

Effectiveness comparison of endoscopic methods of non-varicose upper gastrointestinal bleeding treatment

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Abstract

Introduction: In every case of upper gastrointestinal bleeding suspicion, an endoscopic examination ought to be performed as a matter of urgency. Finding active bleeding, a visible non-bleeding vessel or a lesion with an adherent clot should be followed by application of an available method of endoscopic therapy. The aim of the study was to compare the effectiveness of various endoscopic treatment techniques such as epinephrine injections, coagulation methods and mechanical methods in the treatment of non-varicose upper gastrointestinal bleeding.

Material and methods: Sixty cases of non-varicose upper gastrointestinal bleeding were analysed in terms of the effectiveness of the above-mentioned procedures used in monotherapy or in combination therapy comprising epinephrine injections and clips application. The choice of the applied procedure depended on morphological features and location of the bleeding source, the patient's general condition, as well as technical equipment and manual skills of the endoscopy staff.

Results: The study confirmed the effectiveness of endoscopic treatment of non-varicose upper gastrointestinal bleeding applying the above-mentioned methods. In most patients, this treatment enabled traumatic surgical intervention to be avoided; it was required in only 3 (5%) out of 60 patients with confirmed upper gastrointestinal bleeding. With the first endoscopy, haemostasis was achieved in 47 cases (78.3%) and the second endoscopy, performed due to bleeding recurrence, was successful in the remaining 10 cases (16.7%).

Conclusions: In non-varicose upper gastrointestinal bleeding, urgent diagnostic and therapeutic endoscopy should be the first-line management. If the lesion that is the source of bleeding is possible to localize, the endoscopic techniques should be applied. Among the endoscopic procedures used in monotherapy, clips appeared to be the most effective, their effectiveness being comparable to combination therapy. In bleeding from extensive lesions, coagulation methods are considered to be the most efficacious.

Key words: gastrointestinal bleeding, endoscopic therapy, injections, coagulation, clips.

Introduction

Acute gastrointestinal bleeding is the most common life-threatening condition in gastroenterology. Upper gastrointestinal bleeding comprises 90% of cases of gastrointestinal bleeding and constitutes an important medical problem all over the world. Its incidence has been estimated at 30 to 150 cases per 100 000 inhabitants. The incidence of upper gastrointestinal bleeding increases with age and over the age of 75 reaches 400 per 100 000 people of this population [1, 2].

The most common sources of non-varicose upper gastrointestinal bleeding are: gastric and duodenal ulcers (56%), erosions (10%), oesophagitis (9%), Dieulafoy lesions (2%), gastric neoplasms (4%), and Mallory-Weiss tears (4%) [3]. Among the factors damaging gastric mucous membrane, *Helicobacter pylori* infection should be mentioned as well as non-steroid anti-inflammatory drugs, especially salicylates, pyrazolones and arylacetate derivatives [4]. In recent years, the frequency of upper gastrointestinal bleeding caused by the intake of antiplatelet drugs other than acetylsalicylic acid (ticlopidine, clopidogrel), as well as selective serotonin reuptake inhibitors (SSRI), has been increasing. Mortality due to this disease remains at the level of 7-14%. In patients with concomitant severe diseases and in the case of bleeding recurrence the mortality even exceeds 40% [5]. Eighty percent of all cases of upper gastrointestinal

bleeding end spontaneously, while in the remaining 20% of cases, untreated bleeding may lead to patients' death [6]. In 80% of these patients proper endoscopic treatment results in bleeding arrest. In the remaining 20% of patients, despite the previously achieved effective haemostasis, the lack of appropriate treatment leads to bleeding recurrence.

Complying with the proper algorithm of management should be obligatory in every case of non-varicose upper gastrointestinal bleeding (Figure 1) [5].

Despite the application of endoscopic therapy, several percent of patients may require surgical intervention. Patients with the following symptoms are considered as candidates for such treatment:

- massive bleeding, which is difficult to control,
- subsequent recurrence of bleeding after attempts of endoscopic and pharmacological therapy,
- the source of massive bleeding is situated on the posterior wall of the duodenal bulb.

Endoscopic examination in patients with acute non-varicose upper gastrointestinal bleeding should be performed as soon as possible after admission to hospital and should be carried out in haemodynamically stable patients. Endoscopy allows one not only to localize the source of bleeding and to apply local treatment but also to gain information essential for the proper assessment of bleeding recurrence risk and

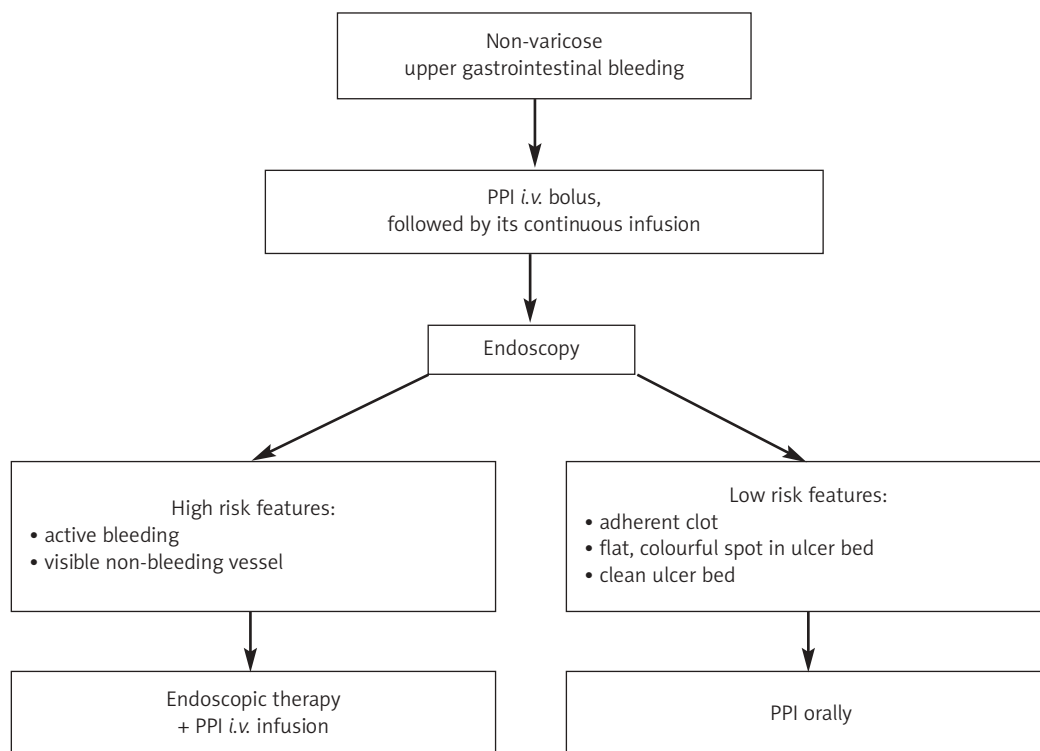


Figure 1 Algorithm of management of non-varicose upper gastrointestinal bleeding [5]
PPI – proton pump inhibitor

prognosis. During endoscopic examination, the following various therapeutic options may be applied individually or together:

- injections of epinephrine, tissue adhesives or thrombin,
- thermal methods, such as thermal probe, argon plasma coagulation (APC) or laser photo-coagulation,
- mechanical methods, such as haemostatic clips or elastic bands.

Material and methods

In the study, we compared the effectiveness of the following various endoscopic methods of treating non-varicose upper gastrointestinal bleeding:

- 1) injections of 1 : 10 000 solution of epinephrine (in normal saline),
- 2) application of haemostatic clips,
- 3) electrocoagulation,
- 4) APC.

The above-mentioned methods were applied as monotherapy or combination therapy, combining injections and clips application.

Sixty cases of upper gastrointestinal bleeding that underwent endoscopic therapy in 2006 were analysed. Patients were either admitted to hospital due to suspicion of upper gastrointestinal bleeding or, in 10 cases, the upper gastrointestinal bleeding occurred during hospitalization due to other reasons, mainly in surgery departments. The numbers of patients from respective departments were as follows: neurosurgery – 4, orthopaedic surgery – 3, intensive care unit – 2, department of internal medicine – 1.

The endoscopic treatment was performed at the Medical University of Lodz, in the Gastrointestinal Endoscopy Laboratory of University Hospital No. 2, in accordance with Figure 1. The only modification concerned the cases with adherent clot (Forrest IIb) that were qualified for endoscopic therapy only after previously removing the clot. The time between upper gastrointestinal bleeding suspicion

and the beginning of endoscopic examination did not exceed 3 h and in most cases it was shorter than 1 h. Prokinetics were not administered before the endoscopy. All patients were given proton pump inhibitor (PPI). The study group consisted of 60 patients, including 52 men and 8 women aged between 31 years and 84 years. The patients were assigned to the group due to the following symptoms: tarry stool, haematemesis or coffee-ground vomiting combined with unexplained decrease in values of red blood cell parameters or haemodynamic instability (tachycardia, blood pressure lowering). The patients in whom upper gastrointestinal bleeding was not confirmed, or surgical endoscopic procedures were not performed, or oesophageal varices were diagnosed as the source of bleeding, were not included in the study group. The patients classified as Forrest Ia, Ib, IIa and IIb were qualified for endoscopic therapy. The method of endoscopic treatment was chosen for each patient according to the type of lesion that was the source of bleeding, its location and technical possibility of performing the endoscopic procedure.

Results

Our study revealed that duodenal or gastric ulcers were the most common sources of bleeding, constituting 48% and 33%, respectively. Less frequently the bleeding occurred due to Mallory-Weiss syndrome (7%), neoplasms (7%) or other reasons (5%). In the study, the number of patients cured after the first and the second endoscopic therapy was 47 and 10, respectively. Despite a double attempt of endoscopic treatment, 3 patients had to undergo surgical intervention (Table I).

In most patients with duodenal or gastric ulcers application of the injection method or clips was successful during the first endoscopy. However, in some cases a second endoscopy (duodenal and gastric ulcers – 4 and 2 patients, respectively) or surgical intervention (2 patients with duodenal ulcers) was required due to bleeding recurrence. All

Table I. The relationship between the causes of upper gastrointestinal bleeding and the outcome of endoscopic treatment

Cause of bleeding	Number of cases	Proportion of cases [%]	Cured after the 1 st endoscopy	Cured after the 2 nd endoscopy	Surgical intervention
Duodenal ulcer	29	48	22	5	2
Gastric ulcer	20	33	16	4	0
Mallory-Weiss syndrome	4	7	4	0	0
Neoplasms	4	7	2	1	1
Vascular malformations	2	3.5	2	0	0
Dieulafoy lesions	1	1.5	1	0	0
Total	60	100	47 (78%)	10 (17%)	3 (5%)

Table II. The relationship between the methods applied and the treatment outcome depending on the bleeding cause

Cause	Method														
	Injections			Clips			Electrocoagulation			APC			Injections + clips		
	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S
Duodenal ulcer	11	3	2	5	1	0	0	0	0	0	0	0	6	1	0
Gastric ulcer	6	2	0	4	0	0	1	1	0	1	1	0	4	0	0
Mallory-Weiss syndrome	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Neoplasms	0	0	0	0	0	0	0	1	0	2	0	1	0	0	0
Vascular malformations	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Dieulafoy lesions	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

E1 – number of patients cured after the first endoscopy, E2 – number of patients cured after the second endoscopy, S – number of patients who underwent surgical intervention

4 patients with Mallory-Weiss syndrome as well as the only patient with Dieulafoy lesion were cured after the first attempt of clips application (Table II).

Combination therapy, combining injections and clips application, was highly effective in patients with duodenal or gastric ulcers, and only 1 out of 7 patients needed a second endoscopic therapy because of bleeding relapse (Table II).

In the study, electrocoagulation was applied in some cases of gastric ulcer and neoplastic lesion, but most patients (2 out of 3) were cured only after the second endoscopy (Table II).

The endoscopic therapy based on APC allowed most patients to be cured during the first endoscopy. Only in 1 patient, in whom gastric ulcer was the source of bleeding, was a second attempt of endoscopic treatment required to achieve complete haemostasis, and another one had to undergo surgical intervention, but in this case a neoplastic lesion was the source of bleeding (Table II).

The patients were monitored during a 30-day follow-up from the first bleeding occurrence. In this period of time, none of the case observations ended in death.

Discussion

Endoscopic treatment of non-varicose upper gastrointestinal bleeding gives patients the opportunity to avoid traumatic surgical interventions, and allows the percentage of bleeding recurrence and the number of deaths to be reduced. In our study group, only 5% of patients had to undergo surgical intervention, in 17% of cases a second endoscopy was required due to bleeding recurrence, whilst as many as 78% were cured by a single endoscopy. Our results are consistent with other research outcomes [7, 8]. The choice of the endoscopic treatment method was based on

endoscopist skills and experience, technical equipment available as well as the type and location of the bleeding lesion.

In our study we have confirmed that epinephrine injection therapy allows one to achieve early haemostasis in almost all patients but the risk of bleeding recurrence reaches the level of 15-20% [9, 10]. Although haemostasis was achieved in all of our 17 patients in whom this method was applied, 5 (29%) of them developed recurrence of bleeding. The application of this method is limited by the lesion size and the lack of visible bleeding source. The bigger the area of mucous membrane damage, the more difficult it is to use the injection method.

The application of haemostatic clips was the mechanical method chosen in our study group. The literature data suggest that this kind of treatment is useful in every type of lesion if the vessel that is the bleeding source is visible [11-13]. Our experience indicates that the surroundings of the damaged vessel and its location are of great importance in applying this method. In our study, in a few cases we were unable to apply clips due to a tough base or difficult location of the lesion (the posterior wall of the duodenal bulb, the posterior wall and the small curvature of the stomach). Despite the above-mentioned difficulties, this method appeared to be the most effective in our study. Only 1 in 15 cases required a second endoscopy, which was performed successfully. Our observations suggest that no more than 1-3 clips should be applied. Every attempt of the next clips application ended in failure or led to changes in the position of the clips previously applied [14, 15].

Coagulation methods such as electrocoagulation and APC allow one to achieve haemostasis by coagulation of the bleeding vessel and the surrounding tissues. In our laboratory we apply

these methods in stopping ulcer bleeding if there is no possibility of using the injection method or clips application (lesion size, tough base) or for bleeding from neoplastic lesions or vascular malformations. Electrocoagulation has been found effective in gastric ulcers and neoplastic lesions; however, in most cases complete haemostasis was achieved only after the second endoscopy performed 24 h after the first one. The effectiveness of both electrocoagulation and APC is comparable to the injection method [16-18], which was confirmed in our study.

The superiority of combination therapy, comprising the injection method and other techniques, to every type of endoscopic monotherapy is emphasized in the literature [8, 19-22]. In our study, the effectiveness of the injection method combined with the mechanical method (clips) has been evaluated. Only in 1 out of 11 cases of gastric or duodenal ulcer bleeding did its recurrence occur and it was treated with another epinephrine injection and clips application. In this case, the presence of the previously applied two clips was not confirmed during the second endoscopy. Premature spontaneous evacuation of the clips (before 48 h) was the most probable cause of the bleeding recurrence.

In each case of bleeding relapse, a second attempt of endoscopic therapy was made. In the case of failure of this second effort of endoscopic treatment, the patient underwent surgical intervention. In our study, among 60 cases treated, bleeding recurrence occurred in 10 patients (17%) and in 3 of them (30%) surgical intervention was needed. Our results are consistent with the observations of other authors, who emphasize the fact that 25–50% of patients with bleeding relapse after endoscopic treatment require surgical intervention [23].

In conclusion, in the case of upper gastrointestinal bleeding, endoscopy should be the most important element of the diagnostic and therapeutic process. In such situations, the endoscopic examination should be performed as a matter of urgency, after the previous correction of haemodynamic disorders. When the source of bleeding can be found and classified as Forrest Ia, Ib, IIa or IIb, the attempt of endoscopic therapy should be made. In the case of bleeding recurrence after the first effective treatment, a second attempt of endoscopy ought to be made. Failure to achieve haemostasis and/or severe patient condition making the endoscopy impossible are indications for urgent surgical intervention. The choice of endoscopic treatment method depends on the type of lesion that is the source of bleeding, its morphological features and location, technical equipment and manual skills of the endoscopy staff as well as the patient's general condition. In small

lesions with a clearly visible bleeding vessel, the mechanical method of applying 1-3 clips is the most effective treatment. In the case of extensive lesions where the bleeding vessel is impossible to find, e.g. a tumour mass, coagulation techniques are considered as the first-line treatment.

Although combination therapy, including epinephrine injections and clips, seems to be more effective than monotherapy based on either of these methods, our study revealed that the effectiveness of clips application is comparable to the combination treatment.

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