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Gastropexy Using the Carter-Thomason Device in Lieu of T-Fasteners in a Critically Ill, Severely Obese Patient: An Innovative Technique

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Abstract

A gastropexy with T-fasteners can maintain gastric apposition to the abdominal wall before a mature gastrocutaneous fistula. In patients at high risk for inadvertently removing their percutaneous endoscopic gastrostomy tube, or those in whom early, unintentional removal and subsequent laparotomy would be catastrophic, the T-fasteners can act as a safety mechanism. We present a case of an obese patient, for whom a surgical gastrostomy was not practical, and the T-fastener system had inadequate length to traverse the abdominal wall. Innovatively a fascial closure device was used in a similar fashion to create an equivalent gastropexy. Obesity frequently complicates surgical and critical care, providing additional technical challenges. We must continue to be creative and innovatively utilize current equipment to deliver more effective and safer care for this unique patient population.

Keywords

obesity; gastrostomy; gastropexy; complications; T-fasteners; Carter-Thomason; innovative; technique

In the early 1980s, as an alternative to the surgical gastrostomy, radiologic percutaneous gastrostomies were performed using nasogastric insufflation, percutaneous puncture under fluoroscopic guidance, and tube insertion over a transabdominal guide wire.¹ Unlike surgical gastrostomy, this method failed to secure the gastric serosa to the abdominal wall. Without adhering the stomach to the abdominal wall, percutaneous tube placement led to wires, catheters, and tubes terminating in the peritoneal cavity, with resulting gastric leakage, as the stomach was displaced internally.^{2,3}

To prevent this complication, Brown et al⁴ developed a technique using nylon T-fasteners, to affix the anterior gastric wall to abdominal wall. This method utilized a 6-cm introducer needle with a preloaded T-bar fashioned to a nylon filament. After needle insertion into the gastric lumen, the T-bar was ejected from the needle with a stylet, the nylon filament retracted until the T-bar was flat against the anterior gastric wall, and the external nylon was secured to provide apposition of the stomach to the abdominal wall. This procedure was

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repeated until 4 T-fasteners were placed, after which the percutaneous gastrostomy could be introduced in the center of the gastropexy anchors.⁴

Despite the introduction of the percutaneous endoscopic gastrostomy (PEG) in 1980, radiologic percutaneous gastrostomy continued in practice primarily for those with obstructing head and neck cancers precluding endoscopy.^{5,6} The T-fastener system also continued to be utilized as a safety mechanism, preventing the stomach from falling into the peritoneal cavity with accidental PEG dislodgement. In patients at high risk for inadvertently removing their PEG tube, or those in whom early, unintentional removal and subsequent laparotomy would be catastrophic, the T-fasteners maintain gastric apposition to the abdominal wall before a mature gastrocutaneous fistula.

Obesity frequently complicates surgical and critical care, providing additional technical challenges. Herein, we report a case of an obese patient, for whom a surgical gastrostomy was not practical, and the T-fastener system (Saf-T-Pexy T-fasteners; Kimberly-Clark Corporation, Dallas, TX) had inadequate length to traverse the abdominal wall. Innovatively the Carter-Thomason device (Carter-Thomason CloseSure System; CooperSurgical Inc. Trumbull, CT) was used in a similar fashion to create an equivalent gastropexy.

CASE PRESENTATION AND TECHNIQUE

A 41-year-old male with morbid obesity (body mass index of 71.2 kg/m²), congestive heart failure, and chronic atrial fibrillation was admitted with groin cellulitis and new shortness of breath. On hospital day 2, despite treatment for community-acquired pneumonia and chronic-obstructive pulmonary disease exacerbation, the patient developed hypercarbic respiratory failure requiring intubation and subsequent tracheostomy. The surgical endoscopy service placed a 24-Fr PEG tube for long-term nutritional support. Because of a 10 cm abdominal wall, a 17-G epidural needle (15 cm) was utilized to access the stomach, as the introducer needle included in the PEG kit was too short. Placement of Saf-T-Pexy T-fasteners was attempted; however, these introducer needles were also too short to reach the gastric lumen through the abdominal wall.

Three days after PEG placement, the patient inadvertently dislodged the PEG by external traction, and because of an immature gastrocutaneous fistula tract, attempts to insert a Foley catheter were unsuccessful. A computed tomography of the abdomen was performed because of significant abdominal tenderness and an unreliable physical examination. The computed tomographic scan (Fig. 1) did not demonstrate pneumoperitoneum or intraperitoneal fluid, but did reveal preperitoneal emphysema and a left rectus sheath hematoma. Therapeutic anticoagulation for chronic atrial fibrillation was held and sandbag compression to the hematoma was performed. The intraperitoneal gastrostomy was allowed to heal with a week of nasogastric tube decompression and antimicrobial prophylaxis with ciprofloxacin, metronidazole, and fluconazole.

The patient continued to require supplemental nutrition, and 8 days after the PEG dislodgement, a second 24-Fr PEG was performed. In an effort to perform a gastropexy, a Carter-Thomason CloseSure System was utilized in lieu of the T-fasteners, requiring the extra-large suture passer. The extra-large suture passer loaded with a 0-Vicryl was inserted through the PEG skin incision, the fascia, and into the gastric lumen. The Vicryl suture was secured in the gastric lumen by the endoscope's grasper. The suture passer was reintroduced through the PEG incision on the same side of the PEG tube, entering the gastric lumen at 0.5 cm away from the first puncture, and the suture regripped by the suture passer and pulled up through the fascia. The Vicryl suture was securely tied underneath the skin incision, completing the first attachment of the gastropexy. This was repeated on the other side of the

PEG as seen in Figures 2 and 3. The new PEG was cut short externally, secured in place, and an abdominal binder was placed over the tube.

The patient was transferred to a transitional care hospital for ventilator weaning 5 days after the final PEG placement. He successfully weaned from the ventilator and underwent tracheostomy decannulation 2 weeks thereafter. Three days later he was discharged home.

DISCUSSION

It is well documented that obesity rates are on the rise and obesity has now become one of the top public health concerns of this decade. The World Health Organization revealed obesity prevalence has significantly increased in men and women, 20 to 74 years of age, comparing National Health and Nutrition Examination Survey (NHANES) II data (1976 to 1980) to NHANES III data (1988 to 1994). These increased rates in men and women were from 12.3% to 19.9% and 16.5% to 24.9%, respectively.⁷

Along with rising obesity rates, the obesity-related medical equipment market has exploded with new products. Medical supply companies now offer bariatric-specific scales, ramps, shower stools, commodes, and complex electric lift chairs and beds. Some surgical devices have also been altered for the bariatric surgical patient such as extra-long insufflation needles and trocars. However, many surgical and critical care instruments are falling short in this obese patient population. Novel techniques are being described to combat the technical challenges created by the obese body habitus.⁸⁻¹¹ In each of these cases, nonbariatric equipment was creatively applied to curtail a particular operative problem.

In our present case, the T-fastener system was not sufficient for our severely obese patient due to the inadequate length of the introducer needle. An aborted gastroperxy subsequently resulted in a failed intubation of the PEG tract after accidental dislodgement. Fortunately, without severe complication, the lack of gastroperxy required a week of nasogastric decompression and secondary PEG placement. The novel use of the Carter-Thomason device allowed us to create a gastroperxy without T-fasteners or operative intervention.

When using the Carter-Thomason suture passer, care must be taken to avoid inadvertent puncture of surrounding structures or viscera between the stomach and abdominal wall. The stomach should remain insufflated to prevent this complication as implemented for PEG or T-fastener placement. The gastroperxy sutures should be tight enough to provide secure approximation of the stomach to the abdominal wall but not too tight to cause gastric mucosal necrosis and possible perforation. We believe the Carter-Thomason device, when utilized in this novel fashion, may provide a safe and efficient means to create a gastroperxy in the severely obese patient population.

CONCLUSIONS

As the prevalence of obesity in our population continues to rise, we as clinicians must continually be engaged in the conception and development of novel products. We must also creatively and innovatively utilize current equipment to deliver more effective and safer care for this unique patient population.

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FIGURE 1.
Computed tomography image revealing a left rectus sheath hematoma (short arrow) and preperitoneal emphysema (long arrow). No pneumoperitoneum or intraperitoneal fluids were appreciated.

FIGURE 2.

Endoscopic image revealing the internal bumper of the percutaneous endoscopic gastrostomy tube (long arrow) and 2 tacking sutures securing the gastropexy (short arrows).

FIGURE 3. Diagram of the Carter-Thomason CloseSure System and the extra-large suture passer used to create a gastropexy in the obese patient. PEG indicates percutaneous endoscopic gastrostomy.