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Position Paper

# Hemospray for treatment of acute bleeding due to upper gastrointestinal tumours

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ABSTRACT

*Background:* Hemospray is a new endoscopic haemostatic powder that can be used in the management of upper gastrointestinal bleedings.
*Aims:* To assess the efficacy and safety of Hemospray as monotherapy for the treatment of acute upper gastrointestinal bleeding due to cancer.
*Methods:* The endoscopy databases of 3 Italian Endoscopic Units were reviewed retrospectively and 15 patients (8 males; mean age 74 years) were included in this study.
*Results:* Immediate haemostasis was achieved in 93% of cases. Among the successful cases, 3 re-bled, one case treated with Hemospray and injection had a good outcome, while 2 cases died both re-treated with Hemospray, injection and thermal therapy. No complications related to Hemospray occurred. Finally, 80% of patients had a good clinical outcome at 30 days and 50% at six months.
*Conclusion:* Hemospray may be considered an effective and safe method for the endoscopic management of acute neoplastic upper gastrointestinal bleedings.


## 1. Introduction

Tumours are responsible for up to 5% of upper gastrointestinal bleedings (UGIBs) and are often clinically challenging due to the poor clinical status of the patients and because endoscopic treatment is difficult and not always feasible [1].

Initial endoscopic haemostasis using traditional methods ranges from 67% to 100%, while re-bleeding rate is about 30% [1,2].

Hemospray is a recently introduced endoscopic haemostatic technology that has been shown to achieve haemostasis in an animal models and in humans with UGIB [3–6].

The aim of this study was to assess the efficacy of Hemospray in stopping acute neoplastic UGIBs and to evaluate the early (within three days) and late re-bleeding rates after initial haemostasis with Hemospray.

## 2. Materials and methods

### 2.1. Patients

Prospectively collected endoscopy databases of 3 Italian Endoscopic Units were reviewed retrospectively, and all patients with active bleeding due to tumours of the upper digestive tract (Fig. 1A), who underwent endoscopic haemostasis using Hemospray as monotherapy, between January 2014 and December 2015, were included. Written informed consent for the procedure was obtained from all patients.

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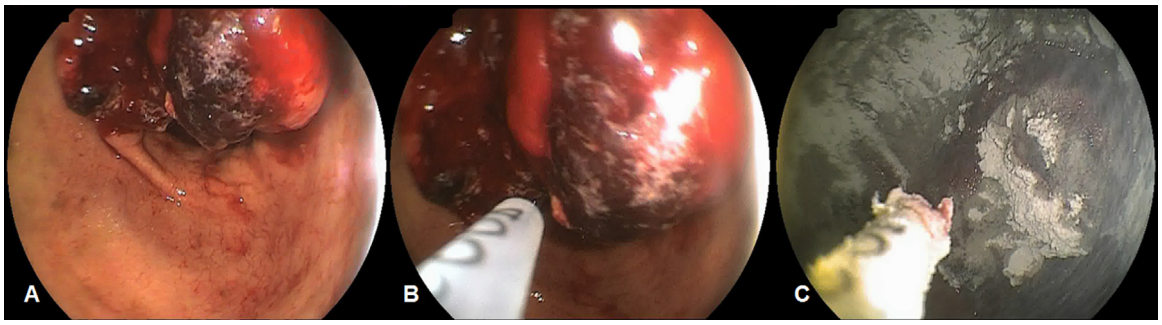


**Fig. 1.** (A) Gastric carcinoma localized in the antrum, with active bleeding and clots; (B) the Hemospray applicator catheter that comes out from the endoscope working channel, just before the endoscopic treatment; (C) the gastric bleeding lesion completely covered by Hemospray.

### 2.2. Methods

Hemospray™ (TC-325, Cook Medical, Winston-Salem, NC) is a novel haemostatic agent, CE-marked for use in the endoscopic treatment of non-variceal UGIB ((International Organization for Standardization) ISO10993-10), that has a double mechanism of action, firstly, by rapidly absorbing water to form a mechanical barrier over the bleeding point and, secondly, concentrating erythrocytes, platelets and clotting factors at the bleeding site. It has the advantage of being a non-contact technique which may be of benefit in treating diffuse lesions or those difficult to target.

The Hemospray device includes two applicator catheters of 10 or 7 French, which are introduced through the operative channel of gastroscope (Fig. 1B), a propellant $CO_2$ cartridge and a syringe containing about 20 g of powder. The powder is sprayed through the catheter under direct endoscopic vision, reducing the blood flow in 1–2 s, until the bleeding lesion is completely covered with the powder (Fig. 1C).

After completing the procedure, the bleeding site was observed for at least five minutes to confirm the haemostasis. In case of failure, the application of Hemospray was repeated or another traditional endoscopic haemostatic treatment was used, based on the judgment and the physician's experience.

Acute neoplastic UGIB was defined as presence of melena and/or hematemesis associated with a rapid decline of haemoglobin values >2 g/dl, with endoscopic confirmation of active bleeding from a neoplastic lesion. In each case, the treatment was considered effective in the absence of bleeding from the lesion after treatment for a time greater than 5 min and with stability of haemoglobin values and vital signs during the following 24 h after the endoscopic procedure. Re-bleeding was defined as a drop in haemoglobin values >2 g/dl with endoscopic confirmation of re-bleeding. Among re-bleeding cases, we distinguished early re-bleeding cases when occurring within 3 days from the endoscopic treatment, and late re-bleeding cases when occurring after 3 or more days.

In case of re-bleeding, the physician chose to use Hemospray as monotherapy, or in combination with other endoscopic therapies. In the event of failure of endoscopic haemostasis, the patient was referred to other therapeutic approaches (e.g. surgery or angiography).

### 2.3. Data acquisition

All patient demographic and clinical data were recorded: sex, age, initial symptoms (anaemia, hematemesis, melena), blood pressure, heart rate, ASA (American Society of Anesthesiologists) score, haemoglobin levels, blood transfusion, medical therapy (NSAIDs (Non-Steroidal Anti-Inflammatory Drugs), heparin, antiplatelet agents, oral anticoagulants, salicylate), proton pump inhibitors therapy, location and type of tumour, immediate clinical success, early and late re-bleeding, adverse events and clinical outcome at one and at six months.

## 3. Results

A total of 15 patients, 8 males, mean age 74 years ± 7.7 (standard deviation) (SD), were included in the study.

Demographic and initial clinical data are reported in Table 1 and outcomes in Table 2.

The most frequent presentation symptoms of acute neoplastic UGIB were anaemia (80%) and melena (73%).

The mean systolic blood pressure was 110 mmHg ± 27 (SD); mean diastolic blood pressure was 62 mmHg ± 12 (SD); mean heart rate was 86 bpm ± 19 (SD); mean haemoglobin was 8 g/dl ± 1.6 (SD); mean ASA score was 3 ± 0.7 (SD); thirteen patients received packed red blood cell transfusions and eight patients were on proton pomp inhibitor therapy before UGI endoscopy.

The most frequent tumour location was the gastric body and fundus in seven patients (47%) while adenocarcinoma was the most frequent type of cancer in 8/15 patients (53%).

All patients presented with oozing bleeding and immediate haemostasis was achieved in 93% (14/15) of cases.

In one case initial haemostasis was not achieved after two applications of Hemospray, and also thermal and injection therapies were used without success; therefore, the patient underwent surgery, but died a few hours later. This patient was suffering from gastric lymphoma with multiple, simultaneously bleeding, gastric ulcers, with ASA score of 4 and alteration of coagulation parameters.

Among patients with initial successful haemostasis, three rebled (21%), two of them within 3 days.

The two patients with early re-bleeding were both treated with Hemospray and thermal and injection therapies, both with initial success, but one died after 6 days due to another episode of bleeding, and the second died after 5 days due to multi-organ failure.

The latter two patients and the patient with failure of endoscopic hemostasis, all reported hypotension during the initial clinical evaluation. The patient with late re-bleeding was treated with Hemospray and epinephrine solution injection (1:10.000), with successful haemostasis and without further episodes of bleeding at 30 days.

Overall, among the 14 patients with initial successful haemostatic treatment, 12 (80%) presented good clinical outcome at 30 days.

At six months' follow-up, 6 patients did not present re-bleeding, two of them underwent surgery; 4 patients died (only one for re-bleeding related causes), one patient was transfused for several episodes of anaemia, and 3 were lost during the follow-up period.

In 8/15 cases, an occlusion of the catheter occurred, and therefore a second catheter had to be used. No procedure-related adverse events were recorded.