

A novel double-endoloop technique for natural orifice transluminal endoscopic surgery gastric access site closure

Tomas Hucl, MD, PhD, Marek Benes, MD, Matej Kocik, MD, Martin Krak, MD, Jana Maluskova, MD, Eva Kieslichova, MD, Martin Oliverius, MD, Julius Spicak, MD, PhD

Prague, Czech Republic

Background: Effective and safe access site closure is critical for clinical application of natural orifice transluminal endoscopic surgery.

Objective: The current study evaluated a simple novel technique of gastrotomy closure.

Design: Feasibility study with a survival animal model.

Setting: Animal laboratory.

Subjects: Ten female domestic pigs.

Interventions: Endoscopic closure of a gastrotomy incision was evaluated in 10 pigs in a survival study. A standard double-channel endoscope was advanced into the peritoneal cavity through an incision made by a needle-knife and an 18-mm dilation balloon. After peritoneoscopy and salpingectomy, gastric closure was performed by using an endoscopic grasper and sequential application of 2 endoloops. After a follow-up period of 1 to 3 weeks, the pigs were killed for postmortem examination.

Main Outcome Measurements: Feasibility, efficiency, and safety of a novel closure technique.

Results: Correct positioning and delivery of endoloops was achieved in all animals in a median time of 17 minutes (range 13-25 minutes). All animals survived without complications. Postmortem examination demonstrated patent full-thickness gastric closure without any evidence of infection.

Limitations: Feasibility study with a small number of subjects in a porcine model.

Conclusion: Double endoloop technique represents a novel, simple, safe, and efficient means of gastric access site closure in natural orifice transluminal endoscopic surgery. (*Gastrointest Endosc* 2010;71:806-11.)

Traditional open surgery has been challenged by minimally invasive surgery for its proven advantages. Laparo-

Abbreviations: NOTES, natural orifice transluminal endoscopic surgery.

DISCLOSURE: J. Spicak was supported in part by grant NS 10525-3 from the Czech Ministry of Health. All authors disclosed no financial relationships relevant to this publication.

Copyright © 2010 by the American Society for Gastrointestinal Endoscopy
0016-5107/\$36.00

doi:10.1016/j.gie.2009.10.058

Received August 28, 2009. Accepted October 27, 2009.

Current affiliations: Departments of Hepatology and Gastroenterology (T.H., M.B., J.S.), Transplantation Surgery (M.K., M.O.), Anesthesiology (M.K., E.K.), and Pathology (J.M.), Institute for Clinical and Experimental Medicine, Prague, Czech Republic.

Reprint requests: Tomas Hucl, MD, PhD, Department of Gastroenterology and Hepatology, Institute for Clinical and Experimental Medicine, Videnska 9, 140 21, Prague 4, Czech Republic.

scopic surgery is generally less traumatic than open surgery and therefore is associated with fewer local and systemic complications, less postoperative pain, better recovery, and better cosmesis.¹ Several abdominal and pelvic procedures are now routinely performed laparoscopically.² In recent years, a novel minimally invasive technique has been developed that may be even less invasive than traditional laparoscopic surgery. This technique takes advantage of natural orifices and is referred to in the literature as natural orifice transluminal endoscopic surgery (NOTES).³ A variety of surgical procedures that use natural orifices has been performed to date in animals and humans.⁴

Because NOTES often gains access to the abdominal cavity through the stomach, closure of the transluminal access site has been a major concern.⁴ Efficacy and safety are crucial before NOTES can gain wide acceptance as a therapeutic alternative. Various closure techniques of gas-

tric and colonic incisions based on suturing, stapling, clipping, plugging, stenting, or tunneling have been evaluated with various closure times, technical difficulty, efficacy, and expense.^{5,6} Because of the uncertain efficacy and safety of gastric and colonic closure, vaginal access with hand-sutured closure has been preferred in most human NOTES procedures.^{7,8}

The aim of our study was to evaluate the feasibility, efficiency, and safety of a novel simple closure technique using endoscopic accessories that are widely available.

MATERIAL AND METHODS

Animals and preparation

The study was performed in female pigs weighing between 23 and 40 kg. The animals were fed a liquid diet and then fasted overnight before the procedure. Before endoscopy, ketamine (10 mg/kg) and azaperone (4 mg/kg) were injected intramuscularly. The animals were endotracheally intubated and were administered general anesthesia with isoflurane (0.8%–1.5%) and fentanyl (3–5 mL/h). Antibiotics (1 g cefazolin) were administered intravenously 30 minutes before the procedure.

Procedure

All procedures were performed in aseptic conditions with a standard double-channel endoscope (CF 2T160I; Olympus Optical Co, Tokyo, Japan). The stomach was irrigated with 1 L of disinfectant solution (10% Betadine; Egis Pharmaceuticals, Budapest, Hungary) and the percutaneous endoscopic gastrostomy (PEG) technique was used to obtain access to the peritoneal cavity.⁹ Briefly, after transillumination, the anterior wall of the stomach was punctured with a needle under endoscopic vision and a guidewire (Jagwire; Boston Scientific, Natick, Mass) was introduced through the needle into the stomach. The guidewire was secured with a snare, pulled through the endoscope working channel, and left in place to guide the subsequent incision.

A Veress needle was introduced percutaneously into the peritoneal cavity in the umbilical region by using standard techniques. Pneumoperitoneum was established and continuously maintained by using a carbon dioxide insufflator containing a built-in manometer (UHI-3; Olympus).

A gastric wall incision was made alongside the guidewire with a triple-lumen needle-knife (Microknife XL; Boston Scientific) followed by balloon dilation with an 18-mm CRE balloon (Boston Scientific). The endoscope was advanced into the peritoneal cavity, which was briefly explored, and the fallopian tubes on both sides were identified. An endoloop (HX-400U-30; Olympus) was placed on one of the fallopian tubes and tightened. A salpingectomy was completed by using a snare.

Gastric wall closure was performed by two sequentially delivered endoloops (Olympus). First, an endoscopic

Capsule Summary

What is already known on this topic

- Effective and safe closure of transluminal access sites is necessary before natural orifice transluminal endoscopic surgery (NOTES) can gain acceptance.

What this study adds to our knowledge

- In 10 pigs, endoscopic closure of a gastrotomy incision using a grasper and sequential application of 2 endoloops resulted in patent full-thickness closure without evidence of infection.

grasper was advanced through an open endoloop. One edge of the incision was grasped and pulled through the endoloop toward the endoscope. The endoloop was closed and then released (Fig. 2). This maneuver resulted in control of one of the edges in a ligature. Next, the other edge of the incision was grasped and pulled through a second open endoloop that had been placed around the stock of the first endoloop. Tightening this second ligature enabled approximation of both edges of the incision and provided complete closure of the gastrotomy (Fig. 1). Patency of the incision was evaluated by using intra-abdominal pressure monitoring after air insufflation in the stomach.

Postoperative period

All pigs recovered well after extubation and were placed in an animal facility where they were evaluated daily for signs of complications. They were fed standard swine chow starting on the first postoperative day. After a follow-up period of 1 to 3 weeks, they were killed by using the above-mentioned anesthetic technique followed by the application of KCl (30–50 mL). After endoscopic evaluation of the closure site, thorough exploration of the peritoneal cavity for signs of complications was performed. Pressure leak tests in surgically removed stomachs were performed. Briefly, a T-shaped tube was used with one end placed through the esophageal remnant into the stomach, a second end was plugged into a manometer, and the third end was placed in a 4-L reservoir of water. The stomach was filled with water, the closure site was visually monitored for leakage, and pressures were continuously recorded. Finally, samples for histological examination of the closure site were taken.

RESULTS

Access into the peritoneal cavity was gained in all animals without any complications. Peritoneoscopy did not reveal any injuries to adjacent organs. The fallopian tubes were identified in all the animals, and a unilateral salpin-

Download English Version:

<https://daneshyari.com/en/article/3305651>

Download Persian Version:

<https://daneshyari.com/article/3305651>

[Daneshyari.com](https://daneshyari.com)