

Hemostatic Powders in Gastrointestinal Bleeding

A Systematic Review



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KEYWORDS

• Gastrointestinal bleeding • Hemostatic powders • Ankaferd Blood Stopper

KEY POINTS

- Topical hemostatic agents and powders are an emerging modality in the endoscopic management of upper and lower gastrointestinal bleeding.
- This systematic review demonstrates the effectiveness and safety of these agents with special emphasis on TC-325 and Ankaferd Blood Stopper.
- The unique noncontact/nontraumatic application, ability to cover large areas of bleed, and ease of use make these hemostatic agents an attractive option in certain clinical situations, such as massive bleeding with poor visualization, salvage therapy, and diffuse bleeding from luminal malignancies.
- Because of their temporary and short luminal residency time, the effectiveness of these topical agents may not be optimal as monotherapy in lesions at high risk of rebleeding beyond a 24-hour period, such as peptic ulcer hemorrhage.

INTRODUCTION

Gastrointestinal (GI) bleeding from both the upper and the lower GI tract is a common cause for hospitalization, resulting in significant mortality, morbidity, and resource utilization. In the United States, nonvariceal upper GI bleeding (NVUGIB) is associated with a hospitalization rate of 60.6 to 78.4 per 100,000 adults and a mortality of 2.1% to 2.45%.¹⁻⁴ Lower GI bleeding (LGIB), on the other hand, is accompanied by a

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hospitalization and mortality rate of 21 per 100,000 adults and 2% to 4%, respectively.^{5,6} The advent of endoscopic hemostatic therapies, such as clips, injection therapy, thermocoagulation, and argon plasma coagulation, have changed the management of GI bleeding and, in the case of NVUGIB, a potential benefit in mortality, need for surgery, and transfusion requirement.^{7,8} However, these devices have their limitations, such as the risk for perforation, worsening of bleeding, and possible difficulty in using with large, friable bleeding surfaces, such as hemorrhage arising from GI tumors.

Over the past few years, innovative topical hemostatic modalities have been developed for endoscopic use. Although these agents are new in digestive endoscopy, topical hemostatic agents have existed over the past 50 years with widespread medical applications.⁹ They were first introduced in 1909, with the use of topical fibrin for surgical hemostasis.¹⁰ Indeed, fibrin sealants marked the beginning of a wide spectrum of topical hemostatic agents to be used in surgery. More recently, novel hemostatic products, such as the Ankaferd Blood Stopper (ABS; Ankaferd Health Products Ltd, Istanbul, Turkey), TC-325 (Hemospray; Cook Medical, Winston-Salem, NC, USA), and EndoClot (AMP; EndoClot Plus Inc, Santa Clara, CA, USA), have been adapted to digestive endoscopy and the management of GI bleed. Uncontrolled data from both TC-325 and ABS have shown promising results in a variety of bleeding pathologic abnormalities from both the upper and the lower GI tract.^{11,12} In the following, the use of endoscopic topical hemostatic agents is discussed, focusing on ABS and TC-325 in terms of their composition, mechanism of action, clinical data and application, and related complications.

METHODS

A computerized systematic literature review from January 1950 through August 2014, by using OVID MEDLINE, EMBASE, CENTRAL, and ISI Web of Knowledge 5.6, was initiated. Articles were selected by using a combination of MeSH headings and text words related to TC-325, nanopowder, hemostatic or haemostatic agent, granule or powder, TC-325, Ankaferd Blood Stopper, and microporous polysaccharides. Recursive searches and cross-referencing were also carried out by using a similar articles function; hand searches of articles were identified after an initial search. Included were all adult human studies in French or English.

STUDY SELECTION

Of an initial 3799 articles, 105 articles were identified that were related to ABS as a topical hemostatic agent; however, after excluding nonendoscopic data, review articles, in vitro studies, and animal models, 17 articles were left on the endoscopic use of ABS in GI bleeding. Also identified were 23 original articles related to TC-325 use in GI bleeding and 21 articles after the exclusion of animal studies. There is only one published article on the use of AMP; therefore, most of this brief review on AMP is based on the information provided by the manufacturer's Web site.

COMPOSITION OF HEMOSTATIC POWDERS AND TECHNICAL APPLICATION

Ankaferd Blood Stopper

The ABS is an herbal extract derived from 5 different plants approved in Turkey for topical application.¹³ Each 100 mL of ABS is composed of 5 mg *Thymus vulgaris*, 9 mg *Glycyrrhiza glabra*, 8 mg *Vitis vinifera*, 7 mg *Alpinia officinarum*, 6 mg *Urtica dioica*. Although the exact mechanism for hemostasis remains unclear, it likely achieves

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