ORIGINAL PAPER

GASTROINTESTINAL BLEEDING IN PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT

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ABSTRACT

Introduction. Gastrointestinal bleeding is a life-threatening condition, with a mortality depending on the cause and severity.

The objective of this study was to retrospectively evaluate the epidemiological, clinical and evolutive aspects of a series of patients diagnosed with gastrointestinal bleeding, admitted to the Intensive Care Unit of the Clinical Emergency Hospital of Bucharest, Romania.

Material and methods. A retrospective, descriptive study was carried out, of patients diagnosed with upper and lower gastrointestinal bleeding, admitted to the Intensive Care Unit of the Clinical Emergency Hospital of Bucharest, Romania, between January 1st, 2013 – December 30th, 2018. The clinical variables were collected in a database designed exclusively for the study.

Results. We observed that most of the cases were bleedings situated above the Treitz's angle; the most frequent causes were peptic ulcer disease, followed by variceal hemorrhage and erosive gastroduodenitis. The three most frequent causes of upper gastrointestinal bleeding in our series were peptic ulcer disease, variceal hemorrhage and erosive gastroduodenitis. The global mortality due to gastrointestinal bleeding was

RÉSUMÉ

L'hémorragie gastro-intestinale chez les patients admis à l'unité de soins intensifs

Introduction. L'hémorragie gastro-intestinale est une condition qui menace la vie du patient, ayant une mortalité qui dépend de sa cause et gravité.

L'objectif de l'étude a été d'évaluer de manière rétrospective les aspects épidémiologique, clinique et évolutif de toute une série de patients diagnostiqués avec hémorragie gastro-intestinale, admis à l'Unité de Soins Intensifs de l'Hôpital Clinique d'Urgence de Bucarest, Roumanie.

Matériel et méthodes. Nous avons fait une étude rétrospective et descriptive dans laquelle ont été analysées les histoires des patients diagnostiqués avec hémorragie gastro-intestinale supérieure et inférieure, admis à l'unité de Soins Intensifs de l'Hôpital Clinique d'Urgence de Bucarest, Roumanie, entre janvier 1er, 2013 et décembre 30, 2018. Les variables cliniques ont été rassemblées dans une base de données dédiée exclusivement à l'étude.

Résultats. Nous avons observé que la plupart des cas étaient des hémorragies situées au-dessus de l'angle de Treitz ; les causes les plus fréquentes étaient l'ulcère peptique suivi de l'hémorragie variqueuse et la

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9.8%, with all cases occurring in the group of patients with upper gastrointestinal bleeding.

Conclusions. It should be noted that in the group of patients who died, all had hemorrhagic shock at the time of admission, a fact that occurred only in 23% of the cases who survived. This highlights the prognostic value of the hemorrhagic shock on admission.

Keywords: gastrointestinal bleeding, hemorrhage, intensive care unit, epidemiology, mortality.

gastro-duodénite érosive. Les trois causes les plus fréquentes de l'hémorragie gastro-intestinale supérieure dans notre série ont été la maladie ulcéreuse, l'hémorragie variqueuse et la gastro-duodénite érosive. La mortalité totale due à l'hémorragie gastro-intestinale a été de 9,8%, tous les cas survenant dans le groupe de patients avec hémorragie gastro-intestinale supérieure.

Conclusions. Il est à remarquer que dans le groupe de patients qui sont décédés, tous ont subi un choc hémorragique à l'admission, fait produit chez seulement 23% des patients qui ont survécu. Cela souligne la valeur de ce signe clinique.

Mots-clefs: hémorragie gastro-intestinale, hémorragie, unité de soins intensifs, épidémiologie, mortalité.

INTRODUCTION

Gastrointestinal bleeding may originate in any segment of the digestive tract, from the esophagus to the anus. It can be upper or lower, as it occurs above or below the Treitz's angle. The relevance of this entity lies in its frequency and its close relationship with the morbidity and the mortality of the patients who suffer from it [1,2].

Although the overall real incidence is not easy to determine, despite the large number of reports found in the medical literature, several population studies estimate an annual rate of 100 to 160 episodes per 100,000 inhabitants per year, being more frequent in the male and elderly population (prevalence increases with age)[3].

Mortality of gastrointestinal bleeding depends on the cause and severity of the bleeding, the patient's coexisting comorbidities and the speed of the diagnostic and therapeutic approach. In general terms, the mortality associated with upper gastrointestinal bleeding (UGIB) ranges from 5% to 10%, although it can reach 30% when it is secondary to esophageal varices[3]. Unlike this, the mortality of acute lower gastrointestinal bleeding (LGIB) is less dramatic, reaching 2.5%, although this rate increases drastically to 23% when it develops during hospitalization[4,5].

Although acute anemia represents the common finding in both UGIB and LGIB, the clinical presentation typically varies, according to the site of the bleeding lesion. Hematemesis and melena are characteristic for UGIB, while hematochezia is the most common semeiotic finding of LGIB. It should be noted that hematochezia can be an expression of UGIB, when the intestinal peristalsis is increased by the sudden irruption of blood in the small intestine, as well as melena can be an expression of bleeding below the Treitz's angle, when peristalsis is reduced.

Hemodynamic instability is more common in UGIB than in LGIB (30% vs. 10%)[4].

By taking into account the etiology and management (diagnostic approach and treatment) of upper gastrointestinal bleeding, it can be divided into „non-variceal UGIB" (80 to 90%) and „variceal UGIB" (10-20%)[3]. The most important causes in the first group are peptic ulcer disease (60%) (Figure 1), erosive gastroduodenitis (12%) and Mallory-Weiss syndrome (4-6%), while in the second group the only cause is bleeding due to varices (esophageal or gastric)[6,7] (Figure 2).

On the other hand, the causes of LGIB vary, according to the reports. The two most frequent causes of lower digestive hemorrhage are diverticular hemorrhage (15-40%) and vascular malformations or angiodysplasia (2-30%), followed by colitis of various causes (10-20%), colonic neoplasia (10-15%) and less frequently, small bowel bleeding (2-9%)[8,9].

Despite the advances in diagnostic techniques, in up to 12% of gastrointestinal bleeding cases a source cannot be identified.

THE OBJECTIVE OF THE STUDY was to retrospectively evaluate the epidemiological, clinical and evolutive data of a series of patients diagnosed with gastrointestinal bleeding admitted to the Intensive Care Unit (ICU) of the Clinical Emergency Hospital of Bucharest, Romania.

MATERIALS AND METHODS

A retrospective, descriptive study was carried out, in which the clinical data of patients diagnosed with upper and lower gastrointestinal bleeding, admitted to the ICU of the Clinical Emergency Hospital of Bucharest, Romania, between January 1st, 2013 to December 30th, 2018, were analyzed. The clinical
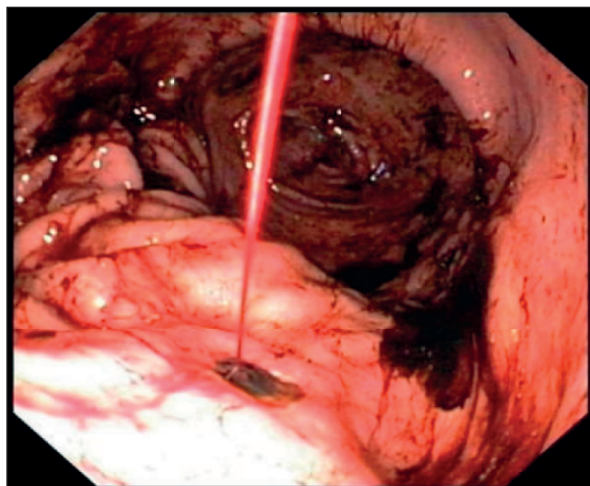
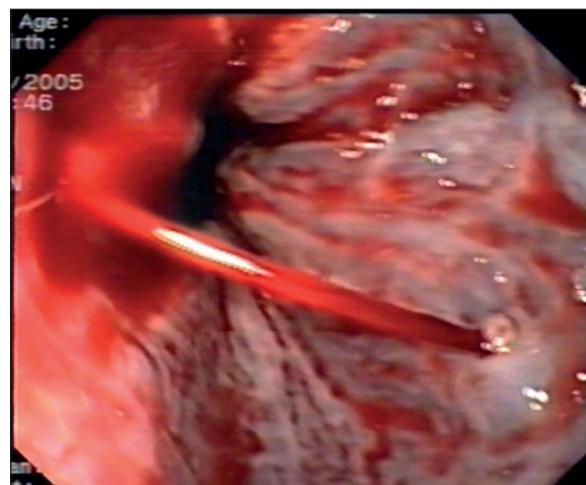**Figure 1.** Gastric ulcer Forrest IA (endoscopy)

Figure 2. Active variceal bleeding (endoscopy)

variables were collected in a database designed exclusively for the study. We excluded those patients in whom the pre-established clinical data could not be collected (demographic, clinical, absence of endoscopic studies).

The data obtained from the medical records were: age, sex, number of days of hospitalization in the ICU, personal history of hypertension (previous medical diagnosis or use of antihypertensive treatment), diabetes mellitus (previous medical diagnosis, at least two measurements of basal glycemia greater than 126 mg/dL, use of antidiabetic medication), atrial fibrillation (previous or detected during admission), established coronary disease (previous acute coronary syndrome, stable angina pectoris, myocardial revascularization surgery), heart failure with reduced ejection fraction (<55%), chronic renal failure, intake of nonsteroidal anti-inflammatory drugs (NSAIDs) in the past 3 months, alcoholism (alcohol consumption greater than 60 g/day), cirrhosis (previous diagnosis or diagnosed during hospitalization), previous digestive hemorrhage, type of clinical presentation (hematemesis, melena, hematochezia, acute anemia, hypovolemic hemorrhagic shock, necessity of tranfusion of blood products), location of digestive bleeding (upper or lower), etiology (gastric ulcer, duodenal ulcer, erosive gastritis, duodenitis, gastric polyp, gastric cancer, Mallory-Weiss syndrome, esophageal varices, colonic angiodysplasia, diverticular hemorrhage, colon cancer, colorectal polyp), endoscopic study performed, surgical treatment, use of Sengstaken Blakemore tube, medical treatment and mortality.

For the description of the continuous variables, the mean and standard deviations were used, when the distribution was normal, and the median and the rank of percentiles otherwise (the normality of a variable was verified by the Kolmogorov-Smirnov test). The categorical variables were described by percentages. The bivariate comparison of groups was carried out with the Student t-tests (normal continuous variables), U-Mann-Whitney (continuous non-normal variables) and $\chi 2$ (categorical variables). A p <0.05 was considered as statistically significant in all the tests. For the analysis of data, we used the statistical program SPSS 25.0.0.0.

RESULTS

Initially, the clinical data of 685 patients admitted with a diagnosis of gastrointestinal hemorrhage have been analyzed, from whom 75 cases were not eligible, based on the pre-established exclusion criteria: in 55 cases, no endoscopy was performed (in 32 patients an endoscopy was not performed because they were not considered an emergency, 11 patients had isolated clinical signs of digestive hemorrhage in the context of another clinical picture, 9 patients refused to perform it and 3 deaths were registered within the first two hours of admission to ICU); 20 cases with a main diagnosis of gastrointestinal bleeding did not have a medical history that could be found in the hospital archives.

Of the 610 remaining cases, 455 (74.6%) were men and 155 (25.4%) women. The average age was 58.35 years, with a standard deviation of 18.27. When performing the descriptive analysis of baseline characteristics, we found that 34% had a history of previous digestive bleeding, 28% had consumed NSAIDs, 25% had terminal liver disease (cirrhosis) and 20.5 % had therapeutic anticoagulation with acenocumarol (93% for atrial fibrillation). Other comorbidities have been diabetes mellitus type 2 (23.4%), heart failure

Table 1. Demographic characteristics and personal history of patients with gastrointestinal bleeding

Demographic data	
Male gender	455 (74.6%)
Age	58.35 ± 18.27
Medical history	
Diabetes mellitus	23.4%
Heart failure	14.6%
Renal failure	3.8%
Cirrhosis	25%
Atrial fibrillation	19%
Anticoagulant therapy	20.5%
NSAIDs consumption	28%
Previous gastrointestinal bleeding	34%
Chronic obstructive pulmonary disease (COPD)	1.3%

Legend. NSAIDs: non-steroidal anti-inflammatory drugs

Table 2. Causes of digestive hemorrhage

Upper gastrointestinal bleeding	
Peptic ulcer	47.1%
Duodenal ulcer	26%
Gastric ulcer	21.1%
Esophageal / gastric varices	26%
Erosive gastroduodenitis	12.2%
Erosive gastritis	10.6%
Duodenitis	1.6%
Mallory Weiss syndrome	2.4%
Gastric polyps	0.8%
Lower gastrointestinal bleeding	
Diverticular bleeding	4.9%
Colonic angiodysplasia	3.3%
Colorectal cancer	0.8%
Colorectal polyps	0.8%
Gastrointestinal bleeding from the small intestine	1.63%

(14.6%), chronic renal failure (3.8%) and chronic obstructive pulmonary disease (1.3%). Table 1 shows the baseline characteristics of the patients.

In relation to the clinical presentation of gastrointestinal bleeding, melena, acute anemia and hematemesis were the most common manifestations (78.4%, 72% and 58.1%, respectively), followed by hematochezia (47%). 38% presented with hemodynamic instability (hypovolemic / hemorrhagic shock).

Regarding the site of digestive bleeding, 87.53% were UGIB (n = 534), 12.47 % were LGIB (n =76). Of all the cases of UGIB, 381 episodes were „non variceal" (71.3%) and 153 cases were „UGIB of variceal origin" (28.7%).

The total causes of gastrointestinal bleeding were: duodenal ulcer (26%), gastric ulcer (21.1%), esophageal or gastric varices (26%), erosive gastritis (10.6%), Mallory Weiss syndrome (2.4%), duodenitis (1.6%), and gastric polyps (0.8%). Among the etiologies of LGIB, we found diverticular hemorrhage (4.9 %), colonic angiodysplasia (3.3%), and colon cancer (0.8%). Table 2 shows the causes determined in our study.

66.8% of patients received endoscopic treatment with adrenaline injection, electrocoagulation with Gold Probe, application of hemoclips or elastic bands (depending on the cause), while 33.2% required only medical support (iv perfusion, transfusions of blood products, intense acid suppression etc). 11.4% of patients required surgical treatment of the bleeding, and in 6.9% of the cases the placement of a Sengstaken Blakemore tube was necessary.

The overall mortality due to digestive hemorrhage in our study was 9.8 % (60 patients). All deaths occurred in the UGIB group, so mortality in this population was 11.23%. The two most frequent causes of death were variceal hemorrhage (45 patients) and duodenal ulcer (15 patients).

When performing the univariate analysis, we found that in the group of patients who died, hemorrhagic shock was detected more frequently at the time of admission (100% of the patients who died compared to 28.2% of those who did not present this outcome; p <0.0001); at the same time, they received more frequently treatment with the Blakemore balloon catheter due to incoercible hemorrhage (23.1 versus 3.6% of patients who survived, p <0.0001). Although the differences did not reach statistical significance in the rest of the variables analyzed, in the group of patients who died, a history of cirrhosis was more common (38.5% versus 28% among those who did not die), the cause of variceal bleeding (38.5% vs. 24.5%) and duodenal ulcer disease (38.5% vs. 24.5%), expression of the gastrointestinal bleeding in the form of hematemesis (76.8% vs. 51.8%), the age over 65 years (61.5% versus 47.3%), and finally, the percentage of endoscopic treatment (61.5% versus 45%). There were no differences related to age (in quantitative terms), sex, other antecedents, causes of bleeding and treatments performed.

Discussion

In our series of patients hospitalized for digestive hemorrhage, we observed that most of the episodes were above the Treitz's angle; the most frequent causes were peptic ulcer disease, followed by variceal
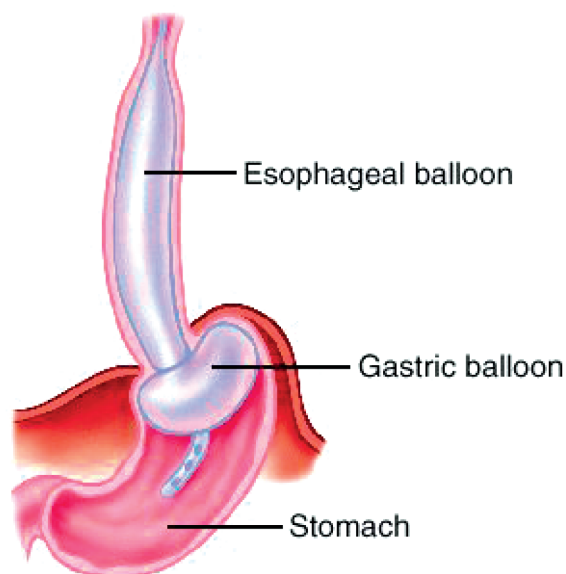
Figure 3. Sengstaken Blakemore tube

hemorrhage and erosive gastroduodenitis, and finally, in the group of patients who died, clinical presentation in the form of hemorrhagic shock and the need to use the Sengstaken Blakemore tube were more common (Figure 3).

The available reports on the frequency of bleeding origin (upper or lower) and its causes provide variable information, which probably reflects the trends over time of the different causes of gastrointestinal hemorrhage, the differences in the design of the studies, the populations studied (adults or elderly, patients admitted to surgical services or critical care etc), and type of diagnostic procedures performed[10].

In our series of patients admitted for gastrointestinal bleeding, 87.53 % of patients presented with UGIB. This contrasts with other studies, where the frequency of upper and lower gastrointestinal bleeding was similar; for example, in the work of Whelan et al, 51% of the cases presented as UGIB and the rest (49%) had a lower source of bleeding[11].

These differences can be justified mainly by the type of population studied. In our study, we evaluated patients admitted to an intensive care unit who are probably more severe (38% of them presented hemorrhagic shock as a form of presentation) than in other series, where patients admitted to the general ward or only the endoscopic finding were taken into account.

The three most frequent causes of UGIB in our series were peptic ulcer disease (47.1%, duodenal ulcer 26% and gastric ulcer 21.1%), variceal hemorrhage (26%) and erosive gastroduodenitis (12.2%). Other causes were Mallory Weiss syndrome (2.4%) and gastric polyp bleeding (0.8%).

In most publications, 80% to 90% of UGIB cases were of non-variceal origin, which differs from our findings, where the percentage of upper non-variceal bleeding reached 70%[1]. These differences could be explained by the fact that our hospital admits a significant number of patients with end-stage liver disease and because these patients usually have greater hemodynamic impairment, which requires their admission in the ICU.

In agreement with the majority of studies regarding acute LGIB, in our study, the most frequent causes were diverticular hemorrhage and colonic angiodysplasia. Although the number of patients with this pathology was low, as it is a cohort of patients admitted to ICU and these, most of the time, are self-limiting, considering only LGIB, we observed that 50% were of diverticular colonic origin and 33% due to colonic angiodysplasia. These findings are similar to those of Ghassemi et al[12].

In our study, global mortality due to gastrointestinal bleeding was 9.8 %, with all cases occurring in the group of patients with UGIB (11.23 % if we consider only this group). The mortality rate from digestive hemorrhage has been progressively decreasing during the last two decades, due to the better diagnostic and therapeutic approach of the disease[13-18].

In a comparative study of two cohorts of patients with UGIB (period 1983-1985 and 2002-2004), Loperfido et al showed that mortality by this entity decreased from 17.1% to 8.2%, respectively[19]. Currently, the mortality due to UGIB is estimated to be between 7% and 12%, and may reach 30% or more in the case of hemorrhage due to esophageal varices (depending on the intensity of bleeding and/or severity of the underlying liver disease, estimated by the Child-Pugh score)[20].

In our study, mortality due to non-variceal UGIB was 10.38%, similar to that published in the literature, while the death rate due to variceal UGIB was lower than this (15.6%), perhaps due to the rapid availability of endoscopic treatment that exists in our institution, which is fundamental for the urgent therapeutic gesture. It should be noted that in the group of patients who died, all had hemorrhagic shock at the time of admission, a fact that occurred only in 23% of the cases who survived. This highlights the prognostic value of the hemorrhagic shock and the importance of adequate early resuscitation in the management of these patients[21,22].

The LGIB mortality in the literature is 2.4 – 3.9%[23,24]. In our study, there were no deaths due to LGIB, perhaps because the number of patients was low, most of them had self-limiting bleeding, since no case of LGIB was admitted with hemodynamic decompensation.

It should be noted that our study has some limitations, the main one being its retrospective nature. Because of the lack of availability of all the data in some patients, such as severity scores at the time of admission, initial response to hemodynamic resuscitation in unstable patients, aspects related to the limitation of the therapeutic effort, number and type of transfusions performed etc, we could not identify other factors that could have influenced the final outcome (mortality)[25-29].

CONCLUSIONS

The aim of our study was to show the demographic characteristics, personal history, form of presentation, causes and mortality in a series of cases of digestive hemorrhage admitted to an Intensive Care Unit. Most of the hemorrhagic events were digestive bleedings above the Treitz's angle. The most frequent causes of upper gastrointestinal bleeding were gastroduodenal peptic ulcer disease, followed by variceal hemorrhage and erosive gastroduodenitis. Finally, all the patients who died (38%) presented hemorrhagic shock upon admission, which highlights its prognostic value.

Compliance with Ethics Requirements:

„The authors declare no conflict of interest regarding this article“

„The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law.“

„No funding for this study“

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