

## Upper gastrointestinal massive bleeding successfully treated intra-operatively with a collagen and thrombin-based high-viscosity gel for haemostasis. Case report

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**SUMMARY:** Upper gastrointestinal massive bleeding successfully treated intra-operatively with a collagen and thrombin-based high-viscosity gel for haemostasis. Case report.

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*A 57-year-old male patient was admitted in our Department for a non-variceal upper gastrointestinal massive bleeding. In accordance with the clinical guidelines, the patient underwent an early endoscopy (within 24 hours from admission), which showed the source of bleeding in the second portion of the duodenum. An endoscopic haemostatic injection with dilute adrenalin (epinephrine, 1:10.000) was then performed. After 8 hours, severe recidive bleeding occurred with reduced haemoglobin levels, which led us to an emergency surgical treatment.*

*A gastric resection was performed, followed by the application of high-viscous gel (Flo seal®) into the source of bleeding within the duodenal lumen. This technique allowed to obtain a definitive haemostasis without long-term complications.*

*Our experience suggests that the intra-operative application of Flo seal® can be an effective alternative to traditional haemostatic techniques in the emergency surgical treatment of upper gastrointestinal bleeding. This also provides additional time to perform other haemostatic techniques avoiding the precarious haemodynamic conditions of a patient in emergency.*

**RIASSUNTO:** Massiva emorragia digestiva superiore trattata con successo intraoperatoriamente mediante applicazione di gel emostatico ad alta viscosità di collagene e trombina. Case report.

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*Un paziente di 57 anni è stato ricoverato nel nostro reparto per massiva emorragia digestiva superiore non da varici esofagee. In accordo con le linee guida, il paziente è stato sottoposto ad esame endoscopico precoce (entro 24 ore dall'ingresso), che ha mostrato la fonte del sanguinamento a livello della seconda porzione duodenale. Durante l'endoscopia è stata praticata un'iniezione emostatica con soluzione adrenalina (epinefrina 1:10.000). A distanza di 8 ore una severa recidiva emorragica con riduzione dei livelli di emoglobina ci ha indotto al trattamento chirurgico d'urgenza.*

*Intraoperatoriamente è stata portata a termine una gastrectomia seguita dall'applicazione di gel emostatico ad alta viscosità (Flo seal®) nella sede dell'emorragia, all'interno del lume duodenale. Questa tecnica ha permesso di ottenere un'emostasi definitiva senza complicazioni a lungo termine.*

*La nostra esperienza suggerisce che l'applicazione intraoperatoria di Flo seal® può essere un'alternativa efficace alle tecniche emostatiche tradizionali nel trattamento chirurgico d'urgenza dell'emorragie digestive superiori. Ciò consente di ottenere una più rapida stabilizzazione emodinamica dando la possibilità di eseguire ulteriori tecniche emostatiche.*

**KEY WORDS:** Non-variceal upper gastrointestinal bleeding - Haemostasis - Flo seal® - Esophagogastroduodenoscopy - Gastrectomy.  
Emorragia digestiva superiore nonvaricosa - Emostasi - Flo seal® - Esofagogastroduodenoscopia - Gastrectomia.

### Introduction

Upper gastrointestinal bleeding is a medical and surgical emergency with an annual incidence of 170 cases for every 100.000 adults. Despite recent innovations in treatment, the mortality rate has remained unchanged

(6-8%). This could be due to an increasing average age and a higher co-morbidity rate (1). The diagnosis and treatment for patients with upper gastrointestinal bleeding is centred on an esophagogastroduodenoscopy (EGD) which can play either a diagnostic or therapeutic role.

EGD allows the source of bleeding to be identified in 90% of cases if carried out within 12 hours of bleeding onset and, at the same time, it enables haemostasis by various means (2). In the case of non-variceal bleeding, the current method of choice is the combination of a thermal agent and injection treatment (1-3). In the

case of variceal bleeding, the current method of choice is the application of sclerosing agents associated with the intravenous administration of octreotide (4). Another method of endoscopic haemostasis is the application of metallic clips, which are indicated in cases of visible bleeding vessels. Endoscopic examination can also help to quantify the risk of recurrent bleeding, which should be treated by repeated endoscopy except in cases of severe relapse.

The indication for surgical treatment is in first instance the massive bleeding with shock, which is resistant to infusion treatment. Other indications for surgical treatment are: 1) failure of endoscopic treatment; 2) bleeding at particular sites such as the posterior wall of the duodenal bulb, the gastric body and gastric lesser curve (associated with a higher risk of endoscopic treatment failure); 3) severe recurrence of bleeding. Although the role of surgery in the treatment of upper gastrointestinal bleeding is secondary, it is essential for the survival of patients in whom primary methods result to be inadequate. In such cases, the choice of timing and the surgical technique are of vital importance (5).

We report a case of severe duodenal bleeding in which urgent surgical treatment was necessary, due to severe bleeding recurrence following endoscopic injection therapy, and which was resolved with the intra-operative application of high-viscosity, collagen- and thrombin-based, gel (FloSeal<sup>®</sup>, Baxter Biosurgery, Wien, Austria). Although currently there are no appropriate scientific studies regarding the use of this haemostatic product in cases of upper gastrointestinal bleeding, on case is an example of how this haemostatic technique may provide a useful alternative when other methods result to be ineffective.

## Case report

B.L., a 57 year-old male, was admitted into our emergency department for an episode of lypothymia. The patient had not lost consciousness, he was cold and sweating, with an arterial pressure of 98/48 mmHg, a heart rate of 78 bpm, respiratory rate of 18 breaths per minute, oxygen saturation of 96% and a body temperature of 36°C.

### Diagnostic initial work up and treatment

An ECG and haemochromocytometry were carried out immediately, and showed sinus rhythm and mild leucocytosis (leucocytes = 13,590 / mm<sup>3</sup>; erythrocytes = 4,800,000 / mm<sup>3</sup>; haemoglobin [Hb] = 14.7 g/dL; haematocrit [Hct] = 45.3%), respectively. A cardiac cause for the lypothymia was excluded and neurogenic causes, such as vaso-vagal syndrome, carotid sinus syndrome and orthostatic hypotension, were also ruled out. An infusion therapy was then started while the patient's vital signs were closely monitored (in order to avoid the risk of a hypovolemic condition).

Approximately 1 hour later, the patient had the first episode of massive melena associated with haematemesis. The haemochromocytometric test revealed an increase in leucocytosis and acute anaemia

(leucocytes = 20,670 / mm<sup>3</sup>; erythrocytes = 3,910,000 / mm<sup>3</sup>; Hb = 12.2 g/dL; Hct = 36.9%). After control of the patient's haemodynamic condition, an emergency EGD was performed that showed extensive blood-clotting within the stomach and active bleeding beyond the pylorus. Haemostatic control was achieved by injecting approximately 3 ml of adrenaline solution (diluted 1: 10,000) into the base of a large clot located in the second duodenal portion (1,2). After evaluation of the bleeding, basing on the amount of melena discharge and haematemesis (approximately 2.5 g equivalent of haemoglobin lost in 60 minutes) and the EGD report, we started a transfusion with two bags of concentrated red blood cells. The patient was then admitted into our emergency surgery department where a nasogastric probe (1) was placed and crystalloid solutions infused. Drug treatment was then started with intravenous ranitidine (50 mg/6 hours), somatostatin (250 µg/24 hours), and tranexamic acid (500 mg / 6 hours), plus sucralfate (2 g/5 hours) via nasogastric probe (6-8).

A review of the patient's medical history revealed two important risk factors for peptic disease: a high level of cigarette smoking (more than 20 cigarettes per day) and the self-administration of a high dosage of non-steroidal anti-inflammatory drugs for approximately 2 weeks, as analgesic treatment for tendonitis (9, 10).

Three hours after the first episode of melena and haematemesis, the patient had a second melena discharge. Several lavages through the nasogastric probe were performed, which first showed up blood spots but gradually ran clear, indicating that the endoscopic treatment had achieved haemostatic control. The patient was subsequently kept under strict clinical monitoring, with vital signs (consciousness, heart rate, arterial pressure, respiratory activity and diuresis) being checked every 15-30 minutes, and haemochromocytometric examinations every 2 hours.

Towards the end of this clinical monitoring period, the patient, who had appeared haemodynamically stable (arterial pressure 100/50 mmHg, heart rate 90 bpm), presented a serious and progressive Hb and Hct lowering (1 - Hb = 10.1 g/dl, Hct = 30.0%; 2 - Hb = 9.5 g/dl, Hct = 28.6%; 3 - Hb = 8.0 g/dl, Hct = 24.4%) (Fig. 1) with lavages via nasogastric probe indicating clear active bleeding and, thus, the need for an emergency surgical treatment (3, 5) An additional transfusion of concentrated red blood cells was carried out.

### Surgical procedure

Basing on the endoscopic examination which had located the source of bleeding in the second duodenal portion, and following gastro-epiploic detachment, the duodenum and the lesser and greater gastric curves were mobilized, and a gastric resection was performed. The duodenum was explored and this manoeuvre revealed an ulcerous lesion copiously bleeding, with active haemorrhagic duodenitis in the second and third duodenal portions.

To compensate for the significant intra-operative blood losses (Hb = 4.7 g/dl Hct = 15.0%), blood flow was maintained through the intravenous infusion of plasma expander (2,500 ml), physiological / Ringer's solution (5,000 ml), noradrenaline (2 ml/hr of an 8 mg/50ml solution), and four bags of concentrated red blood cells. This infusion treatment aimed toward the maintenance of a proper arterial pressure for systemic perfusion (100 / 50 mmHg), and the restriction of blood loss.

Simultaneous visual monitoring of the lumen of the duodenal stump and a temporary, induced increase in blood pressure, allowed us to identify the approximate source of the active bleeding. However, it was not possible to stop the bleeding through the usual surgical haemostatic methods (sutures, ligatures or clips) because of the deep location of the site and of an obscured visibility by the leaking blood. The intraoperative view was worse than the EGD report. Because of the patient's serious conditions, we planned to perform a duodenocephalopancreasectomy and decided to apply high-viscosity, collagen- and thrombin-based gel (FloSeal<sup>®</sup>, Baxter Biosurgery,

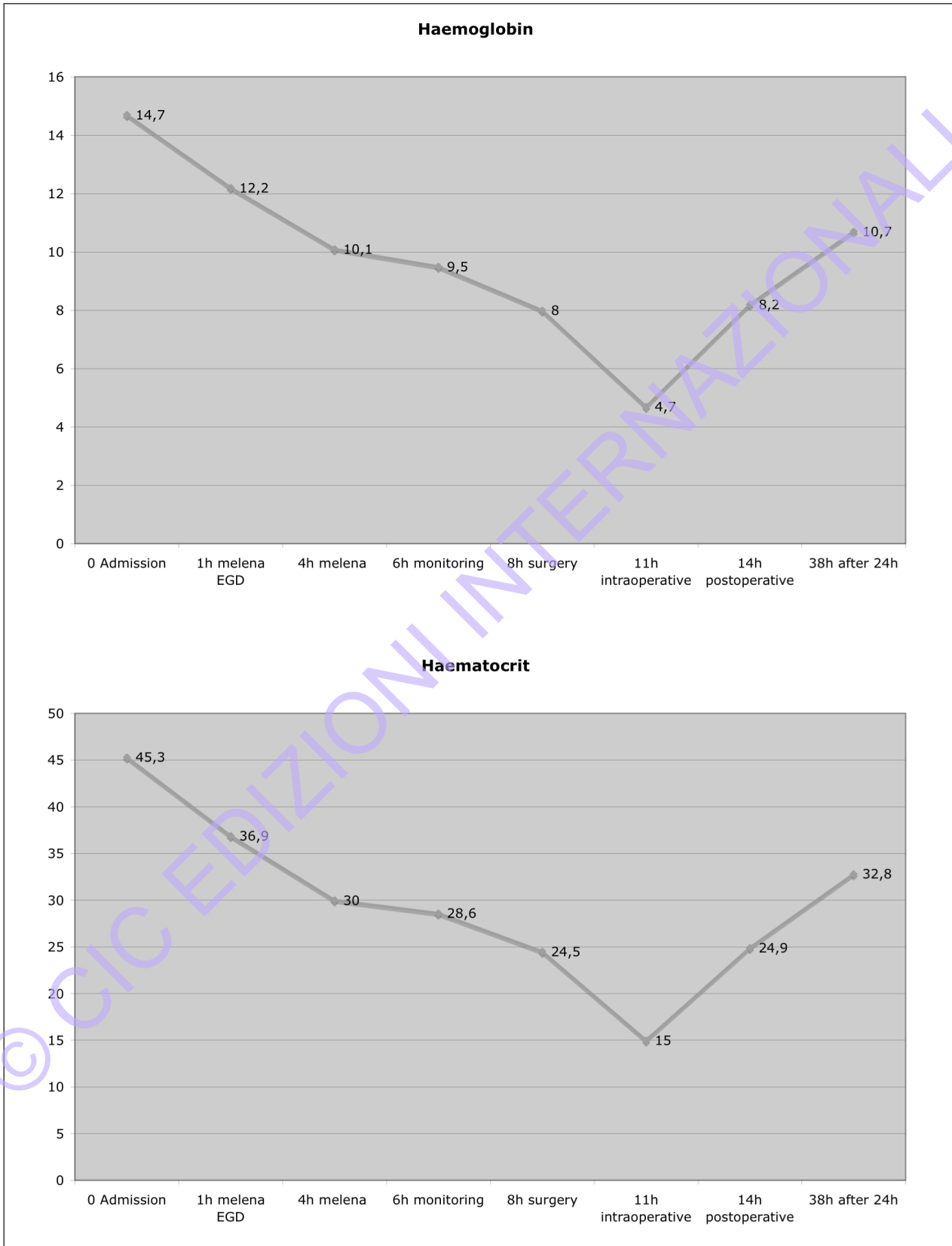


Fig. 1 - Laboratory tests.

Wien, Austria) (11–16) as a haemostatic measure within the duodenal lumen. Four vials of the gel were applied, with manual compression for 3–5 minutes using a moist gauze after each vial. This allowed effective haemostatic control, which was certified by raising of the patient's blood pressure and monitoring patient's status for 15–20 minutes. Then we closed the duodenal stump and performed a Billroth II transmesocolic gastroenteroanastomosis.

#### Post-operative care

Once surgery was completed, the patient was admitted into intensive care unit for a continuous monitoring. The patient received intravenous crystalloid solution (3,000 ml), four more bags of concentrated red blood cells, six bags of plasma and two vials of albumin in order to restore an adequate blood flow. Additionally, omeprazole (40 mg / 24 hours) and piperacillin (4 g / 8 hours) were administered intravenously.

Twenty-four hours later, after a satisfactory improvement in vital signs (arterial pressure 140 / 80 mmHg, heart rate 78 bpm) and better laboratory test results (Hb = 10.7 g/dl; Hct = 32.8%) (Fig. 1), the patient came back to the emergency surgery unit where infusion treatment was carried out with crystalloid solutions (3,000 ml) and one vial of albumin every 12 hours. Treatment for rebleeding was also continued, consisting in intravenous ranitidine (50 mg / 6 hours), somatostatin (250 mcg / 6 hours), and tranexamic acid (500 mg / 6 hours), plus oral sucralfate (2g / 5 hours) (6-8).

Post-operative antibiotic treatment was started and continued until the patient acquired conscious. With the onset of fever on the third post-operative day (body temperature 38°C), antibiotic treatment was turned into intravenous piperacillin/tazobactam (4,500 g / 8 hours). The patient's fever abated on the fifth post-operative day, and subsequent post-operative progress was normal.

#### Outcome and follow up

The patient was discharged from our hospital in good condition on the 15<sup>th</sup> post-operative day, and was assigned for clinical and instrumental follow up to check the regularity of gastrointestinal flow and the absence of iatrogenic lesions in the Vater ampulla. For this purpose, an EGD and an upper abdominal echography were performed 7 months post-operatively. The EGD was carried out through the second duodenal portion, and showed striated hyperaemia of the terminal oesophagus, cardia incontinence, a normal gastric stump (in terms of morphology and mucous characteristics), a significant amount of bile, and a normal anastomosis and digiunal loop. The upper abdominal echography showed increased liver size with a regular echostructure, biliary ducts of normal diameter, multiple lithiasis in the cholecystis with thickened walls as in chronic inflammation, and no visible liquid collections.

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## Discussion and conclusion

In our clinical case, the application of high-viscosity collagen- and thrombin-based gel for haemostasis (FloSeal<sup>®</sup>, Baxter Biosurgery, Wien, Austria) into duodenal stump allowed the successful resolution of an extremely problematic situation both in terms of patient's haemodynamic condition and of difficult surgical access, without long-term complications.

As there is no significant number of similar cases in literature, we cannot state certain conclusions about the haemostatic efficacy of this technique. We can, however, state that in the case of duodenal bleeding, once the site of bleeding has been identified, the intraluminal application of haemostatic gel can represent a useful alternative and contribution to conventional surgical methods for haemostasis. Depending on the seriousness of the bleeding extent, the hemostasis achieved could either be temporary or permanent.

The advantage of this method lies in the ease and speed through which haemostasis can be achieved, which means that the patient's haemodynamic condition can be steadied, providing the opportunity to undertake further conventional haemostatic techniques. Furthermore, the use of FloSeal<sup>®</sup> could make these conventional methods easier because visibility is improved due to reduced local bleeding. In our case, the direct application of the gel onto the source of bleeding allowed us to achieve permanent haemostasis, so we did not need to perform other haemostatic techniques on the site of bleeding. This technique could be especially useful in the upper gastrointestinal bleeding, when the surgeon could apply this haemostatic gel through a simple gastrotomy/duodenotomy without requiring a gastrectomy, which would also lower the patient's morbidity and mortality rate. Even though the collagen and thrombin-based gel haemostasis may only be temporary, the gained time could be very important to achieve the patient's haemodynamic stability.

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