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Safety of percutaneous endoscopic gastrostomy after trauma laparotomy

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ABSTRACT

Background: Trauma patients frequently require long-term enteral access because of injuries to the head, neck, or gastrointestinal tract. Noninvasive methods for gastrostomy placement include percutaneous endoscopic gastrostomy (PEG) and percutaneous radiographic gastrostomy (PRG). In patients with recent trauma laparotomy, PEG placement is felt to be relatively contraindicated because of the concerns about altered anatomy. We hypothesize that there is no increased rate of complications related to PEG placement in patients with trauma laparotomy compared with those without laparotomy provided that basic safety principles are followed.

Materials and methods: This retrospective study evaluates all percutaneous gastrostomies (both PEG and PRG) placed in trauma patients admitted at a level I trauma center between January 1, 2007 and March 30, 2010. The electronic medical records of the 354 patients were reviewed through 30 days after procedure, and patients were further subdivided by the history of laparotomy. Statistical analysis was performed using Fisher exact test or two-tailed *t*-test, as appropriate.

Results: In patients with no prior trauma laparotomy, successful PEG placement occurred in 92.2% of patients, the remainder underwent PRG placement. Of patients with prior trauma laparotomy, 82.4% had successful PEG placement. Two percent of attempted PEG placements failed in patients with no previous trauma laparotomy, whereas 11.8% failed in patients with recent trauma laparotomy. The overall complication rate was 2.0%, with no recorded complications in patients with trauma laparotomy before PEG placement.

Conclusions: These data suggest that surgeons should not consider recent trauma laparotomy a contraindication to PEG placement.

1. Introduction

Trauma patients frequently require long-term enteral access because of injuries to the head, neck, or gastrointestinal tract [1]. Enteral access methods include percutaneous, laparoscopic, or open gastrostomy or jejunostomy. In the critical care setting, percutaneous endoscopic gastrostomy (PEG) has become widely practiced because it does not require general anesthesia and can be done at the bedside. Percutaneous radiographic gastrostomy (PRG) does not require general anesthesia, however typically does require transport to a fluoroscopy suite. Bedside procedures eliminate risks associated with transport [2,3]. Significant adverse events occur in as many as 36% of intrahospital transfers of critically ill patients;

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life-threatening complications have been estimated to be as high as 8% [4,5].

PEG has been found to be safe in the general trauma population and in patients with previous abdominal surgery [6,7]. Previous studies regarding the safety of PEG placement in patients with recent laparotomy have been limited to small case series or case reports and do not necessarily examine trauma patients. Exploratory laparotomy may alter anatomy because of resections or new adhesions, raising concern for procedural difficulty or damage to colon, small intestine or liver during PEG placement. This retrospective study reviews the placement, failure, and complication rates of PEGs placed in trauma patients. We hypothesize that there is no increased rate of complications related to PEG placement in patients with trauma laparotomy compared with those without laparotomy provided that basic safety principles are followed.

2. Materials and methods

Study approval was obtained from the Institutional Review Board at an urban level I trauma center. A search of the trauma database identified patients who underwent PEG or PRG between January 1, 2007 and March 30, 2010. Patients with feeding tubes placed surgically or at outside hospitals were excluded. Demographics and injury data were abstracted from the trauma database. We reviewed the electronic medical record of the 354 patients that met the inclusion criteria. In this cohort, patients with PEGs and PRGs were further subdivided by the history of laparotomy. Prior trauma laparotomy was defined as exploratory laparotomy on the same hospital visit before gastrostomy placement. PEGs are placed by a standard pull technique at bedside. A standard esophagogastroduodenoscopy is performed to visualize and insufflate the stomach for abdominal transillumination. The PEG attempt is halted if transillumination fails and the patient is referred to interventional radiology for potential PRG placement. In patients with successful transillumination, a needle is used to access the stomach under direct visualization and slowly withdrawn while aspirating. Again, the attempt is halted, and the patient referred for PRG if significant air or fluid is aspirated. PRG placement requires transfer to the fluoroscopy suite. During PRG, a nasogastric tube is passed to allow gastric air insufflation before puncture. Two to four T-fasteners are deployed into the distended stomach and contrast is injected through each to confirm intragastric placement. A needle is used to gain access to the stomach and the gastrostomy is placed using Seldinger technique [8]. Daily progress notes and discharge notes in addition to any telephone encounters, clinic visits, or readmissions were reviewed for up to 30 days after procedure to screen for complications. These include bleeding requiring a repeat procedure, ulcer formation, internal leakage, gastrocolic fistula, dislodgment, external leakage, and surgical site infection. Statistical analysis was performed using Fisher exact test for categorical data and two-tailed *t*-test for continuous data. A level of 0.05 was considered significant. Statistical analysis was conducted with PRISM 5 software (GraphPad Software, Inc, La Jolla, CA).

3. Results and discussion

3.1. Results

Of the 354 patients, 34 had a trauma laparotomy before gastrostomy placement. Average length of follow-up data available was 26.9 d. Demographics, including race and sex, did not differ significantly between the two cohorts of patients (Table 1). Patients with a trauma laparotomy were significantly younger (41.9 years) and the injury severity score (32.5) was significantly higher than age (50.7 years) and injury severity score (24.1) of patients without a recent laparotomy (Table 1). Procedures performed during exploratory laparotomy included splenectomy (six), bowel resection (nine), diaphragmatic injury requiring repair (four), and temporary abdominal closure (six). Gastrostomy was placed in patients without a trauma laparotomy an average of 1 d later than in patients with a laparotomy. The average length of stay was modestly, but not significantly, longer in patients without exploratory laparotomy (Table 1).

The majority of patients with a trauma laparotomy had PEG (82.4%) whereas the remainder underwent PRG (17.7%) (Table 2). Patients with no history of prior trauma laparotomy had PEG significantly more frequently (92.2%). The overall failure rate of PEG placement was 2.0% (6/300) in trauma patients without laparotomy and 12.6% (4/33) in trauma patients with prior laparotomy (Table 2). In patients with trauma

Table 1 – Demographics of trauma patients.

	No trauma laparotomy ($n = 320$)	Trauma laparotomy ($n = 34$)	*P* value*
Age, median (CI)	50.7 (48.3, 53.1)	41.9 (35.6, 48.2)	0.023
Caucasian (%)	79.4	73.5	ns
Female (%)	24.7	26.5	ns
ISS, median (CI)	24.1 (22.9, 25.3)	32.5 (29.1, 35.9)	<0.001
HD of percutaneous gastrostomy placement, median (CI)	14.1 (12.5, 15.9)	13.3 (11.1, 15.5)	ns
LOS, median (CI)	29.0 (26.4, 31.5)	27.6 (23.2, 32.0)	ns

CI = confidence interval; ISS = injury severity score; HD = hospital day; LOS = length of stay; ns, not significant.
* Statistical analysis for continuous data by two-tailed *t*-test and Fisher exact test for categorical data.