

CASE REPORT

# Trans-oral embolization of a post-operative duodenocutaneous fistula

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## Introduction

Duodenal fistulas can be caused by several conditions, including blunt abdominal trauma and local malignancy. However, the majority of such fistulas occur postoperatively after emergency surgery for a bleeding ulcer, with or without perforation, or after transplantation of adjacent organs, followed by local infection.<sup>1-4</sup>

Despite significant progress in surgery, pharmacology, parenteral nutrition and intensive care, high-output duodeno-cutaneous fistulas are difficult to treat, especially in presence of other severe coexisting problems. Such fistulas are often accompanied by sepsis and are associated with substantial morbidity and mortality.

Various percutaneous and endoscopic techniques have been used for the non-surgical interventional closure of enterocutaneous fistulas. We present a case of a postoperative duodenocutaneous high-output fistula, which was successfully occluded by transcatheter tract embolization, using a trans-oral approach.

## Case report

A 68-year-old patient, whose clinical history included previous myocardial infarction, hypertension, and surgery for atherosclerotic disease of the carotid and coronary arteries, was admitted to the intensive care unit (ICU) after a new episode of angina pectoris. During his stay in the ICU, he developed a duodenal stress ulcer complicated by haemorrhage and duodenal perforation. At a subsequent laparotomy a substantial quantity of clotted blood and free gastric contents were found. The ulceration site was oversewn with an omental patch, and a feeding jejunostomy was instituted. The laparotomy wound was left open to facilitate further inspection and irrigation. However,

at the re-look operation 4 days later, more clotted blood and almost 4 l of gastric fluid were found. Over 500 ml of bile and duodenal contents continued to leak through a high-output duodenal fistula, preventing healing of the wound. The fistula was explored again at subsequent surgery, but could not be located. The patient was treated with total parenteral nutrition, antibiotics and octreotide (Somatostatin, Sandoz Pharma) 0.1 mg subcutaneously three times daily, administered via a tunnelled central venous catheter, without success. Over the following weeks, the patient suffered from sepsis caused by enterococci, respiratory instability and acute renal failure. He subsequently required a pacemaker implant to treat a cardiac arrhythmia. Three months after the initial admission to hospital the duodenal fistula was still active in the upper right edge of the open laparotomy wound.

The patient was referred to the interventional radiology department for further localization of the fistula and possible embolization. As the patient was heavily sedated, the details of the procedure were explained to the clinical team and patient's family and after obtaining their consent, we proceeded with the case. It was not possible to catheterize the fistula via the percutaneous route, but it was entered and opacified successfully after trans-oral catheterization of the duodenum with an 8 F multipurpose end-hole catheter (Cordis Europa, Roden, Netherlands) and injection of water-soluble contrast medium (Omnipaque 300 Nycomed, Amersham) (Fig. 1). After selective catheterization of the fistula, this catheter was advanced a few centimetres into the tract and then a mixture of 3 ml of tissue adhesive (Indermil, *n*-Butyl-2-Cyanoacrylate, Tyco, Hampshire, UK) and 2 ml Lipiodol (Guerbet Laboratories, Milton Keynes, UK) was injected whilst withdrawing the catheter into the duodenum. Acrylate, when in contact with hydroxyl groups begins to polymerize immediately, therefore, we used Lipiodol in the mixture, as this is an oily medium with no hydroxyl groups. The glue solidified along the tract and no leakage, reflux or migration of the embolization mixture was observed (Fig. 2). The fluid output from the fistula gradually decreased. A duodenogram performed using a trans-oral catheter 3 days after the embolization did not show filling of the fistula (Fig. 3). The abdominal wound started to heal but the patient died 3 weeks later due to multi-organ failure as a result of sepsis.

## Discussion

A high-output, external duodenal fistula is a difficult condition to treat and is commonly

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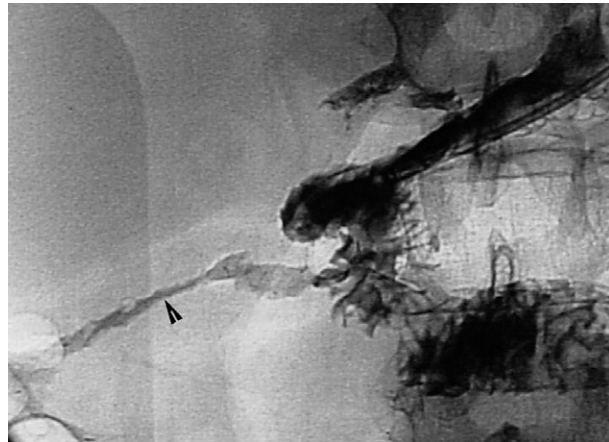


**Figure 1** The duodenal fistula (arrowhead) was opacified after injection of water-soluble contrast medium via trans-oral catheter.

associated with a prolonged and complicated clinical course. Despite advances in nutritional care and surgical therapy morbidity and mortality remain high. Treatment options for alimentary tract fistulas include closure of the fistula, local drying out of the lesions and active stimulation of wound healing. Total parenteral nutrition in combination with octreotide injections can rapidly reduce the output of enterocutaneous fistulas, but does not influence the spontaneous closure rate



**Figure 2** Selective catheterization of the tract before tissue adhesive injection.



**Figure 3** Duodenography at day 3 showing no further filling of the fistula tract (arrowhead showing the solidified Lipiodol/Indermil mixture).

significantly.<sup>5</sup> Surgical management involving exclusion, resection and closure of the fistula can be successful in many cases.<sup>6</sup> The success rate ranges from 25-75% with supportive care only, but approaches 100% with appropriate surgical treatment.<sup>6</sup>

Duodenocutaneous fistulas lead to exposure of the surrounding tissues to large volumes of enzyme-rich secretions. This is one of the reasons for the high mortality, which can reach 33%, especially in presence of other severe underlying coexisting problems.<sup>7,8</sup> Sepsis can be found in up to 84% of the cases and localized abdominal infection in 85%.<sup>1</sup> In such cases rapid surgical treatment is indicated, with aggressive drainage of abscesses if necessary.<sup>3</sup>

Various percutaneous techniques have been used for non-surgical interventional closure of enterocutaneous fistulas.<sup>2,3,9-14</sup> D'Harcour et al.<sup>10</sup> reported an overall closure rate of 81% by means of percutaneous drainage after catheterization of the fistulous tracts and cannulation of the enteric segments in 147 patients with enterocutaneous fistulas not responding to medical treatment.

Perforations and fistulas resulting from open surgical or endoscopic procedures on the oesophagus are not unusual. In difficult bougienage of oesophageal stenoses or endoprosthesis implantation in benign or malignant stenoses the stability of the oesophageal wall is not always predictable. In the non-tumour bearing oesophagus endoscopic sealant application has been carried out successfully using histoacryl and fibrin. Marco et al.<sup>11</sup> were able to block an oesophagobronchial fistula by using endoscopic injection of cyanoacrylate (histoacryl). Bianchi et al.<sup>12</sup> failed to close a chronic duodenal fistula using the same agent, but achieved success with percutaneous catheterization and injection of prolamine, an amino acid polymer. Their initial

failure was due to adherence of the acrylate to the catheter, a well-known complication of this technique. Transparietal abdominal endoscopy with elective intubation of the fistulas has also been used successfully.<sup>13</sup>

Cadoni et al.<sup>14</sup> used highly concentrated fibrinogen for closure of similar fistulas. This substance was first used in babies for closing isolated hair fistulas and oesophageal recurrent fistulas after surgical correction of oesophageal atresia. The fibrin sealant (Tissucol) comes as a two component system that promotes the normal process of wound healing. However, it requires a double lumen catheter for simultaneous injection of both components onto the surface or to the fistula canal in order to seal the fistula successfully. Carrier probes with a single lumen can be used for the injection of Tissucol, but risk premature precipitation within the probe. Fistuloscopy as an adjuvant technique for sealing gastrointestinal fistula has been described.<sup>15</sup> However, in cases where the intestinal opening of the fistula was not accessible, such treatment was impracticable. This procedure can be technically challenging as complications can occur when fibrin is injected into the fistula under pressure and one patient has died as a result of an air embolism.

The chances of success in sealing fistulas in the alimentary tract depend mainly on the size of the defect and the regeneration capacity of the tissue lining the lesion. Extensive defects between two organ systems are not suitable for glue treatment alone.<sup>16</sup> Placement of covered endoprosthesis may be more suitable in such cases.<sup>17</sup> Also, wherever the sealant encounters damaged epithelium (tumour, radiation damage), it is of little use. When referred such cases we generally try to roughen the fistula tract with brush forceps in order to try to stimulate epithelization before injecting the sealant. It is also known that the fistulas can reopen at a later date and the procedure could be repeated.

We successfully managed to close a postoperative duodeno-cutaneous high-output fistula, with transcatheter embolization of the tract, using a trans-oral approach. We believe that this method of treatment has several advantages. It achieves very good opacification of the tract and the leakage site. The identification and catheterization of the fistula with fluoroscopically guided catheters makes it easier to find and catheterize the fistula than using endoscopy alone.

In summary, trans-oral obliteration of a postoperative duodenocutaneous fistula with Indermil is simple, safe and inexpensive. Although the fistula

was sealed successfully in our case it is regrettable that this occurred too late to alter the final outcome. With more availability of this and associated interventional radiological techniques, it may be possible to reduce the morbidity of this condition.

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