

Predictors of Emergency Blood Transfusion in Esophageal Variceal Bleeding

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Abstract

Objective: Esophageal variceal bleeding is the most important and common complication of cirrhosis. Predicting the indication of emergency transfusion in patients with esophageal variceal hemorrhage is controversial. The aim of this study is to identify predictors of emergency transfusion by comparing the differences in demographic characteristics, vital signs, complete blood count, biochemistry, Partial thromboplastin time values, use of medication, and the insertion of nasogastric tubes in transfused and non-transfused esophageal variceal bleeding patients.

Material and Methods: The files of 51 esophageal variceal bleeding patients admitted to the emergency department between 2000 and 2009 were reviewed retrospectively. Vital signs of the patients, whole blood counts, biochemistry, PTT, INR values, emergency department blood transfusion, medications, and mortalities were recorded. Data were analyzed with SPSS version 17.0. Categorical variables were analyzed with chi-square test, and nonparametric data were analyzed with Mann-Whitney U-test.

Results: The incidence of transfusion was significantly higher ($p=0.02$) in patients with a decreased albumin/globulin ratio. Patients requiring emergency transfusion had significant tachycardia ($p=0.016$). Age ($p=0.026$) and hematocrit value ($p=0.00001$) also predicted the need for emergency transfusion.

Conclusion: Low albumin/globulin ratio, tachycardia, and age over 60 in patients with esophageal variceal hemorrhage predict the indication of emergency transfusion. (*JAEM 2014; 13: 45-8*)

Key words: Albumin, esophageal varices, hemorrhage

Introduction

Esophageal variceal bleeding (OVB) is a common and very important complication of cirrhosis. Mortality of variceal bleeding has decreased from 40% to 20% in the past 20 years. OVB is a disease that should be followed in intensive care units; so, if the conditions are not suitable, the patient should be transferred to a suitable center (1). Because of the lack of gastroenterology units in hospitals, it is usually hard to transfer these patients to suitable clinics. Correct and prompt blood transfusion can decrease the mortality of OVB (1-3). The indications of blood transfusion in OVB cases are the same as in other bleeding patients. We have not found any studies on the predictors of immediate blood transfusion need in OVB patients in the literature. The studies on the subject are usually on predictive factors that influence 6-week survival (1-3).

The aim of this study is to compare patients with OVB who underwent blood transfusion and who did not according to demographic properties, vital signs, complete blood counts, biochemical profiles, prothrombin times, the medications they took, and nasogastric tube insertion and define the predictors of emergency blood transfusion.

Material and Methods

The patients who were admitted to our emergency department with the diagnosis of upper gastrointestinal bleeding between the years 2000 and 2009 were retrospectively screened. Among them, patients with OVB constituted our study group. Data were collected from the patient files and computer records. The emergency blood transfusion need was accepted as having a blood transfusion in the first 4 hours after admission to the emergency department.

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Table 1. The differences between transfused and non-transfused groups

	Mean	Std. deviation	Minimum	Maximum	Grouped Median
Transfused patients					
Age	62.03	16.366	19	86	64.25
Time before admission	16.55	19.789	2	72	10.29
Heart rate	106.94	19.676	80	140	104
Respiratory rate	18.87	6.438	0	36	17.67
Systolic blood pressure	105	23.13	50	160	106
Diastolic blood pressure	63.55	18.175	20	100	63.85
Hematocrit	21.29	6.477	10	45	20.4
Time before endoscopy	33.42	23.867	2	96	27
Non-transfused patients					
Age	47.7	21.29	18	80	53
Time before admission	43.2	70.2	2	240	13.5
Heart rate	93.45	11.714	80	120	89.67
Respiratory rate	17.05	4.407	12	30	15.4
Systolic blood pressure	118	30.018	80	190	109
Diastolic blood pressure	69.75	14.553	40	100	69
Hematocrit	28.1	4.077	20	37	28.33
Time before endoscopy	20.63	12.997	2	48	19.5

The vital signs, blood counts, biochemical profiles, prothrombin times, international normalization ratio (INR) values, transfusions in the emergency department, medications, and mortalities of the patients were compared.

Statistical Analysis

Data were analyzed with Statistical Package for Social Sciences 17.0 (SPSS Inc., Chicago, IL, USA). Chi-square test was used for univariate analysis of categorical variables. For the non-parametric variables, Mann-Whitney U-test was used. $p < 0.05$ was accepted as significant.

Results

From the 350 patients who were diagnosed with upper gastrointestinal bleeding and hospitalized, 54 patients had OVB. Three patients were excluded because of incomplete work-up; 51 patients were included in the study.

Mean age of the patients was 56.4 ± 19.5 (range 16-86). The patients who underwent emergency blood transfusion had a mean age of 62 ± 16.3 , while the non-transfused ones had a mean age of 47.7 ± 21.2 . Patients who received blood transfusion in the emergency department were significantly older than the non-transfused group ($p = 0.026$).

The systolic and diastolic blood pressures were not significantly different from each other (Table 1). The mean heart rate of patients who had transfusions was 106.94 ± 19.67 , while it was 93.45 ± 11.71 for the other group. The patients who had transfusions were relatively tachycardic ($p = 0.016$).

The time spent in the emergency room did not change significantly among the two groups ($p = 0.194$). The patients receiving blood transfusions did not receive earlier endoscopies (Table 1).

The patients receiving emergency blood transfusions had a mean hematocrit value of 21.2 ± 6.4 , whereas the non-transfused pa-

tients' mean hematocrit was 28.1 ± 4.0 . This revealed that the patients in need of transfusions have a significantly lower hematocrit level ($p = 0.00001$).

There was no statistically significant difference in prothrombin times of the transfused and non-transfused patients ($p = 0.038$). While 56.8% of all patients with OVB had an albumin/globulin ratio lower than 1, 22 of 31 transfused patients (70%) had an albumin/globulin ratio lower than 1 (Table 2). There was a significantly larger number of patients with low albumin/globulin ratios in the transfused group ($p = 0.02$).

No statistically significant differences in additional chronic diseases, peptic ulcers, or upper gastrointestinal bleeding history because of a different etiology between two groups were revealed (Table 2).

The two groups did not have meaningful differences in the use of medications, like beta-blockers, warfarin, nonsteroidal anti-inflammatory drugs (NSAIDs), or aspirin (Table 2).

The application of nasogastric tubes and gastric lavage was not helpful in predicting the need for transfusion ($p = 0.635$). The mortality of OVB was 13.7% for all OVB patients (7 of 51 patients).

Discussion

The most serious complications of cirrhosis are hepatic encephalopathy due to portal hypertension, ascites, and OVB (4). OVB is an important cause of mortality in cirrhosis (4). The advancements in the diagnostic and therapeutic era in the last 20 years have significantly decreased the mortality of OVB (4). In our study, we found a mortality rate of 13.7%, which is similar to recent studies (1). In a study from Egypt, the mortality rates were 23.8% in patients older than 60 years of age and 10% in patients younger than 60. The mean age of the patients in our study was similar to this study. The transfused patients had a mean age of 62 ± 16.36 and were significantly older than non-transfused patients. Age was a significant predictor of emergency transfusion need in our study ($p = 0.026$).

Table 2. The differences between transfused and non-transfused groups

	Nontransfused	Transfused	Total	p value
Ulcer history	5	7	12	0.99
Non-OVB upper GIS bleeding history	1	4	5	0.636
Comorbidities	3	8	11	0.493
Splenomegaly	5	5	10	0.486
High PTT and INR	9	19	28	0.388
Albumin/Globulin	7	22	29	0.02
Beta blocker use	3	5	8	0.99
Warfarin use	1	5	6	0.384
NSAID use	5	9	14	0.99
Aspirin use	4	5	9	0.724
Nazogastrik insertion	19	30	49	0.635
Endoscopic management of varices	4	6	10	0.99

Fifty percent of cirrhosis patients have esophageal varices. Varices appear in 5% of patients without them every year. Twenty-five percent of these varices bleed in the next 2 years (4-6). OVB patients are usually admitted to emergency clinics. Proper management of this disease in the emergency room can save lives. Emergency blood transfusions can be important in the management of OVB and can reduce mortality (3). The follow-up of OVB requires intensive care conditions (6). It is necessary to take precautions against hypovolemia and bacterial infections and watch out for renal failure in order to treat OVB properly in the emergency room (6). Specific hemostatic management is to stop bleeding and prevent rebleeding (4). Emergency service doctors have difficulties in meeting the needs of transfusion in this time-consuming period.

Blood transfusions, saline solutions, and plasma volume expanders should be used in order to keep hemoglobin values over 8 g/dl (3). Hypovolemia should be avoided to not cause complications, like renal dysfunction (3). The adjustments should be made carefully. Over-resuscitation can increase the portal pressure and increase bleeding. In our study, the systolic and diastolic blood pressure was not different in the transfused and non-transfused groups. There was no significant difference in the respiratory rates. Heart rate, which is another vital sign, was significantly higher in patients requiring blood transfusions. Considering the medical conditions of the patients and their medications, the vital signs cannot clearly show the need of transfusion. This leads emergency doctors to base the decision of blood transfusion predominantly on hemoglobin/hematocrit values (3, 7). Hematocrit values can be misleadingly high in the first hours of bleeding. In our study, the hematocrit levels of patients who required blood transfusions were significantly lower ($p=0.00001$). The average time spent before being referred to a hospital was about 16 hours. This might be the reason why the hematocrit was so accurate. In earlier admissions, hematocrit might still be misleading.

The higher levels of prothrombin times and INR values may theoretically increase the need of blood transfusions due to alterations in the hemostatic pathways. The studies on this subject reveal different outcomes (8). The higher PTT and INR values have not increased the need for emergency blood transfusions in our study. Ascites ($p=0.451$), high PTT ($p=0.388$), and high bilirubin levels ($p=0.451$), which are the Child-Pugh criteria, have not predicted the need for blood transfusions (9,10).

Low albumin/globulin ratio is a classical hallmark related to cirrhosis (4-6). In our study, 70% of the transfused patients had low ratios. The patients with lower albumin/globulin ratios were the ones with higher Child-Pugh scores. The severity of liver disease (especially, Child-Pugh class C) is the major and constant prognostic factor for early mortality (4-6).

In these patients, poor prognosis should be expected. In our study, low albumin/globulin ratio was a predictor for emergency transfusion need.

Using warfarin, acetylsalicylic acid, beta-blockers, or NSAIDs did not increase the need of blood transfusions in our study. Using NSAIDs increases variceal and non-variceal upper gastrointestinal bleeding by 2-fold (11). Similarly, diagnostic or therapeutic nasogastric tube insertion has not predicted the need for blood transfusion. A recent study reveals that nasogastric tube insertion and lavage do not have any benefits in upper gastrointestinal bleeding (12).

In our study, none of the OVB patients admitted to the emergency room was treated with ceftriaxone. Recent studies reveal that this could decrease the mortality (6). Including ceftriaxone to OVB emergency treatment might decrease the mortality.

Our study had several limitations due to the retrospective design, the possible effects of the excluded patients, and the small number of patients. Our findings should be confirmed by further prospective studies.

Conclusion

Among esophageal variceal bleeding patients, those who are older than 60 years of age and tachycardic and have an albumin/globulin ratio lower than 1 are more likely to need blood transfusions.

Ethics Committee Approval: Due to the retrospective nature of this study, ethics committee approval was waived.

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References

1. García-Pagán JC, Reverter E, Abraldes JG, Bosch J, Acute Variceal Bleeding. *Semin Respir Crit Care Med* 2012; 33: 46-54. [\[CrossRef\]](#)
2. Köseoğlu Z, Kara B, Akın MS, Canataroğlu A, Açıkalın A, Ünal İ. Evaluation of 364 Cases with Non-Variceal Gastrointestinal System Bleeding. *JAEM* 2011; 10: 165-70.
3. Balderas V, Bhore R, Lara LF, Spesivtseva J, Rockey DC. The Hematocrit Level in Upper Gastrointestinal Hemorrhage: Safety of Endoscopy and Outcomes. *Am J Med* 2011; 124: 970-6. [\[CrossRef\]](#)
4. Augustin S, González A, Genescà J. Acute esophageal variceal bleeding: Current strategies and new perspectives. *World J Hepatol* 2010; 2: 261-74. [\[CrossRef\]](#)
5. Gado AS, Ebeid BA, Abdelmohsen AM, Axon AT. Clinical outcome of acute upper gastrointestinal hemorrhage among patients admitted to a government hospital in Egypt. *Saudi J Gastroenterol* 2012; 18: 34-9. [\[CrossRef\]](#)
6. Villanueva C, Balanzo J. Variceal Bleeding Pharmacological Treatment and Prophylactic Strategies. *Drugs* 2008; 68: 2303-24. [\[CrossRef\]](#)
7. Altıntop L, Bektaş A, Narğis C, Güven H, Doğanay Z, Aygün D, ve ark. Ondokuz Mayıs Üniversitesi Tıp Fakültesi Hastanesi Acil Tıp Anabilim Dalına Gelen Gastrointestinal Sistem Kanamalı Hastaların Değerlendirilmesi. *JAEM* 2003; 1: 21-2.
8. Günay N, Yıldırım C, Zengin S, Köse B, Çavdar M, Hocagil H, ve ark. Acilservise Başvuran Üst Gastrointestinal Sistem Kanamalı Hastalar için, Bazı Zaman Değerlerinin Prospektif Olarak Saptanması. *JAEM* 2006; 4: 17-20.
9. Child CG, Turcotte JG. Surgery and portal hypertension. In: *The liver and portal hypertension*. Edited by CG Child. Philadelphia: Saunders 1964: 50-64.
10. Pugh RN, Murray-Lyon IM, Dawson JL, Pietroni MC, Williams R. Transection of the oesophagus for bleeding oesophageal varices. *Br J Surg* 1973; 60: 646-9. [\[CrossRef\]](#)
11. Lee YC, Chang CH, Lin JW, Chen HC, Lin MS, Lai MS. Non-steroidal anti-inflammatory drugs use and risk of upper gastrointestinal adverse events in cirrhotic patients. *Liver Int* 2012; 32: 859-66. [\[CrossRef\]](#)
12. Pallin DJ, Saltzman JR. Is nasogastric tube lavage in patients with acute upper GI bleeding indicated or antiquated? *Gastrointest Endosc* 2011; 74: 981-4. [\[CrossRef\]](#)