SIGNIFICANCE OF FORREST CLASSIFICATION, ROCKALL'S AND BLATCHFORD'S RISK SCORING SYSTEM IN PREDICTION OF REBLEEDING IN PEPTIC ULCER DISEASE

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Prediction of the risk in patients with upper gastrointestinal bleeding has been the subject of different studies for several decades.

This study showed the significance of Forrest classification, used in initial endoscopic investigation for evaluation of bleeding lesion, for the prediction of rebleeding.

Rockall and Blatchford risk score systems evaluate certain clinical, biochemical and endoscopic variables significant for the prediction of rebleeding as well as the final outcome of disease.

The percentage of rebleeding in the group of studied patients in accordance with Forrest classification showed that the largest number of patients belonged to the FIIb group. The predictive evaluation of initial and definitive Rockall score was significantly associated with percentage of rebleeding, while Blatchfor score had boundary significance. *Acta Medica Medianae 2007;46(4):38-43.*

Key words: *Forrest classification, Rockall score, Blatchford score*

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Introduction

Prediction of the risk in the patients with upper gastrointestinal bleeding has been the subject of study for a several decades. In the United States, more than 500.000 new cases of the peptic ulcer disease have been diagnosed per year, while according to the estimation, around 4 million people have a recurrent form of the peptic ulcer disease (1,2,3). Upper gastrointestinal bleeding represents a common emergency in clinical practice (4) with an incidence of 50-170 per 100 000 people on year basis (5). Bleeding from peptic ulcer occur in 50% up to 70% cases of patients admitted with upper gastrointestinal bleeding (6,7). Acute gastrointestinal bleeding emerges with symptoms of haematemesis or melaena, or with both symptoms. Around 20% patients with peptic ulcer bleeding are admitted in hospital with melaena, 30% have signs of haematemesis, while 50% of patients have both symptoms (8,9). Haematochesis, as a symptom of bleeding from gastric or duodenal ulcer appears in 5% of patients (8,9,10). At least 80%

of cases of upper gastrointestinal bleeding have good prognosis – haemorrhage stops spontaneously, with medicaments therapy only (11). Endoscopic therapy in majority of cases stops active bleeding, but in 10-20% cases after initial haemostasis patients have further bleeding or rebleeding (12). Rebleeding was defined as a new episode of bleeding during hospitalisation, after the initial bleeding had stopped, that manifested as: recent haematemesis, hypotension (systolic pressure lower than 100 – 90 mmHg), tachycardia, (rapid pulse higher than 100 - 110 beats per minute), melaena, transfusions requirement greater than 4 - 5 units and the level of haemoglobin lower than 100 g/l in the first 72[h] from the initial endoscopic treatment (12). Furthermore, recent haematemesis and/or melaena associated with development of shock (pulse faster than 100 beats per minute, systolic blood pressure lower than 100 mmHg), drop of the central venous pressure for the values higher than 5 mmHg, or the reduction of the haemoglobin level for more than 20 g/l for the period longer than 24[h] can also be defined as rebleeding (2). Forrest classification stratify patients with acute upper gastrointestinal bleeding into high- and low-risk categories for mortality. This classification is also significant for the prediction of rebleeding and very often is the method of valuation of the endoscopic intervention modalities (13). Several significant clinical and endoscopic scoring systems have been developed and described in literature

to predict and to stratify patients with upper gastrointestinal bleeding. Scoring system include certain factors of risk such as: age of patients, presence or absence of shock, pulse, comorbidity and initial endoscopic intervention findings during patient's admission (14,15). Rebleeding is considered as independent and the most important negative risk factor for mortality in patients with upper gastrointestinal bleeding, as described in literature. In this case, mortality rate is five times higher (12,13).

Aim

Having on mind significance of the rebleeding in peptic ulcer disease, the aim of this study was to assess the validity of clinical manifestation of bleeding, Forrest classification, initial and definitive Rockall risk scoring system in its occurrence.

Patients and methods

We prospectively studied in total 67 patients who were consecutively admitted with symptoms of acute upper gastrointestinal bleeding. Data were collected using a standard methodological approach – comparison of data provided by farsighted and retrospective analysis of anamnestic and medical data. All patients who developed an acute upper gastrointestinal bleeding were included in the study. They were hospitalized at the Clinic for Gastroenterology and Hepatology, Clinical Centre Nis, in period from January 2003 to March 2006.

Besides collected basic anamnestic data connected with clinical symptoms of the haemorrhage (haematemesis, melaena and syncope), all patients were, in accordance with endoscopic intervention findings, classified into groups according to Forrest classification of the bleeding peptic ulcer. Furthermore, this data were used for the determination of initial and definitive Rockall risk scoring system and Blatchford risk scoring system.

Endoscopic evaluation of the bleeding lesion was determined in accordance with Forrest classification as following: FI – Active bleeding (FIa – arterial, spurting hemorrhage, FIb – oozing hemorrhage), FII – Stigmata of recent haemorrhage (FIIa – Visible vessel, FIIb – Adherent clot, FIIc – Dark base - haematin covered lesion, FIII – Lesions without active bleeding (13).

Table 1. Forrest classification of the bleeding peptic ulcer activity

I : Active bleeding	II : Stigmata of recent haemorrhage	III: Lesions without active bleeding (No signs of recent haemorrhage)
I a: Arterial, Spurting haemorrhage	II a: Visible vessel	
I b: Oozing haemorrhage	II b: Adherent clot	
	II c: Dark base (haematin covered lesion)	

SRH = stigmata of recent hemorrhage
Major SRH = Forrest la, 1b, 2a and 2b
Mild SRH = Forrest 2c and 3

The Rockall risk scoring system was used for prediction of clinical and endoscopic parameters of upper gastrointestinal bleeding (13).

Table 2. The Rockall risk scoring system

The Rockall risk scoring system	
Variable	score
Age (years)	
< 60 years	•
60 – 79 years	•
> 80 years	•
Shock	
Pulse < 100/min STA > 100 mmHg	•
Pulse > 100 /min STA > 100 mmHg	•
Pulse > 100/min STA < 100 mmHg	•
Comorbid conditions	
No major comorbidity	•
Cardiac failure, ischemic heart disease	•
Renal failure, liver failure, disseminated malignancy	•
Diagnosis	
Mallory Weiss tear, no lesion identified and no SRH/blood	•
All other diagnoses	•
Malignancy of upper GI tract	•
Major stigmata of recent hemorrhage	
None or dark spot only	•
Blood in upper GI tract, adherent clot, visible or spurting vessel	•

The Rockall risk scoring system was developed to predict mortality as well as to predict rebleeding.
 It includes the following variables:
• patient's age ,
• presence /absence of shock (TA, pulse)
• coexisting illness (Cardiac failure, ischemic heart disease, renal failure, liver failure, malignancy of upper GI tract, other and disseminated malignancy)
• Endoscopic classification of bleeding (Forrest). (13,18,20,21).

Blatchford risk scoring system was used for prediction of clinical outcome of upper gastrointestinal bleeding, without endoscopic evaluation of bleeding lesion (22).

The risk markers used in Blatchford scoring system are the following:
• increased level of urea in patient's blood,
• decreased level of haemoglobin,
• decreased value of systolic blood pressure,
• rapid pulse,
• melaena,
• syncope,
• significant cardiac and liver failure.

In accordance with clinical parameters that are evaluated in Blatchford risk scoring system, if the score is higher than 5, it is possible to select high risk patients for endoscopic treatment. If the score is lower than 4, there is no indication for an urgent encoscopic treatment (22).

Patients are divided in two groups, depending whether they had rebleeding or not, and furthermore stratified in according to sex.

Table 3. Blatchford risk scoring system

Blatchford scoring system	
Clinical parameter	**score**
level of urea in serum (mol/L)	
• 6,5 - 8.0 • 8,0 – 10,0 • 10,0 – 25,0 • > 25,0	• 2 • 3 • 4 • 6
level of haemoglobin (g/L) m	
• 120 – 130 • 100 – 120 • < 100	• 1 • 3 • 6
level of haemoglobin (g/L) w	
• 100 – 120 • < 100	• 1 • 6
value of systolic blood pressure (mmHg)	
• 100 – 109 • 90 – 99 • <90	• 1 • 2 • 3
Rapid pulse > 100 / minute	• 1
Melaena	• 1
Syncope	• 2
Liver failure	• 2
Cardiac failure	• 2

Data processing was based on standard descriptive statistical methodology (average value, standard deviation and percentage). Student test was used for parametric and Mantzel Haencel test for non-parametric characteristics. Prognostic value of clinical symptoms and clinical risk scores for the rebleeding was determined with Binary logistical regression model. Statistical processing was done in programme Excel 7.0 and SPSS 11.0, Windows 98. All results are presented in the tabular and graphical form.

Results

General characteristics of examined patients with haemorrhage and ulcer are presented in Table 4.

Table4. General characteristics of patients

Sex	N	%	Age (years)	Rebleeding	
				N	%
Women	28	42	69.3±10.6	5	17.8
Men	39	58	66.8±11.7	6	15.3
Total	67	100	67.8±11.3	11	16.5

In total, the study processed 67 patients with ulcer disease, 42 % of which were women and 58% men. Average age of the patients was 67.8±11.3 years; the Student test didn't show a significant difference in age between both sexes. Total number of patients with rebleeding was 16.5% and Mantzel Haencel test didn't show any significant difference in frequency of rebleeding according to sex (Hi=0,2; p=NS).

Importance of the clinical symptoms that occurred in acute ulcer bleeding in connection with latter relapse-rebleeding was examined with

Binary logistical regression. Results are presented in Table 5.

Table 5. Connection of clinical symptoms and occurrence of rebleeding

	B	Wald	df	p.	Exp(B)	95.0% C.I.	
						Lower	Upper
Haemat emesis	-0.082	0.012	1	0.911	0.921	0.218	3.892
Melaena	-0.006	0.006	1	0.995	0.994	0.153	6.455
Syncope	-0.298	0.121	1	0.728	0.742	0.138	3.985

The group significance of this model is very small (Cox & Snell R^2=0.002). In the binary logistic model, it was not possible to find connection between these symptoms and occurrence of rebleeding (Table 5).

The frequency of the mentioned clinical signs related to sex of the examinees is described in Table 6.

Performed Mantzel-Haencel test didn't show any significant difference in the frequency of haematemesis, melaena and syncope in female patients with and without rebleeding compared with the same cases of male patients (Table 6).

Table 6. Clinical manifestation of bleeding according to sex and rebleeding

sex	Haemat emesis	Melaena	syncope
Women with rebleeding	3	4	1
Women without rebleeding	17	17	7
Men with rebleeding	3	5	1
Men without rebleeding	18	28	8
Total	41	54	17

The estimation of the bleeding lesion activity and percentage of rebleeding in studied patients, classified according to Forrest classification is presented in Table 7.

It is evident that the largest number of patients with rebleeding (Table 7) belongs to Forrest IIa classification -30 (44, 78%) patients), while the smallest number of the examined belongs to the Forrest Ia classification-1 (1, 49%) patients). The percentage of rebleeding is the largest in IIb stage -5 (27, 78%) patients), while the smallest number belongs to the Ia, IIc and III stage (0%). The patient with bleeding that corresponds to the FIa activity during initial endocopic findings continued with hospital treatment at the Surgery Clinic.

The predictive valuation of initial and definitive Rockall score, as well as Blatchford score, associated with occurrence of rebleeding was examined by statistical model of binary logical regression. Results are presented in Table 8.

Table 7. Endoscopic findings (Forrest classification) and number of cases of rebleeding

Endoscopic findings (Forrest classification)	Total number of patients (n=67)	Number of rebleeding	Percentage of rebleeding
Forrest Ia (Spurting hemorrhage)	1 (1,49%)	0	0%
Forrest Ib (Oozing hemorrhage)	11 (16,42%)	2	18,18%
Forrest IIa (Visible vessel)	30 (44,78%)	4	13,33%
Forrest IIb (Adherent clot)	18 (26,87%)	5	27,78%
Forrest IIc I III (Dark base, no stigmata of recent haemorrhage)	7 (10,45%)	0	0%

Table 8. Connection of the clinical manifestation of the bleeding and occurrence of rebleeding

	B	Wald	df	p	Exp(B)	95.0% C.I.	
						Lower	Upper
Blatchford	0.311	3.618	1	0.057	1.365	0.991	1.882
Initial Rockall	2.885	3.907	1	0.048	17.899	1.025	312.682
Definitive Rockall	-3.241	5.475	1	0.019	0.039	0.003	0.591

The group significance of this model was quite low (Cox & Snell R2 =0.17). Analysis has shown that Blachfor score demonstrate boundary significance wit occurrence of rebleeding, while initial and definitive Rackall score are significantly connected with occurrence of rebleeding in studied group of patients (p<0.05) (Table 8).

Discussion

Rebleeding is considered the most important risk factor for mortality and causes 5 times higher mortality rate compared with patients with initial bleeding and those in whom bleeding spontaneously stopped (13), described in the literature in 80% of cases (11). Therefore, the prediction of risk in patients with upper gastrointestinal bleeding and early stratification in accordance with clinical symptoms in low and high risk patients for rebleeding or mortality during admission in hospital is very important. Furthermore, this problem demands development of protocols of adequate care for the patients, prevention and resolving of the possible complications (21,22).

Stratification of the patients was based on the scoring system that includes multivariate analysis of information from history, endoscopic investigation, pathological substratum, progression of clinical symptoms or combining of all the abovementioned (13). The upper gastrointestinal bleeding occurs more frequently in men than women (2:1) and this relation increases according to age (23). Our Study processed in total 67 patients with ulcer disease, 42 % of which were women and 58% men. Average age of the patients was 67,8±11,3 years, and the applied Student test didn't show significant age difference between both sexes. Total number of patients with rebleeding was 16.5% and Mantzel Haencel test didn't show any significant difference in frequency of rebleeding according to sex (Hi=0.2, p=NS). The occurrence of bleeding in patients aged over 60

years with serious comorbid conditions represents very high mortality risk in the studied group (24,25). Introduction of the flexible endoscope in the routine clinical practice has shown that endoscopic findings, especially those that indicate stigmata of the recent bleeding in patients during admission in hospital have great importance in prediction of the outcome of bleeding (13). The category stigmata of the recent haemorrhage in the patients with peptic ulcer disease has shown clear relation between stadium of the Forrest scoring system and risk for rebleeding. This risk represents, by itself, an independent factor for prediction of the mortality rate (13,26).

Percentage of the rebleeding occurrence described in the literature, according to stratification based on activity of the bleeding lesion is presented as follows: Forrest I a (80-100%), Forrest I b (75-85%), Forrest II a (50%), Forrest II b (20-30%) and Forrest II c and III (5-10%) (30,31). In the studied groups,the percentage of the rebleeding according to endoscopic findings was in the following range: Forrest I a (0(1)-0%), Forrest I b (2(11)-18,18%), Forrest II a (4(30)-13,33%), Forrest II b (5(18)-27,78%) and Forrest II c and III (0(7)–0%). It is evident that the largest number of patients belongs to the Forest II a classification (30 patients), while the smallest number of patients belongs to the Forest Ia classification (1 patient). Percentage of rebleeding in upper gastrointestinal bleeding is the highest in Ib stadium (27,78%), and the lowest in II c and III (0%). The percentage of rebleeding in FIIb group in our study, compared with cases described in the literature, coincides with percentages worldwide, while smaller percentage of rebleeding in the FIa and Fib groups most probably is connected with relatively small number of patients (27,28). The patients with active bleeding (Forrest Ia and I b) as well as those with visible vessel in the ulceration (Forrest II a), have very high risk of rebleeding

(13,26). Applied endoscopic treatment of the stigmata of recent haemorrhage, as well as their recidivism is essential base of further care treatment (26). The Rockall system, as one of the first and most frequently used scoring system, represents an accurate and valid predictor of rebleeding and death, achieving better results in prediction of mortality (29). Rockall scores are designed to combine information such as the subject's age, occurrence of shock assessed from systolic blood pressure readings and pulse rate, presence and severity of comorbid conditions, diagnosis and endoscopic stigmata of recent bleeding (17,18,30). Original Rockall scoring system was performed on 4200 cases and the discriminative abilities of Rockall scoring system for prediction was evaluated by numerous authors in several studies. Results have shown that cases that belong to the Rockall score 0-3 have low morality risk - 3,2%, while cases from Rockall score 4-7 classification have 22,8% mortality rate (17,18). Doctor Phang et al. have retrospectively assessed initial Rockall score system on 565 cases of acute upper gastrointestinal bleeding in hospitals in New Zealand and results of this study have shown good validity of this scoring system for prediction of mortality (28). Generally accepted conclusion is that the risk scoring system developed by Rockall is clinically useful scoring system for stratifying patients with acute UGIB into high and low risk categories for mortality. For the prediction of rebleeding, however, the performance of this scoring system was unsatisfactory (20).

Vreeburg et al. in his study performed on 1000 cases has concluded that Rockall scoring system didn't show good prediction of rebleeding. Moreover, this prediction very usually have shown overrating values for rebleeding in patients with high score, while in patients with low score this might have led to an underestimation of the occurrence of recidivism (17). Church and Palmer in Edinburgh's Study have presented satisfactory prediction validity of the rebleeding, based on Rockall score system in patients treated with endoscopic haemostasis of bleeding lesion. This classification represents a golden standard in treating upper gastrointestinal bleeding nowadays (20). Some authors have developed alternative scoring systems, led by practical need to estimate and predict necessity of endoscopic or surgical treatment, more that to predict outcome of disease (21). Blatchford has developed his scoring system based on initial Rockall scoring system that partialy overlap with parametaers of initial Rockall scoring system that haven't been evaluated yet by other authors (22). It provides an acceptable tool for clinical decision-making purposes in implementing more expedient care (low risk subjects, without sacrificing outcomes) and more efficient monitoring of high risk individuals, who need urgent treatment (22). Analysis has shown that Blachfor score in our study demonstrate boundary significance with occurrence of rebleeding, while initial and definitive Rackall score are significantly connected with occurrence of rebleeding in studied group of patients (p<0,05).

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PREDIKTIVNI ZNAČAJ FORREST KLASIFIKACIJE, ROCKALL SKORA I BLATCHFORD SKORA ZA POJAVU RECIDIVIRAJUĆEG KRVARENJA KOD ULKUSNE BOLESTI

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Predikcija rizika kod bolesnika sa kliničkom prezentacijom akutnog krvarenja iz proksimalnog segmenta gastrointestinalnog trakta bila je i ostaje predmet istraživanja više decenija.Radom se prikazuje prediktivni značaj Forrest-ove klasifikacije, kojom se pri inicijalnoj endoskopiji ocenjuje aktivnost krvarenja za pojavu recidiva krvarenja. Stavljanjem u odnos određenih kliničkih, biohemijskih i endoskopskih parametara, dobijaju se Rockall i Blatchford rizik skorovi, kojima se vrši predikcija recidiva krvarenja, kao i konačan ishod bolesti.

Procenat recidiva u ispitanoj grupi bolesnika u odnosu na Forrest klasifikaciju pokazao je najveću stopu u grupi FIIb. Inicijalni i definitivni Rockall skor pokazali su značajnu povezanost sa procentom recidiva, dok je Blatchford-ov skor imao graničnu značajnost.
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Ključne reči : *Forrest klassification, Rockall score, Blatchford score*