A case of successful ablation of a gastrophrenic fistula with *n*-Butyl-2-Cyanoacrylate

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A 79-year-old woman with a fistula between a subphrenic abscess and the fundus of the stomach was successfully treated with *n*-Butyl-2-Cyanoacrylate. Conservative management had failed. Clinical presentation, treatment progress and imaging findings by computed tomography scan, ultrasound, gastroscopy and fluoroscopy are presented, along with a brief review of the relevant literature.

Key Words: Embolization; Fistula; Histoacryl; *n*-Butyl-2-Cyanoacrylate

Un cas d'ablation réussie d'une fistule phrénicogastrique à l'aide de *n*-Butyl-2-Cyanoacrylate

Une femme de 79 ans ayant une fistule entre un abcès sous-phrénique et la grosse tubérosité gastrique a reçu un traitement au *n*-Butyl-2-Cyanoacrylate qui a réussi. La prise en charge prudente avait échoué. Les auteurs exposent la présentation clinique, les progrès du traitement et les observations tomodensitométriques, échographiques, gastroscopiques et fluoroscopiques, de même qu'une brève analyse bibliographique.

CASE PRESENTATION

A 79-year-old woman had initially presented four years before her admission described in the present paper with autoimmune hemolytic anemia, for which she underwent a laparoscopic splenectomy. The procedure was complicated by cecal rupture, intra-abdominal sepsis and multiple enterocutaneous fistulas. Numerous surgical corrections were performed, including a right hemicolectomy followed by a total abdominal colectomy and multiple small bowel resections. Several subsequent admissions were recorded for the treatment of complications related to abdominal abscess formation.

The patient's most recent prior admission had been related to the presence of a subdiaphragmatic abscess communicating with the skin and the fundus of the stomach. She had been managed conservatively using ultrasound (US)-guided percutaneous drainage with an 8 Fr pigtail Navarre drain (Bard Nordic, Sweden) and antibiotics, and had been discharged when the fistula appeared closed on the US. The drain had been left in situ. However, she re-presented four months later (the admission described in the present paper) with epigastric pain, pyrexia and an elevated white blood cell count ($21 \times 10^9/L$). The drain remaining from her previous admission was present in the left subcostal region and was draining a small quantity of purulent fluid as it had been doing intermittently since her previous discharge. The patient complained of nonspecific abdominal tenderness. All other laboratory values were normal.

Treatment and progress

A chest x-ray, computed tomography scan and sinogram (Figure 1) were performed upon the patients' admission, and demonstrated that the fistula between the gastric fundus and the abscess cavity remained present. The drain was replaced over a guidewire with a similar 8 Fr pigtail Navarre drain and 80 mL of thick pus was obtained. The internal opening of the

Figure 1) Sinogram showing a small left subphrenic abscess, which communicated with the fundus of the stomach through a short fistula measuring 2 cm in length; there was a free flow of contrast media outlining the stomach

fistula tract was visualized by gastroscopy (Figure 2), which confirmed the absence of a foreign body or neoplastic change, a nasojejunal tube was placed and the patient commenced on intravenous cefazolin (1 g three times per day). The external drain continued to pass serous fluid for two days, with a minimal reduction in the patient's symptomatology. Given the apparent failure of conservative management, the decision was made to

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Figure 2) Gastroscopy – a nasojunal tube was placed under endoscopic guidance in the second part of the duodenum. The opening of the fistula tract was visualized in the fundus of the stomach, but exploration was difficult due to thickened regional mucosa

ablate the gastrophrenic fistula tract using an inorganic resin. The fistula tract was cannulated under fluoroscopic guidance by guidewire exchange using the indwelling pigtail drain (Figure 3). The fistula itself was cannulated using a 5 Fr Kumpe access catheter (Cook Urological Inc, USA), which was passed into the stomach. 1.5 mL of Histoacryl resin (Histoacryl, B Braun Melsungen AG, Germany) was thoroughly mixed with 0.5 mL of Lipiodol contrast (distributed by EZM Canada and manufactured by Guerbet, France). The required glue volume was estimated from the contrast volume required to fill the tract. The catheter and delivery syringe were thoroughly flushed with 5% dextrose solution to avoid premature polymerization; then, the glue and Lipiodol mixture was injected under US guidance while withdrawing the catheter, filling and sealing the entire tract. The patient's condition was monitored clinically while in hospital. Her white blood cell count normalized three days postprocedure and her epigastric tenderness subsided. She was discharged four days postprocedure. The abscess completely resolved one week postdischarge. She remained well after six months with no recurrence of abscess or any related symptomatology. Follow-up examinations are ongoing.

DISCUSSION

A fistula is an abnormal communication between two hollow visci or from a hollow viscus to the body surface (1). The treatment of fistulas varies based on their location and the bridging visceral structures. Fistulas in the gastrointestinal (GI) tract can be associated with systemic illness, postoperative ischemia, trauma and malignancy. Treatment ranges from fistulectomy (2) to observation and conservative management. While glue has become a mainstay of therapy in GI viscerovascular fistulas such as variceal bleeding (3), its role in tissue fistulas is less well-defined.

Tissue adhesives can be divided into two categories: organic and inorganic. Fibrin glue, an organic product, is routinely used in surgical procedures to stop low-pressure bleeding (4) and has been used in a variety of other applications. It is a blood product, and its mechanism of action relies on the formation of fibrin from the precursors, fibrinogen and thrombin. Inorganic resins such as *n*-Butyl-2-Cyanoacrylate (Histoacryl) are compounds that polymerize in an exothermic reaction, forming a mechanical bond between adjacent surfaces. The risks associated with inorganic resins are minimal, but theoretical risks include allergy and tissue damage during the

Figure 3) Fistula tract ablation – the fistula tract and cavity were visualized under fluoroscopy. The fistula tract was cannulated with a guidewire, and 1.5 mL of 75% to 25% Histoacryl (B Braun Melsungen AG, Germany) and Lipiodol solution (Guerbet, France) were used to ablate the fistula tract

exothermic polymerization process; no such cases have been reported in the literature. When used in the vascular system, intravascular embolization may occur with both organic and inorganic products; in this case, without any vascular communication, there is no risk of this complication.

There have been case reports describing success with resin ablation of some GI fistulas, and in certain cases, the resin was introduced endoscopically (5). However, there have been no trials in the literature to provide us with evidence to favour its use, and there is no guarantee that the procedure will succeed in permanently ablating the fistula tract. However, glue embolization, in experienced hands, appears to be a good empirical option for the treatment of tissue fistulas in patients who fail conservative medical management and are not operative candidates; follow-up examinations are important to ensure that the tract remains closed.

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