

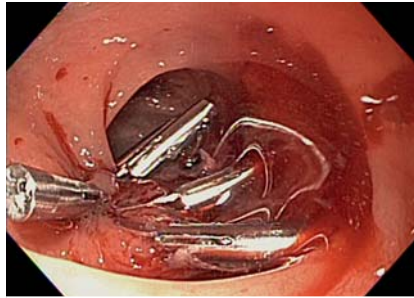
Dual endoscopic technique using through- and over-the-scope clips to close a colo-gastrocutaneous fistula due to a percutaneous gastrostomy tube

An 88-year-old woman with multiple morbidities, including end-stage renal disease, severely advanced dementia, type 2 diabetes mellitus, hypertension, and active bilobar pneumonia, who had undergone colonic resection and colostomy for a perforated diverticulum, followed by placement of a percutaneous endoscopic gastrostomy (PEG) tube 7 months previously, presented with malodorous fecal material coming out of her PEG tube.

An abdominopelvic computed tomography (CT) scan without contrast showed the PEG tube was positioned inside the transverse colon, with a resulting gastrocolonic fistula. Unfortunately, the PEG tube was removed prior to referring the patient to our hospital. The surgical team would not operate as the patient was a poor surgical candidate. Therefore, a decision was taken to attempt endoscopic closure of this complex fistula.

The patient had two colostomy bags over her abdomen, one covering the real colostomy and a second bag located over the colo-gastrocutaneous fistula (colo-PEG fistula). First, a pediatric colonoscope was passed through the colostomy, but the fistula could not be found. Therefore, a 0.035-inch biliary guidewire (Metro; Cook Medical, Winston-Salem, North Carolina, USA) was advanced through the skin into the gastrocolonic fistula. The floppy end of the wire came out into the colonic lumen, clearly demonstrating the area of the fistula. The colonic side of the fistula was then closed using five through-the-scope clips (Instinct; Cook Medical). In addition, cyanoacrylate glue (Histoacryl) was injected into the fistula base to guarantee complete closure (► **Fig. 1**).

Simultaneously, an esophagogastroduodenoscopy (EGD) was performed to locate the gastrocutaneous fistula, which was located at the junction of the body and antrum of the stomach. The defect was then successfully closed using an



► **Fig. 1** A combination of Histoacryl injection and multiple through-the-scope clips were used to close the colonic side of the complex colo-gastrocutaneous fistula created by misplacement of a percutaneous endoscopic gastrostomy (PEG) tube.

over-the-scope clip (12/6gc; Ovesco, Tübingen, Germany). Finally, a nasojejunal feeding tube was placed into the small bowel using the pull-push technique with Raptor forceps (US Endoscopy, Mentor, Ohio, USA) (► **Video 1**)

There have been previous reports of dual endoscopic techniques to remove en-

trapped loops around polyps or to define gastrointestinal fistulas [1]. Malayil et al. [2] also reported on the use of two scopes to diagnose a gastrocolonic fistula; however, no endoscopic therapeutic intervention was possible. In another recent report the group of Dr. Lo in Los Angeles reported on the use of an Amplatzer septal occluder to endoscopically close a large gastrocolonic fistula [3].

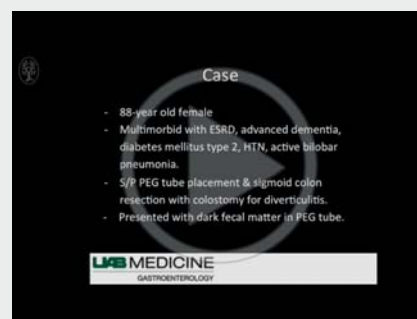
In summary, this case is unique as it exemplifies the use of minimally invasive endoluminal endoscopic surgery using multiple endoscopes, instruments, skills, and techniques to solve a complex endoscopic problem in a patient who was a poor candidate for surgery.

Endoscopy_UCTN_Code_TTT_1AO_2AI

Competing interests

Klaus Mönkemüller has received honoraria for teaching lectures from Ovesco, Tübingen, Germany.

► VIDEO 1



► **Video 1:** Steps used to close the complex colo-gastrocutaneous fistula. The key elements of our intervention were the use of: (i) a dual endoscopic technique; (ii) a biliary guidewire to locate the fistula; (iii) various types of endoscopic devices such as glue, and both through-the-scope and over-the-scope clips; (iv) the extra-long Raptor forceps to successfully insert the nasojejunal tube into the jejunum.

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