SCIENTIFIC PAPER JSLS

Percutaneous Endoscopic Gastrostomy in the Super-Morbidly Obese Patient

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ABSTRACT

Introduction: Obesity is reaching epidemic proportions in the United States, and as patients at the extremes of morbid obesity come under the care of surgeons, routine procedures may become increasingly complex in the face of greater body mass. We prospectively evaluated the success rate of percutaneous endoscopic gastrostomy (PEG) placement in a group of morbidly obese patients outside the current classification systems used to stratify obesity.

Methods: Patients with a body mass index (BMI) greater than 60 kg/m^2 who presented for PEG over a one year period were prospectively enrolled. Each patient underwent attempted PEG placement using the pull method by a single surgeon. Outcome variables included: successful PEG, wound infection, tube dislodgement, or bleeding.

Results: Six patients with BMI > 60 kg/m^2 presented for PEG. All patients were in a surgical critical care unit maintained on mechanical ventilation. All underwent successful PEG placement with standard techniques and sustained no post-procedural complications.

Conclusion: In the hands of an experienced surgical endoscopist, percutaneous endoscopic gastrostomy can be safely performed in patients at the extremes of morbid obesity. Future studies are warranted to validate the results of our small series.

Key Words: Percutaneous endoscopic gastrostomy, Morbid obesity.

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INTRODUCTION

Obesity is reaching epidemic proportions in the United States. As this public health concern continues to grow, our hospitals and trauma centers are seeing an increasing number of critically ill patients with less than optimal body habitués. Recently, an expert panel convened by the National Heart, Lung, and Blood Institute (NHLBI) in cooperation with the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) identified a patient with a BMI of 25 kg/m^2 to 29.9 kg/m^2 as overweight, and those with a BMI of ≥30 kg/m^2 as obese. Defining overweight as a BMI ≥25 is consistent with the recommendations of the World Health Organization and most other countries.

As more overweight, obese, morbidly obese, and super (mega) obese patients come under the care of ICU physicians, practices routine to the care of patients with ideal weights become a challenge in the face of greater body sizes. The long-term care of these patients requires a significantly greater amount of expertise in the performance of commonly performed invasive procedures. One procedure in particular is the placement of a percutaneous endoscopic gastrostomy (PEG) tube for long-term enteral access. We have recently reported that obese patients admitted to the ICU have a significantly greater number of ICU and hospital days as well as infectious complications.[1] The purpose of this study was to prospectively evaluate the success rate of PEG placement in a series of morbidly obese patients outside current classification schemes of obesity.

METHODS

The patient is placed on continuous oxygen saturation and cardiac monitoring. Before placement of the endoscope, intravenous Versed and Fentanyl are administered and titrated appropriately as per institutional conscious sedation guidelines. The endoscope is placed into the esophagus and a thorough evaluation of the esophagus, stomach, and duodenum is performed. After this is completed, the endoscope is pulled back into the stomach, and a careful evaluation of the anatomic position of the stomach is performed as the assistant applies digital pres-

sure on the anterior abdominal wall. The endoscopist evaluates the level and intensity of each impression. In the super-obese patient, attention is focused exclusively in what we describe as the B Zone **(Figure 1)**, as this area has the least amount of fat tissue density. The first step is to determine which "spot" finger impression is most significant. After this area is recognized, the lights are dimmed and transillumination is attempted. If unsuccessful, it is our practice in super-morbidly obese patients to apply significant transabdominal compression using the operating surgeon's fist, followed by repeat attempts at transillumination. It is important to note that in the super-obese patient, significant pressure is needed on the abdominal wall to obtain transillumination. If unsuccessful, the "spot" that is most impressive is marked. At this point, the abdomen is prepped and draped and local anesthesia is administered. A standard PEG kit is opened and an incision is made. A hemostat is gently placed into the incised area mimicking needle placement to visualize the optimal trajectory for the subsequent needle/catheter placement. The endoscopist introduces and opens the snare to encompass the stomach wall area in which the needle will most likely penetrate and thus facilitate the endoscopic snaring of the needle/catheter and wire. After the optimal trajectory is visualized and the snare location is set, the needle/catheter is slowly placed into the stomach under direct visualization. Because of the significant amount of abdominal wall tissue density that needs to be penetrated before piercing the peritoneum, the operator must continue to place a moderate amount of pressure on the abdominal wall area encompassing the incision to compress the tissue and allow for needle/catheter penetration of the gastric wall. In addition, a syringe is attached to the needle/catheter and simultaneous aspiration of the syringe is performed evaluating for air or potential bowel contents. The snare is manipulated to encompass the needle/catheter, and the wire is passed through the catheter and snared. The wire and endoscope are simultaneously pulled back out through the oral cavity, and a PEG catheter is fastened to the wire. The wire and PEG catheter are then pulled back through the oral cavity into the stomach and out through the abdominal wall until the button adheres to the abdominal wall. The endoscope is placed back into the stomach to assure that the proper position is obtained and that no evidence is present of bleeding or complications.

Figure 1. Bochicchio zone (B-zone) for percutaneous endoscopic gastrostomy placement in the Mega-morbid obese patient.

RESULTS

Over a 1-year period, 6 patients with a BMI >60 kg/m^2 underwent successful PEG placement utilizing the technique as described above **(Table 1)**. Four patients were admitted for traumatic injury, and 2 were surgically treated for a necrotizing soft tissue infection. The mean age was 43±3 years with 4 of 6 (67%) being male. Three of the 6 patients had some type of prior abdominal surgery. All 6 patients were supported by mechanical ventilation for chronic respiratory failure and subsequently had a surgically placed tracheostomy. The mean day in which the PEG was placed was 19±5 days. Four of the 6 patients (67%) could be transilluminated with deep palpation, while the remaining 2 patients underwent successful placement based on finger impression alone. No procedural complications occurred for a placement success rate of 100%. Tube feeds were initiated after 24 hours of gravity drainage. Each patient was advanced to goal feeds within 48 hours of PEG placement. The mean hospital length of stay was 28±8 days. No postprocedural complications (ie, wound infections, bleeding, tube dislodgment) occurred as a result of the PEG placement.

DISCUSSION

Obesity has reached epidemic proportions in the United States, and we are continuing to see an increasing number of these patients in our critical care units. Results of the National Health and Nutrition Examination Survey (NHANES) (1999–2000) indicate that an estimated 64% of United States adults are either overweight or obese.[2] Estimates of obesity alone are generally over 18%, and in 18- to 29-year-olds obesity has increased from 12% to 19% between 1991 and 1999.[3] A growing body of literature

Table 1.
Demographics of Study Population

Patient	Age	Gender	Admission Diagnosis	Prior Abdominal Surgery	Complications
1	42	Male	Trauma	None	None
2	45	Male	Soft tissue infection	Appendectomy	None
3	39	Female	Soft tissue infection	None	None
4	47	Male	Trauma	None	None
5	42	Male	Soft tissue infection	Cholecystectomy	None
6	41	Female	Trauma	C-section	None

describes the higher mortality rates experienced by morbidly obese individuals. One study[4] demonstrated that mortality rates in the morbidly obese are 12 times higher in men aged 25 to 34 years and 6 times higher in men aged 35 to 44 years compared with nonobese men of the same age. A prospective study[5] documented increased risk of death from all causes, cardiovascular disease, and cancer across a range of BMI indicating overweight and obesity.

Classification systems have been developed to grade the level of obesity in a particular patient. An expert panel convened by the National Heart, Lung, and Blood Institute (NHLBI) in cooperation with the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) has identified a patient as overweight with a body mass index (BMI) of 25 kg/m^2 to 29.9 kg/m^2 and as obese with a BMI $\geq$30 kg/m^2. The classification has been expanded by the World Health Organization Obesity Task Force, which defines overweight as a BMI $\geq$25, and further stratifies excess body mass with Class I obesity defined as a BMI of 30.0 to 34.9, Class II obesity as a BMI of 35.0 to 39.9; Class III, or extreme obesity is defined as a BMI $\geq$40. These widely used classification systems do not further stratify patients with a BMI $>$40 kg/m^2.

As the general population continues to push the limits of modern obesity classification schemes, it has become clear that the current upper limit of modern obesity classification systems may in fact be insufficient. As more of these patients outside of the modern classification systems come to require critical care for medical, surgical, and traumatic illness, practices routine to the care of patients with ideal weight become a challenge in the face of greater body sizes. One procedure in particular is the placement of a percutaneous endoscopic gastrostomy (PEG) tube for enteral access.

PEG placement in critically ill patients has become commonplace, as long-term enteral access for nutrition is essential in these compromised hosts who require long-term treatment due to the sequelae of their disease or illness. Numerous studies have shown the benefit of early enteral nutrition, with most advocating initiation of enteral nutrition within 24 hours of illness or injury in patients with an intact gastrointestinal tract.[6–10] To meet this need in critically ill patients in the chronic stage of their disease who require long-term enteral access, percutaneous endoscopic gastrostomy (PEG) has been widely applied and has become the method of choice in critically ill and trauma populations.[11]

Several recent studies have evaluated the placement of PEG in circumstances that were once considered contraindications. For example, PEG in patients with prior abdominal surgery (once a contraindication to PEG placement) has become an accepted practice in experienced hands. Results from several studies[12–14] have demonstrated similar safety and efficacy. Eleftheriadias et al[15] evaluated PEG placement in 37 patients who had undergone previous abdominal surgery, with over half (22 of 37) undergoing PEG placement just 2 weeks postlaparotomy for a wide range of abdominal operations. PEG placement was successful in 36 of 37 patients compared with 286 of 291 in the nonoperative control group. In another recent report,[16] patients with open abdomen and giant hernia following an abdominal catastrophe or abdominal compartment syndrome have also undergone safe PEG placement. Most recently, we reported in a prospective study of 117 patients that no difference occurred in complication rates between patients with prior abdominal surgery and those with a virgin abdomen.[17]

A paucity of data, however, has evaluated the impact of body habitus on the efficacy of PEG placement. In 1992, Bender[18] reported the successful placement of a single PEG in a 170-kg man in the operating room. During the procedure, ballottement was identified following insuf-

flation of the stomach, but there was no light reflex and a spinal needle could not be passed into the stomach. A cut-down approach was utilized, in which an incision was made over the area where a finger impression had been visualized through the endoscope. The skin and subcutaneous fat were bluntly dissected to the level of the anterior rectus muscle, the PEG placement procedure completed, and the skin incision closed. The tube functioned well throughout a 13-month hospital and rehabilitation course.

Morbid obesity may have once been considered a relative contraindication to PEG placement, but our series represents the first and largest series evaluating PEG placement in morbidly obese patients outside the classification systems available today. The total absence of complications in this small number of procedures begins to challenge the notion that morbidly obese patients are poor candidates for PEG placement. Although small, this case series demonstrates the safety and efficacy of PEG placement even without full transillumination or use of a cut-down approach. We did not deviate from standard, routine placement techniques in any patient, nor did we utilize instruments outside those found in typical placement kits.

In addition, as a greater number of patients fall outside of the traditional obesity classification schemes, we propose expanding the current classification systems to stratify patients with a BMI >40 kg/m^2. At our institution, we typically classify patients with a BMI between 30 kg/m^2 to 40 kg/m^2 as obese, 40 kg/m^2 to 50 kg/m^2 as morbidly obese, 50 kg/m^2 to 60 kg/m^2 as super-morbidly obese, 60 kg/m^2 to 70 kg/m^2 as mega-morbidly obese, and those with a BMI >70 kg/m^2 as super-mega-morbidly obese. By revising and expanding this classification, we may better be able to evaluate risk of body habitus in a more defined and stratified fashion.

CONCLUSION

Current obesity classification systems are inadequate; obese patients who fall outside the current classification systems for obesity can have safe PEG placement in experienced hands. A larger, prospective study evaluating PEG placement in this challenging group of patients is currently under investigation utilizing an expanded obesity classification system that more appropriately stratifies this growing segment of our population.

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