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## Post-PEG Feeding: Why Wait?



Steve Condron

**The appropriate time to initiate enteral nutrition after placement of a percutaneous endoscopic gastrostomy (PEG) tube has been an area of limited research. Historically, data to guide decisions regarding the initiation of feedings has been extrapolated from surgical experience with gastrostomy tubes. With the increased use of PEGs, concern for resource allocation, prolonged hospitalization times, and a desire to optimize nutritional outcomes, researchers have attempted to demonstrate the safety of early enteral nutrition after gastrostomy placement. The purpose of this review is to describe the available literature addressing early feeding (usually defined as same day feeding), versus standard feeding regimens, i.e., greater than 24 hours or next day feeding.**

### INTRODUCTION

**T**he use of enteral nutrition (EN) has undergone dramatic change with the introduction of percutaneous endoscopic gastrostomy (PEG) tubes. The non-surgical placement of gastrostomy tubes was first described in 1980 (1). This technique is simple, of relatively low cost, and placed with increasing frequency within the United States. Clinical concern exists after PEG placement for leakage into the peritoneal cavity and gastric retention, thereby increasing the risk for

peritonitis and aspiration, respectively. Given these concerns, PEG tubes have typically been observed for 12–24 hours, or more, prior to the initiation of EN. This decision is based on a standard convention, extrapolated from surgical guidelines, with little data to support the withholding of feedings after PEG placement. With increasing financial pressures on the health care system, as well as the nutritional needs of the patient, controlled trials have challenged the waiting period necessary prior to the initiation of EN. Initiation of feedings on the same day of the procedure is not an uncommon practice. Significant clinical variability in the implementation of feeding post-PEG

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placement persists and the major gastrointestinal societies have not clearly established a standard of care in this respect. The purpose of this article is to review the available literature regarding the safety of early feeding after PEG placement.

### WHAT IS STANDARD PRACTICE?

A questionnaire based analysis conducted in 1998 involving primarily private practice gastroenterologists in the US established that the majority of respondents (82%) were aware of data supporting early refeeding post-PEG placement, yet only 11% were initiating EN in this time frame. The majority of respondents (39%) initiated EN near the 24-hour post placement window with only 3% waiting greater than 24 hours (2).

The *American Gastroenterological Association Technical Review* on tube feeding for enteral nutrition published in 1995 does not address the issue of initiation of feeding post-placement (3). The American Society for Gastrointestinal Endoscopy (ASGE) acknowledges the controversy in feeding practices after tube placement and mentions two of the randomized studies addressed within this paper. The ASGE does not have a position on early feeding (4).

### DOES EARLY FEEDING INCREASE RISK FOR PERITONEAL EXTRAVASATION OF GASTRIC CONTENTS?

The primary concern of clinicians with early post-PEG feeding is the possible increased risk of peritonitis, a potentially life threatening complication. PEG insertion involves placement of an internal bumper (also referred to as a crossbar) opposed to the gastric wall with adjustment of an external bumper opposed to the skin (Figures 1 and 2). Natural wound repair of the gastrocutaneous fistula tract eliminates the potential space into the peritoneal cavity over a period of days to weeks.

Yarze, et al studied the risk for hydroperitoneum with a water-soluble contrast agent three hours post button endoscopic gastrostomy placement (6). No subject (n = 25) demonstrated extravasation of contrast (300 mL) at three hours and no cases of peritonitis

were found. In this prospective, non-controlled study, EN was initiated at 4–6 hours post-PEG placement in an escalated bolus fashion 5 times per day (day 1 = 100 mL/bolus, day 2 = 200 mL/bolus, day 3 = bolus per patient need). One patient with quadraparesis and dysphagia had an aspiration event with the contrast study requiring tracheal intubation for acute respiratory failure. Three patients were diagnosed with peri-PEG cellulitis. There were no long term complications noted with greater than 6-month follow-up. Of note, the authors performed a pilot evaluation for potential contrast extravasation prior to developing this study (n = 10) with no evidence of hydroperitoneum.

Gupta, et al described in abstract form, 22 patients post-PEG placement that were evaluated for peristomal leak by radiography (7). One half hour post-PEG procedure Hypaque sodium solution (100 mL) was instilled into the G-tube and the patients placed in the prone position for one hour such that the G-tube was in the most dependent position. Three radiographs were obtained to identify leakage. No hydroperitoneum was identified in any of the study participants. Seventeen of the 23 patients were fed within 3–6 hours post procedure without difficulty. One patient in the study, who was fed late, developed peritonitis requiring surgical exploration post procedure day three. During exploration, the stomach wall was widely separated from the abdominal wall, not identified during post procedure study.

Nolan, et al described radiologic evaluation (standard abdominal flat plat after Hypaque injection into G tube) for leakage in 9 patients within 3 hours of placement of a PEG tube and in 9 patients at 24 hours after tube placement (8). None of the patients, irrespective of time of analysis, showed evidence of leakage.

### REVIEW OF TRIALS

There are few published trials in the literature to guide post-PEG feeding decisions. Detailed in the following sections, and summarized in the attached table, are the available data where studies of early versus delayed feedings were compared. “Early” is defined as same day initiation of a feeding regimen and “delayed” is defined as greater than 24 hours, or next day feeding. There are four peer-reviewed prospective studies

**Table 1**  
**Studies of Early vs Late Use of PEG's after Placement**

<i>Author (Year)</i>	<i>Study Type</i>	<i>Study Size</i>	<i>Early/Late Methods</i>
<b>Prospective Randomized Controlled Trial (PRCT)</b>			
Brown et al. (1995)	PRCT	n = 57	3 hr versus next day Delivery method and rate as per attending MD
Choudhry et al. (1996)	PRCT	n = 41	3 hr vs 24 hr Early Feeding Rate (continuous infusion): Day 1: 30 mL/hr × 24 hr, Then: increased to 70 mL/hr at end of 72 hr
McCarter et al. (1998)	PRCT	n = 112	4 hr vs 24 hr Early Feeding Bolus: 100mL every 4 hr × 6 200mL every 4 hr × 6 then goal
Stein et al. (2002)	PRCT	n = 80	1 hr vs 24 hr Early Feeding Rate (continuous infusion): Day 1: 30 mL/hr × 20 hr Day 2: 70 mL/hr Day 3: 100 mL/hr Day 4: Goal rate
Chumley et al. (1993)	PRCT Abstract	n = 150	3 hr vs 6 hr vs 24 hr continuous rate 50 mL/hr (n = 67); bolus feeds (n = 33).

Results

Wound Infection:	Early Group (n = 27)	Delayed Group (n = 30)
Transient melena:	1	4
Complications requiring DC of tube feeds:	0	1
Patients tolerating TF:	0	0
	all	all
<b>Max Residual Volume (mL)</b>	<b>Early Group (n = 21)</b>	<b>Delayed Group (n = 20)</b>
Day #1	17.4 mL	8.5 mL, (p = NS)
Day #2	14.9 mL	13.2 mL, (p = NS)
Day #3	8.1 mL	16.5 mL, (p = NS)
Gastric Residual (>60 mL)	2	1, (p = NS)
<b>Complications</b>		
Local infection	1	0, (p = NS)
Fever	1	0, (p = NS)
<b>Mortality</b>		
Within 72 hr	0	1
Day 4 to 30	3	3
<b>High Gastric Residuals</b>	<b>Early Group (n = 57)</b>	<b>Delayed Group (n = 55)</b>
(>50% of TF vol)	Day 1 14 (25%)	Day 1 5 (9%), (p = 0.029)
	Day 2 13 (23%)	Day 2 7(13%), (p = NS)
<b>Complications</b>		
Diarrhea	5	5, (p = NS)
Minor site bleed	1	0, (p = NS)
Transient GERD	1	0, (p = NS)
Mortality	0	1, (p = NS)
<b>Residual Volume</b>	<b>Early Group (n = 40)</b>	<b>Delayed Group (n = 40)</b>
Day #1	58 ± 76 mL	50 ± 65 mL, (p = NS)
Day #2	76 ± 47 mL	48 ± 39 mL, (p = 0.01)
Day #3	93 ± 111 mL	63 ± 79 mL, (p = NS)
Residual Volume >100 mL	13	11, (p = NS)
<b>Complications</b>		
Stomatitis	2 (5%)	0 (0%), (p = NS)
Leakage	0 (0%)	2 (5%), (p = NS)
Bleeding	0 (0%)	0 (0%), (p = NS)
Vomiting	3 (7.5%)	5 (13%), (p = NS)
Mortality (days 1–3)	2 (5%)	3 (7.5%), (p = NS)
Mortality (days 1–30)	12 (30%)	10 (25%), (p = NS)
<b>Complications</b>	<b>Early Groups (n = 100)</b>	<b>Late Group (n = 50)</b>
Increased gastric residual	1 in 3 hr group	0
Cellulitis around PEG site	1 in 6 hr group	0

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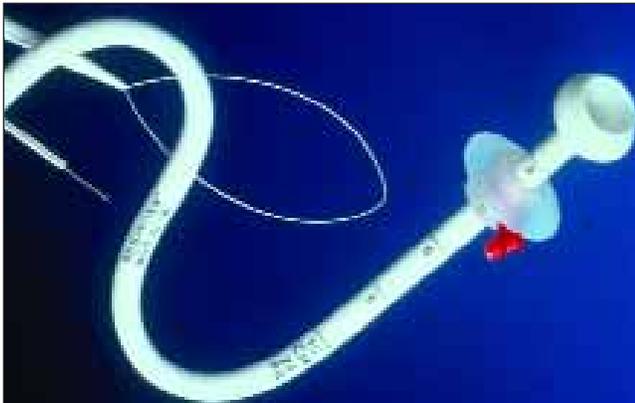


Figure 1.

where randomization between early and delayed groups occurred. There are several studies detailed in abstract form, as well as a few non-controlled series in published peer-reviewed journals.

### BEST EVIDENCE: CONTROLLED PROSPECTIVE TRIALS OF EARLY VERSUS DELAYED FEEDING

Choudhry, et al prospectively analyzed 41 subjects in randomized controlled fashion to early (within 3 hours) versus delayed feedings (after 24 hours) after PEG placement (9). The baseline demographics, method, composition, and rate of feedings were similar between groups (see Table 1 for details of feeding regimen). Feedings were continuous rather than bolus. Two subjects in the early intervention group versus one subject in the late intervention group had feedings held due to significant gastric residuals (arbitrarily defined significant gastric residual volumes as 60 mL). Complication rates and mortality data were similar among groups.

Stein, et al prospectively enrolled 80 patients in a randomized controlled trial comparing immediate feeding after PEG placement (within one hour) versus delayed feeding (after 24 hours) in intensive care and intermediate unit patients (10). The baseline demographics, method (continuous feedings), composition, and rate of feeding were similar between groups. Gastric residual volumes were measured as the primary end-point (Table 1). Residual volumes were similar between groups on day 1 and 3. Complication rates (stomatitis, leakage, bleeding) and mortality rates were

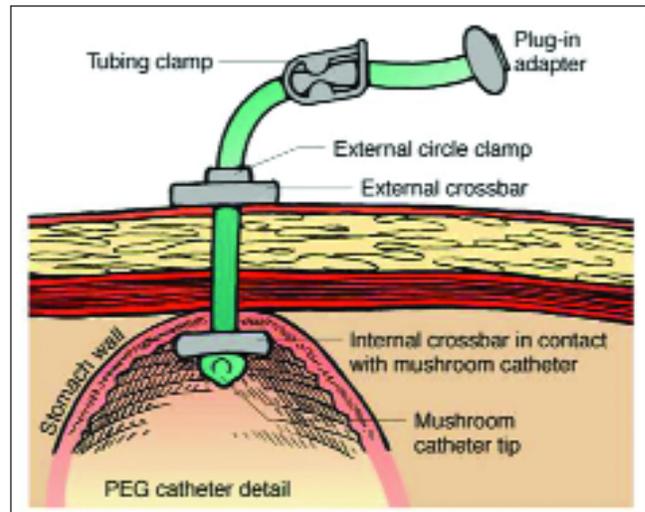


Figure 2. Percutaneous endoscopic gastrostomy tube in place in the stomach. (Smeltzer, S.C. and Bare, B.G. [2004]. *Brunner and Suddarth's textbook of medical surgical nursing* [10th ed., p. 998.]. Philadelphia: Lippincott Williams & Wilkins.) Copyright © 2005 Lippincott Williams & Wilkins Instructor's Resource CD-ROM to Accompany *Fundamentals of Nursing: The Art and Science of Nursing Care*, Fifth Edition.

similar between groups both in short-term analysis (3 days) and long-term follow-up (30 days).

McCarter, et al prospectively studied 112 patients referred to the GI Department in a controlled randomized fashion comparing early feedings (4 hours) versus delayed feeding (24 hours) after PEG placement (11). A bolus-feeding regimen was pursued. Demographic data was not available for review. Gastric residuals were measured prior to each feeding and if residuals were greater than 50% of previous infusion amount, the feedings were held. Twenty five percent of the early feeding group had a high gastric residual on day 1 compared to 9% in the delayed feeding group ( $p = <0.029$ ). By day two, there was not a statistically significant difference in gastric residuals between the early versus delayed group (Table 1). One patient in the study died of aspiration pneumonia (delayed feeding group *without* high gastric residual prior to the event). Minor complications were similar between groups.

Brown, et al prospectively enrolled 57 patients in a controlled randomized trial comparing early (within 3 hours) versus delayed (next day) feeding regimen post PEG-placement (12). Baseline demographic data

Table 1 (continued from pages 52–53)  
Studies of Early vs Late Use of PEG's after Placement

Author (Year)	Study Type	Study Size	Early/Late Methods
<b>Prospective Non-Controlled Trial (PNCT)</b>			
Yarze et al. (2001)	PNCT	n = 25	Button Gastrostomy Feed at 4–6 hours Contrast radiography at 3 hours
Dubagunta et al. (2002)	PNCT	n = 77	All patients fed at 4 hours post procedure Feeds initiated at 1/2 goal and advanced to goal within 24 hours
Bajaj et al. (1993)	PNCT	n = 48	Within 6 hours versus next day feedings

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between groups were not available for review. The feeding regimen was not standardized nor described in the study. The feeding protocol was determined by the attending physician's discretion. All patients tolerated the feeding regimen without complication. Details of minor complications are listed in the Table 1.

Chumley, et al describes in abstract form a prospective randomized controlled study of 150 patients (13). Three groups were compared. Groups 1 and 2 were fed early (group 1, n = 50 — fed at 3 hours; group 2, n = 50 — fed at 6 hours). Delayed feedings took place after 24 hours. Patients were matched for age, sex and reason for PEG placement (details not available). Feeding regimens varied for early groups (67 patients were fed continuously, 33 patients were fed by bolus). One patient in the 3-hour group developed increased gastric residuals (volume not defined).

### NON-CONTROLLED TRIALS OF EARLY VERSUS DELAYED FEEDING

Werlin, et al enrolled 24 of 28 consecutive pediatric subjects in a prospective non-controlled series (14). Patients were fed within 6 hours of PEG placement (PEG vented for 2 hours followed by clamping for 4

hours) with Pedialyte in 30 to 60 mL boluses. Feedings were separated by 3 to 4 hours. Minor complications were encountered: 3 with peri-PEG erythema, 2 with vomiting. No major complications were noted. Twelve of 13 patients were discharged within 24 hours on full feedings; one patient required continued hospitalization for an asthma exacerbation.

Bajaj, et al described in abstract form a series of 45 patients comparing early feeding (within 6 hours, n = 23) versus next day feeding (n = 22) (15). No short-term complications were noted and long-term complications were similar among the early and delayed feeding groups. Kirby, et al reported observations in a consecutive group of 55 patients (16). In this study, the majority of patients were fed on the same day of the procedure. Five patients (9%) developed aspiration pneumonia. Further review of early feedings is not possible in this study given the lack of details. Dubagunta, et al described early feedings in a series of 77 patients (17). Feedings were initiated at 4 hours post procedure at one half-goal rate. Feedings were advanced to goal within 24 hours. There was one case of aspiration pneumonia and one death related to underlying disease within the thirty day follow up of the study. Navarro, et al studied 14 consecutive patients fed within 3 hours post PEG placement (18). No complications related to early feeding were identified.

<i>Results</i>		
Contrast extravasation:	0	None at 6 months
Aspiration:	1	
Peri-PEG cellulitis:	3	
Tolerated tube feeding:	25	
Asp. Pneumonia:	1 (1.3%)	Not Applicable
Death– not related to procedure:	1 (1.3%)	
	<b>Early group (n = 23)</b>	<b>Late group (n = 22)</b>
Cellulitis	2	2

### DOES EARLY FEEDING INCREASE RISK FOR ASPIRATION?

Placement of PEG tubes can induce ileus and gastroparesis. Concern exists for early feeding increasing the risk for aspiration related events. Of the controlled prospective studies to date, there has been no significant increase in aspiration complication rates reported. One patient with quadraparesis in the non-controlled Yarze study had an aspiration event. Outside of a controlled comparison, determining the significance of this complication is not possible.

### WHAT ABOUT POST-GASTROJEJUNOSTOMY PLACEMENT?

Kirby, et al described a non-controlled series of 27 patients with severe brain injury who had feedings initiated within four hours after placement of a percutaneous gastrojejunostomy tube (19). One patient developed abdominal distension requiring discontinuation of feedings; otherwise, no complications of early feedings were described. Full caloric feedings were achieved in a mean of 4.2 days.

### CONCLUSION

With the advent of percutaneous placement of enteral

feeding devices into the gastric cavity, management of EN has evolved significantly over the last 25 years. Variability exists regarding the time at which EN should be initiated post-PEG placement, as well as the quantity and rate (bolus versus continuous infusion). There are sufficient randomized prospective controlled trials to support early nutritional intervention post-procedure, as soon as one hour after placement (10). The decision to pursue early feeding (i.e. within 3–6 hours after PEG placement) appears justified by the available literature with no clear evidence of harm. In fact, withholding early EN may be more harmful than proceeding forward with the much needed nutrition and hydration given the patient populations selected for PEG placement. ■

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