

Use of the Complete Rockall Score and the Forrest Classification to Assess Outcome in Patients with Non-variceal Upper Gastrointestinal Bleeding Subject to After-hours Endoscopy: A Retrospective Cohort Study

A Giese^{1,2}, C Grunwald², J Zieren³, NJ Büchner⁴, BF Henning²

ABSTRACT

Objectives: To evaluate the usefulness of the Forrest classification and the complete Rockall score with customary cut-off values for assessing the risk of adverse events in patients with upper gastrointestinal bleeding (UGI-B) subject to after-hours emergency oesophago-gastro-duodenoscopy (E-EGD) within six hours after admission.

Methods: The medical records of patients with non-variceal UGI-B proven by after-hours endoscopy were analysed. For 'high risk' situations (Forrest stage Ia–IIb/complete Rockall score > 2), univariate analysis was conducted to evaluate odds ratio for reaching the study endpoints (30-day and one-year mortality, re-bleeding, hospital stay ≥ 3 days).

Results: During the study period (75 months), 86 cases (85 patients) met the inclusion criteria. Patients' age was 66.36 ± 14.38 years; 60.5% were male. Mean duration of hospital stay was 15.21 ± 19.24 days. Mortality rate was 16.7% (30 days) and 32.9% (one year); 14% of patients re-bled. Univariate analysis of post-endoscopic Rockall score ≥ 2 showed an odds ratio of 6.09 for death within 30 days ($p = 0.04$). No other significant correlations were found.

Conclusion: In patients with UGI-B subject to after-hours endoscopy, a 'high-risk' Rockall score permits an estimation of the risk of death within 30 days but not of re-bleeding. A 'high-risk' Forrest score is not significantly associated with the study endpoints.

Keywords: After-hours care, digestive system, haemorrhage, risk scoring systems, upper gastrointestinal tract

El Uso de la Puntuación de Rockall Completa y la Clasificación de Forrest para Evaluar Resultados en Pacientes con Hemorragia Gastrointestinal Alta No Varicosa Sometidos a Endoscopia de Urgencia: Un Estudio de Cohorte Retrospectivo

A Giese^{1,2}, C Grunwald², J Zieren³, NJ Büchner⁴, BF Henning²

RESUMEN

Objetivos: Evaluar la utilidad de la clasificación de Forrest y la puntuación de Rockall completa con los valores límites habituales a fin de evaluar el riesgo de eventos adversos en los pacientes con hemorragia gastrointestinal alta (HGIA) sometidos a una esofagogastroduodenoscopia (EGD) de urgencia dentro de seis horas después del ingreso.

Métodos: Se analizaron las historias clínicas de pacientes con HGIA de origen no varicoso comprobada por endoscopia de urgencia. Para las situaciones de 'alto riesgo' (etapa Forrest Ia–IIb/puntuación de Rockall completa > 2), se realizó un análisis univariado para evaluar las probabilidades de riesgo (odds-ratio) y llegar a los criterios de valoración del estudio (mortalidad de 30 días y un año, resangrado, estancia hospitalaria ≥ 3 días).

Resultados: Durante el periodo de estudio (75 meses), 86 casos (85 pacientes) cumplieron los criterios de inclusión. La edad de los pacientes fue de 66.36 ± 14.38 años; 60.5% eran varones. La duración promedio de estancia hospitalaria fue de 15.21 ± 19.24 días. La tasa de mortalidad fue de 16.7% (30 días)

From: ¹Department of Internal Medicine I, St Josef-Hospital, Medical Centre of the Ruhr-University Bochum, Bochum, Germany, ²Department of Internal Medicine I, ³Department of Surgery and ⁴Department of Internal Medicine I, Pulmonology Unit, Marienhospital Herne, Medical Centre of the Ruhr-University Bochum, Herne, Germany.

Correspondence: Dr A Giese, Department of Internal Medicine I, St Josef-Hospital, Medical Centre of the Ruhr-University Bochum, Gudrunstraße 56, 44791 Bochum, Germany. E-mail: arnd.giese@rub.de

y 32.9% (1 año); el 14% de los pacientes volvió a tener sangramiento. El análisis univariado de la puntuación Rockall postendoscópica ≥ 2 mostró un odds-ratio de 6.09 por muerte en 30 días ($p = 0.04$). No se encontraron otras correlaciones significativas.

Conclusión: En pacientes con HGIA sometidos a endoscopia de urgencia, una puntuación Rockall de 'alto riesgo' permite una estimación del riesgo de muerte dentro de 30 días, pero no de resangrado. Una puntuación Forrest de 'alto riesgo' no es significativa con respecto a los criterios de valoración del estudio.

Palabras claves: Atención de urgencia, sistema digestivo, hemorragia, sistemas de puntuación de riesgo, tracto gastrointestinal superior

West Indian Med J 2014; 63 (1): 30

INTRODUCTION

Current guidelines recommend discharge of patients with acute ulcer bleeding at low risk of re-bleeding (1). Different scoring systems are used for triage in upper gastrointestinal bleeding [UGI-B] (2).

The Rockall score incorporates clinical and endoscopic findings. It may identify patients at low risk of re-bleeding or death [complete Rockall score ≤ 2] (3) or be used to detect patients in need of clinical intervention (4).

The Forrest classification describes severity of UGI-B at endoscopy (5). Clinically stable patients with a Forrest IIb or III situation might be discharged safely (6). Class IIb and III stigmata may predict a lower risk of re-bleeding (7).

There is evidence that patients admitted outside regular working hours for UGI-B are more critically ill, have longer delays to endoscopy (8) and an increased mortality (9). In the past, we have therefore studied patients subject to after-hours endoscopy (10). In contrast to previous findings (11), the presence of an active UGI-B at emergency oesophago-gastro-duodenoscopy (E-EGD) could not be reliably predicted by using pre-endoscopic variables in our patient population (12). It is unknown whether endoscopic information allows a more precise triage of after-hours patients with UGI-B.

This study examines whether endoscopic information alone (Forrest classification) or a combination of endoscopic and clinical information (Rockall score) can predict outcome in patients with non-variceal UGI-B subject to an emergency endoscopy outside regular working hours.

SUBJECTS AND METHODS

During 75 months (2003–2009), consecutive emergency endoscopies performed outside regular working hours at our acute care university hospital (575 beds; catchment population: 100 000 people) in Germany were prospectively recorded (10). Regular working hours were Monday to Friday from 8 am until 6 pm. The medical records of patients who were subject to an emergency E-EGD within six hours after admission were retrospectively analysed. Patients could be counted more than once. Patients who had already been hospitalized at the time of first symptoms of bleeding were excluded since previous studies had reported an elevated mortality for this group compared to emergency admissions for UGI-B (13). Patients

with variceal UGI-B were excluded since outcome related to this pathology is largely defined by an underlying hepatic disease and therefore differs substantially from that of non-variceal haemorrhage. Demographic and clinical information was drawn from the medical records.

Data concerning mortality were in some cases obtained from the patients' general practitioner or from the residents' registration office. For every E-EGD, a standardized written report was available containing detailed information on the endoscopic findings including the severity of bleeding according to the Forrest classification (5). A Forrest class of Ia, Ib, IIa or IIb at endoscopy was defined as a 'high risk' as previously recommended (2, 7). The complete Rockall score was calculated (3). A Rockall score > 2 was used to define 'high risk'. Mortality was defined as all cause mortality during the mentioned period (30 days, one year). Re-bleeding was defined as further haematemesis or melaena with signs of haemodynamic instability such as a rise in heart rate, fall in blood pressure or fall in haemoglobin concentration during the same hospital stay. Melaena without haemodynamic instability was not considered as re-bleeding. To differentiate between severely ill patients and those who might have benefited from an early discharge, we assumed that patients with a hospital stay ≥ 3 days would not have been suitable for an early discharge. Simple logistic regression analysis was used to estimate the odds of the 'high risk' scores (Forrest, Rockall) by outcome. Analyses were conducted using SPSS (version 19.0.0; SPSS Inc., Chicago, USA). The study was approved by the ethics committee of the Ruhr-University Bochum.

RESULTS

During the study period, 228 E-EGD were performed outside regular working hours. Of these, 195 were triggered by the suspicion of a UGI-B. We excluded 84 endoscopic examinations as the patients concerned had already been hospitalized at the onset of first symptoms of bleeding. Thirteen patients with variceal bleeding and 13 patients without evidence of UGI-B at endoscopy were excluded. Therefore 86 cases (85 patients) were included in the study. One patient was examined twice during the study period. Table 1 shows the patients' characteristics, while Table 2 shows the sites of haemorrhage identified in the 86 admissions included in our study. In 13 cases

Table 1: Patients' characteristics

Characteristic	Number of cases (%)
Men	52 (60.5)
Age (years)	
< 60	24 (27.9)
60–79	49 (57)
≥ 80	13 (15.1)
Medical history	
Recent use of one or more anticoagulative agents*	38 (51.8)
Recent use of NSAID	12 (14.6)
Ischaemic heart disease	27 (31.8)
Congestive heart failure	9 (10.6)
Renal failure	33 (38.8)
Liver failure	1 (1.2)
Malignancy and/or cirrhosis	19 (22.1)
Clinical findings	
Systolic blood pressure ≥ 100 mmHg	65 (75.6)
Pulse ≤ 100/minute	54 (62.8)
Mortality	
Death within 30 days*	14 (16.7)
Death within 1 year*	27 (32.9)
Re-bleeding	12 (14)
Length of hospital stay (days; mean ± SD)	15.21 ± 19.24

*Anticoagulative agents: aspirin and/or clopidogrel and/or vitamin K – antagonists. *Data available for 84 cases.

•Data available for 82 cases. NSAID: non-steroidal anti-inflammatory drug, SD: standard deviation

(15.1%), endoscopy revealed signs of recent upper gastrointestinal haemorrhage (blood or coffee ground material) but could not detect an active or inactive localized source of bleeding.

Tables 3 and 4 show the results of the univariate analyses of a 'high risk' Forrest score (Ia–IIb) and a post-endoscopic Rockall score of > 2, respectively for reaching the study endpoints (30-day mortality, one-year mortality, re-bleeding, length of hospital stay ≥ 3 days). A complete Rockall score of > 2 was associated with a significant, six-fold increased risk of

Table 2: Site of haemorrhage

Site of haemorrhage	Number of cases (%)
Oesophagus	
Gastro-oesophageal reflux disease	6 (7)
Lower pharynx and upper oesophagus	2 (2.3)
Tubular oesophagus	1 (1.2)
Gastro-oesophageal junction	
Mallory-Weiss tear	13 (15.1)
Hiatal hernia	2 (2.3)
Other cause	1 (1.2)
Corpus of stomach	
Diffuse haemorrhage of gastric mucosa	4 (4.7)
Gastro-duodenal anastomosis	4 (4.7)
Ulcer of corpus of stomach	3 (3.5)
Upside-down stomach	1 (1.2)
Pyloric antrum of stomach	
Ulcer	7 (8.1)
Other cause	1 (1.2)
Duodenum	
Ulcer of duodenal bulb	23 (26.7)
Ulcer of descending duodenum	2 (2.3)
Duodenal bulb other than ulcer	1 (1.2)
Descending duodenum other than ulcer	1 (1.2)
Major duodenal papilla	1 (1.2)
Other	
Signs of recent upper gastrointestinal haemorrhage without a focal or localized source of haemorrhage	13 (15.1)

30-day mortality (odds ratio: 6.09, 95% confidence interval: 1.09, 34.11, $p = 0.04$). Because some of the patients had moved to an unknown address, it was impossible to obtain data concerning mortality for two patients for 30-day mortality and for four patients for one-year mortality. Data do not include the cause of death.

Table 3: Univariate analysis of a Forrest score of Ia–IIb for reaching the study endpoints

Number of patients*	Study endpoint	Yes n (%)	No n (%)	Odds ratio	95% CI	p-value
84	Death within 30 days after admission	8 (17.8)	37 (82.2)	0.841	0.264, 2.677	0.769
82	Death within 1 year after admission	15 (34.9)	28 (65.1)	0.830	0.329, 2.092	0.692
86	Re-bleeding	10 (21.7)	36 (78.3)	0.189	0.39, 0.925	0.40
86	Length of hospital stay ≥ 3 days	38 (82.6)	8 (17.4)	4.0	0.797, 20.080	0.92

* The number of patients analysed varies as data for 30-day and 1-year mortality were not available for all patients.

Table 4: Univariate analysis of a post-endoscopic Rockall score of > 2 for reaching the study endpoints

Number of patients*	Study endpoint	Yes n (%)	No n (%)	Odds ratio	95% CI	p-value
84	Death within 30 days after admission	11 (14.1)	67 (85.9)	6.091	1.088, 34.105	0.040
82	Death within 1 year after admission	24 (31.6)	52 (68.4)	2.167	0.407, 11.53	0.365
86	Re-bleeding	11 (13.75)	69 (86.25)	1.255	0.134, 11.778	0.843
86	Length of hospital stay ≥ 3 days	72 (90)	8 (10)	0.22	0.37, 1.410	0.11

* The number of patients analysed varies as data for 30-day and 1-year mortality were not available for all patients.

DISCUSSION

In the present study, a complete Rockall score of > 2 shows an odds ratio of 6.09 for death within 30 days after admission for UGI-B ($p = 0.04$). This is consistent with previously published data showing that the complete Rockall score is useful for the prediction of mortality but not for re-bleeding (14, 15). Others have found the complete Rockall score to be predictive for re-bleeding and mortality (3) and to be able to identify a group of patients at low-risk for re-bleeding and mortality [Rockall score ≤ 2] (16). In contrast to these results, the complete Rockall score may be predictive for re-bleeding but not mortality in UGI-B from peptic ulcers (17). In our patient population, a complete Rockall score of ≤ 2 predicts 30-day mortality with a sensitivity of 78.6% and a specificity of 4.3%. If we had used a complete Rockall score of ≤ 2 as an indicator for safe early discharge, we would have sent six patients (7.1% of all patients) home. Three of those patients died within 30 days. Mortality in this 'low-risk' group was therefore as high as 50%. Unfortunately, our data do not include the cause of death.

In the present study, 'high-risk' endoscopic stigmata of UGI-B according to Forrest (Ia, Ib, IIa, IIb) were not predictive of a higher risk of mortality, for re-bleeding or for a hospital stay ≥ 3 days. These data contrast to previous studies. Early discharge might be safe and cost-effective in haemodynamically stable patients with 'low risk' endoscopic stigmata [Forrest IIc or III, Mallory-Weiss tear or other benign findings] (6). In ulcer bleedings, there was a marked increase in the rate of re-bleeding, need for surgery and mortality, if a haemorrhage was classified as more severe than Forrest IIc or III (7). A possible explanation why 'high-risk' Forrest stages are not predictive for mortality, re-bleeding and length of stay in the present study might be the very early timing of endoscopy.

In patients presenting with haematemesis, Forrest *et al* found signs of active or recent haemorrhage in 71% of patients if endoscopy was performed within 48 hours but only in 37% in a later endoscopy (5). In the present study, in which endoscopy was done within six hours after admission, more severe haemorrhage might have been detected than studies with longer delays. Another reason for diverging results might be that the present study included only endoscopic evaluations that took place outside regular working hours. Patients examined outside regular working hours tend to be more critically ill (8) and have a higher mortality (9) than those examined during working hours on weekdays.

The retrospective design of the present study is more vulnerable to bias compared to a prospective approach.

Current guidelines and algorithms recommend that medical, social and local factors be taken into account, in addition to endoscopic information, when deciding which patient might be suitable for early discharge (1, 18). Our data show that only relying on the endoscopic judgement of severity of bleeding is not sufficient. Future prospective studies should take into account the timing of endoscopy.

In conclusion, the Forrest classification and the complete Rockall score were retrospectively studied in 86 cases (85 patients) with UGI-B, outside regular working hours, proven by endoscopy. 'High risk' scores (Forrest Ia–IIb or Rockall > 2) were tested with regard to their ability to predict patient outcome (30-day and one-year mortality, re-bleeding and hospital stay ≥ 3 days). A complete Rockall score of > 2 was associated with a significant, six-fold increased risk of 30-day mortality (odds ratio: 6.09, 95% confidence interval: 1.09, 34.11, $p = 0.04$). No other significant correlations were found for the situations and endpoints analysed. In the recent study, the Forrest classification did not permit prediction of the risk of re-bleeding.

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