software package program was used to obtain receiver operating characteristic (ROC) curve. The utility of the mortality rate was evaluated *via* ROC curves, and the cutoff value was determined. ROC curves were also used to analyse specificity, sensitivity, negative and positive predictive values as well as positive and negative likelihood ratios of Rockall and Blatchford score for death. Quantitative data were expressed in the tables as average ± std.

(standard deviation) and median ± IQR values. Whereas categorical data were represented with n (number) and percentages (%). The data were examined at a reliability level of 95% with p values that are lower than 0.05 accepted as statistically significant.

Table 2. *Blatchford risk scoring system.*

Parameters	Score
A. Blood urea values (mmol/dL)	
≥ 25	6
10-<25	4
8-<10	3
6.5-<8	2
<6.5	0
B. Hemoglobin (g/dL)	
<10.0 for males and females	6
10.0-<12.0 only for males	3
10.0-<12.0 for females,12.0-<13.0 for males	1
≥ 12.0 for females, ≥ 13.0 for males	0
C. Systolic blood pressure (mmHg)	
<90	3
90-99	2
100-109	1
≥ 110	0
D. Other markers	
Cardiac failure	2
Liver disease	2
Presentation with syncope	2
Presentation with melena	1
Pulse ≥ 100/min.	1
Total score: A+B+C+D	
Risk category: high (≥ 6), medium (3-6) and low (<2).	

Results

A total of 120 (63.8%) of our patients were men and 68 (36.2%) were female. The general age average of the cases was determined as 65.16 ± 16.61 (17-92). The age average of females was 68.88 ± 15.29, whereas the age average of males was 62.97 ± 17.02. When the age distributions were examined with regard to gender, it was observed that age was greater in females. When the distribution results of the study were evaluated with regard to age interval, it was determined that 95 (50.6%) of the 188 patients were in the age interval of 61-80. When the complaints of patients who applied to the emergency department were examined, it was observed that 156 (82.9%) applied with melena complaints whereas 6 (3.2%) applied with syncope complaints.

Table 3. *Demographic and characteristic findings of the patients.*

		Frequency	Percentage
Age (years)	18-40	20	10.6
	41-60	40	21.3
	61-80	95	50.6
	>80	33	17.5
Gender	Female	68	36.2
Male	Male	120	63.8
Complaint	Syncope	6	3.2
	Melena	156	83.2
	Hematemesis	16	13.6
Accompanying diseases	Hyper-tension	65	34.6
	CPD	47	25
	DM	41	21.8
	Malignity	22	11.7
	CVE	16	8.5
	CKF	12	6.4
	LF	8	4.3
	Other	156	7.9
Laboratory findings	Hemoglobin	9.02 ± 2.74 (2.6-16.0)	
	Urea	14.02 ± 9.33 (2.49-56.40)	

CAD: Coronary Artery Disease; DM: Diabetes Mellitus; CVE: Cerebrovascular Event; CKF: Chronic Kidney Failure; LF: Liver Failure.

When the vital findings of the patients were examined, it was determined that the average systolic pressure was 118 ± 26 mm/Hg (70-200), diastolic pressure was 68 ± 15 mm/Hg (30-120) and average pulse rate was 93 ± 21 pulses/min (56-165). 130 (69.2%) of the patients had an accompanying or more than one systemic disease. The most commonly observed comorbid disease was hypertension with 65 (34.5%) patients. This was followed by coronary artery disease in 47 (25%) patients, diabetes mellitus in 41 (21.8%) patients, malignity in 22 (11.7%) patients, cerebrovascular disease in 16 (5.2%) patients, chronic kidney failure in 12 (6.4%) patients, liver failure in 8 (4.3%) patients. Upper GIS bleeding was accompanied by asthma, chronic obstructive pulmonary disease, pulmonary emboli, hypothyroidis, peripheric artery disease and other disease in 15 (8%) patients. When the Hb values of the patients in our study were examined, it was determined that the average Hb: 9.02 ± 2.74 (2.6-16.0), urea values: 14.02 ± 9.33 (2.49-56.40) (Table 3). The Rockall score average of the patients was determined as 2.75 ± 1.88, wheras the Blatchford score average was determined as 9.72 ± 3.84.

The hospital mortality of the patients was evaluated in our study and 8 (4.3%) of the patients were exitus. The age average of the exitus patients was determined as 72.25 ± 9.08. The Rockall score average of the exitus patients in our study was 4.38 ± 1.40, the Blatchford score average was 12.87 ± 2.64. When the efficacy of scoring systems in assessing mortality in ROC analysis of patients was examined: AUC: 0.740, p=0.022 for Blatchford Scoring, AUC: 0.7661, p=0.013 for Rockall scoring. When the score averages of the exitus patients were compared with the score averages of the living patients, both scores were determined to be statistically significant (P<0.001) (Table 4). When the Rockall, Blatchford scores and the reliabilities for high risk patient estimation were evaluated; sensitivity value for Rockall score was 73.9% specificity value was 45.6%, positive predictive value was 98.7% and negative predictive value was 100%. The sensitivity value for the Blatchford score was 96.1%, specificity value was 10%, positive predictive value was 100% and negative predictive value was 55.7% (Table 5).

The gender, age, Hb, BUN, existence of syncope, melena, CPD, accompanying disease, pulse rate, tension values were compared one by one with the low and high risk groups defined previously. No statistically significant relationship was observed. The hospital mortality of the patients in our study was evaluated and 8 (4.3%) patients were exitus. The 8 exitus patients were in the high risk group according to Blatchford risk classification. Whereas 7 patients were in the high risk group according to Rockall risk classification, 1 patient was in the low risk group. The sensitivity of Blatchford risk classification was 100%, specificity was 5%; whereas the sensitivity of Rockall risk classification was 87.5%, specificity was 47%.

Table 4. *Relationship between risk scores and mortality.*

	Mortality		P
	EXİTUS (Average ± Sd)	LIVING (Average ± Sd)	
Rockall	4.38 ± 1.40	2.68 ± 1.86	0.000***
Blatchford	12.87 ± 2.64	9.50 ± 3.83	0.000***

Table 5. *Analysis of risk scores-high risk patient group.*

		High risk	Low risk	Total
Glaskow-Blatchford Risk score.	High risk	99	80	179
	Low risk	3	6	9
Rockall score	High risk	55	47	102
	Low risk	47	39	86
Total		102	86	188

Discussion

Upper GIS bleeding comprises an important portion of the patients who apply to the emergency. An annual hospitalization of about 150,000 takes place in the United States of America for the evaluation and treatment of ulcer bleeding [9]. Whereas the mortality rate stayed constant at 10% despite the developing medical approaches and it is prone to be high in elderly patients with accompanying diseases [9]. Even though it is difficult to prove the beneficial effect on mortality, carrying out risk classification especially at the triage phase will enable correct medical decision making, patient treatment as well as development in the course of the disease and the use of resources. When the economical dimensions of medical care are examined, it is no surprise that the interest has increased for the early risk scoring of patients with acute upper GIS bleeding; in this way patients will be evaluated correctly and thus medical care costs will be decreased [5].

The ratios of male and female patients in our study (63.8% and 36.2%) were in accordance with the relevant literature. It is generally accepted that upper GIS bleeding is twice more common in male than in female [5]. The ratios of male and female patients in the study carried out by Stanley et al. with 1555 cases were 62% and 38% respectively [10]. The male-female ratio in the study carried out by I-Chuan et al. on 354 patients with upper GIS bleeding excluding varices was also similar (66.9% and 33.1%) [11]. Male patient ratio in the study carried out by Işık et al. on 134 patients was 64.17%, whereas the female patient ratio was 35.83% which were similar to those of our study [12]. The fact that upper GIS bleeding is more common in males could be related with both the high frequency of comorbid disease and especially with a better gastric mucosal integrity of females during the premenopausal period [13].

Age average was determined as 61.6 ± 16.2 in the study carried out by I-Chuan et al. Age average was similar in the study carried out on 1087 patients by Sandy et al. which evaluated the significance of risk scores in estimating endoscopy requirement (66.9 ± 17.6) [14]. Age average was determined as 64 ± 13 in the study carried out on 282 patients by Daniela et al. [15]. Age average of our study was in accordance with literature (65.16 ± 16.61). Melena was ranked the first among the complaints of the patients in our study (83.2%). In addition, it was observed that 3.2% of the patients applied with syncope complaints. The complaints of our patients at the time of application were in accordance with literature. In the study carried out by Chandra et al. complaints were divided as 70.2%

for melena and 12.3% for syncope [16]. Whereas in the study carried out by Shennak, melena as the only initial symptom was 32%, hematemesis was 21% and both hematemesis and melena was determined as 47% [17]. Melena ratio as application complaint was determined as 70.7% in the study carried out by Daniela et al. [15] whereas the melena ratio in the study carried out by Işık et al. was determined as 76.1% [12].

One of the possible risk factors that affect morbidity and mortality in upper GIS bleedings is the existence of accompanying diseases. Accompanying disease was determined in 69.2% of the patients in our study. Accompanying disease ratios in literature were determined as 58.7% and 68% [18,19]. Accompanying disease ratio was determined as 67.3% in the study carried out on 2332 patients by Rockall et al. [20]. It is observed that the accompanying disease ratios of our study were similar with those in the relevant literature. Hemoglobin value at the time of the arrival of the patient is significant for the follow up, prognosis and treatment of patients with upper GIS bleeding. Hemoglobin value average of the patients when interned was determined as 9.02 ± 2.74 dl/gr and similar results with the literature were obtained. Average admittance hemoglobin value for upper GIS bleedings was determined as 9.5 dl/gr by Fiore et al. whereas the same value was determined as 9.8 dl/gr by Chassaignon et al. as 8.8 dl/gr by Yenigün et al. as 9.9 dl/gr by Göksu et al. and as 9.3 by Kaltar et al. [20-25].

Blatchford carried out 2 studies while developing the risk scoring system. Scoring system in the first study was developed using data acquired from patients who applied to 19 hospitals in Scotland with acute upper GIS bleeding. A logistics regression analysis was developed for treatment requirement using data obtained from 1748 patients. Whereas in the second stage; the reliability of the risk scoring system was tested prospectively with 197 patients who applied consecutively to 3 hospitals in Western Scotland within a period of 3 months with upper GIS bleeding complaints. The reliability of the scoring system was evaluated after which it was compared with Rockall and post-endoscopy scores. This risk scoring system was determined to be 99% sensitive and 32% specific in determining high risk [13]. Whereas it was determined that more than 20% of the patient group were suited to emergency or early discharge without any requirement for endoscopy [26]. Similar to this study, sensitivity of the Blatchford scoring system was determined in our study as 96.1% and its specificity was determined as 10%.

Rockall score was put forth in England during a multi-centered study including 4185 adult patients who applied to 74 hospitals with upper GIS bleeding. The applicability of the scoring system was examined afterwards during a study carried out on a second group of 1625 patients. Even though alternative scoring systems have been developed, Rockall is the only scoring system for which international reliability test has been carried out [9]. It has been defined that the Rockall scoring system can be used to determine which patients are in high risk group and which require close follow-up and which are suited for early discharge. It can define 15% of the patients with low risk of re-bleeding and mortality at the time of admission and 26% after endoscopy [9]. 4% re-bleeding and 0.1% mortality ratios were determined for patients with scores of ≤ 2 according to the Rockall scoring system [27]. Rockall et al. carried out another study after wards on 2531 patients in order to show that patients in the low risk group can be discharged earlier and treated as outpatients. In this study, Rockall risk scoring system was applied on 2531 patients as a result of which it was determined that 744 (29.4%) patients had a risk score of ≤ 2 for which re-bleeding was observed only in 32 (4.3%) and mortality was observed in 1 (0.1%) and it was put forth that the risk score could define patients with low risk in terms of re-bleeding and mortality [28,29]. Similarly of the Rockall classification in our study was high.

Patients with transfusion need, surgical intervention or endoscopic intervention requirement were defined as high risk patients in the study by Chuan et al. and the sufficiency of risk scores for determining these patients was evaluated. Whereas 245 of 246 high risk patients were determined by Blatchford in this study consisting of 354 patients, Pre-Rockall was able to determine 220 of the 246 patients. The sensitivity of Blatchford scoring was determined as 99.6%, specificity was determined as 25% whereas the sensitivity and specificity, of the Pre-Rockall scoring were determined respectively as 90.2% and 38% [28]. Similar to these results, the sensitivity of the Blatchford scoring system in our study was determined as 96.1% but the specificity were determined to be different than those of this study as 10%, respectively. The sensitivity of Rockall scoring system was determined as 73.9%, specificity was determined as 45.6%. Pang et al. carried out a prospective study on 1087 patients in which they evaluated the patient group defined in our study as high risk group requiring endoscopy to evaluate the endoscopic intervention requirement for the Blatchford score and the pre-endoscopic Rockall score and a value of 1 or above was accepted as high risk for both scores. Similar to our study, the sensitivity of the Blatchford score was determined as 100% and its specificity was determined to be similarly low (6.3%) [19]. Whereas Pre-Rockall score was determined to be unsuccessful for distinguishing endoscopic intervention requirement for patients.

Different mortality rates are put forth from different centers for patients with upper GIS bleeding. Mortality rate was determined in our study as 4.3%. Mortality rates in upper GIS bleeding cases are still between 5-15% despite the advancements in medical and endoscopic treatments. Thomopoulos et al. determined the mortality ratio as 5.2%, Paspatis et al. as 5.6%, Okutur et al. as 5.7%, Aksöz et al. as 7.4%, Blatchford et al. as 8.1%, Yenigün et al. as 10.2%, Czernichow et al. as 14.3% [13,23,30-34]. The mortality ratio in our study may be lower in comparison with those of the other studies since we considered the mortality during the time of hospitalization, whereas the other studies considered the mortality for 1 month in general. Both compared scores were determined to be statistically significant on mortality in accordance with literature. When compared with the study

carried out by Chen et al. sensitivities of Blatchford and Rockall scores on mortality were similar. The negative predictive values of the scores were determined to be similar to those of Chen et al. for Blatchford classification. Rockall score was the score with the highest specificity in both our study and that by Chen et al. [14].

There are studies in literature which use risk classification scores for the evaluation of hospitalization indication. It was observed that only 2 patients were discharged during our study. Of these 2 discharged patients 1 was low risk according to Glaskow-Blatchford Risk Classification, Rockall Classification whereas the other was high risk. It has been observed in our hospital that patients who apply to our hospital with upper GIS bleeding suspicion are hospitalized for monitoring purposes.

Limitations

Although it affects mortality rates, unfortunately, our records did not include information on the time of endoscopy. Malignity ratio was high in our study since there is an oncology unit in our hospital; and the long term mortality and morbidity status of these patients could not be evaluated despite their high scores since their follow ups were carried out in other hospitals. Because of that our study population is not represented general population. The limited number of patients in the study and the fact that there is no clinical data (re-bleeding and mortality) for the post-hospitalization period, prevents us from making a clear interpretation regarding the effectiveness and reliability of the risk scores in the long term.

Conclusion

In conclusion, estimation models for defining the life threatening hemorrhage risk can be generated if risk evaluations carried out via endoscopic, laboratory and clinical findings (Rockall, Blatchford) are combined for patients with upper GIS bleeding. The early and effective evaluation of the patients, proper medical and supportive treatment are very important for preventing morbidity and mortality that might occur as a result of upper GIS bleeding.

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