ORIGINAL ARTICLE

Transnasal endoscopy vs. fluoroscopy for the placement of nasoenteric feeding tubes in critically ill patients

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Background: Placement of a nasoenteric feeding tube (NET) beyond the pylorus in critically ill patients is desirable. Bedside methods are unreliable, and fluoroscopic methods require transport and/or radiation exposure. Traditional endoscopic methods require sedation and oronasal transfer techniques. Transnasal techniques of NET placement by using recently developed ultrathin endoscopes have been described. The object of this prospective study was to compare the efficacy of NET placement by using ultrathin transnasal endoscopy vs. fluoroscopic placement.

Methods: This is a prospective randomized study of endoscopic vs. fluoroscopic NET placement. The settings of the study were intensive care units at academic medical center. The study included 100 consecutive patients who required NET placement. They received endoscopic NET placement at the bedside with a 5.1-mm, ultrathin endoscope by using a transnasal over-the-wire technique vs. fluoroscopic NET placement by using standard techniques. The procedure success was defined as postpyloric (beyond the duodenal bulb) NET placement, jejunal placement success, and procedure time.

Results: Tube placement success was not significantly different between endoscopic and fluoroscopic methods (90% with both methods; $p = 1.00$). The endoscopic procedure duration (12.8 $\pm$ 6.4 minutes) was significantly shorter than fluoroscopic procedure duration (19.3 $\pm$ 12.0 minutes) ($p < 0.001$). Procedure duration decreased significantly (from 17.3 $\pm$ 6.2 minutes to 8.0 minutes $\pm$ 4.2 minutes, $p = 0.04$), and jejunal placement increased significantly (from 60% to 100%, $p = 0.04$) from the first to the last 10 endoscopic procedures.

Conclusions: NET placement success with an ultrathin transnasal endoscope is equivalent to fluoroscopic placement with faster procedure times. More distal placement and procedure times improve with increasing experience with the endoscopic technique. Endoscopic NET placement can be performed at the bedside without the need for oronasal transfer, additional sedation, or fluoroscopy. (Gastrointest Endosc 2005;62:661-6.)

Early enteral nutritional support for critically ill patients improves outcomes in a variety of clinical situations.[1,2] Enteral nutrition is thought to be a key factor in maintaining the normal gut mucosal barrier function. Maintenance of gut integrity may lead to less bacterial translocation and decreased stimulation of the systemic inflammatory response that is associated with attendant complications, including multiorgan failure.[3,4] Intragastric tube feeding is more physiologic but often is complicated by intolerance in the critical care setting, resulting in inadequate provision of calories.[5,6] In contrast, jejunal feeding provides more reliable nutritional support and is favored by many physicians. Recent data also suggest that nasojejunal feeding decreases the risk of aspiration- and ventilator-associated pneumonia.[7,8] Postpyloric nasoenteric feeding tube (NET) placement may be achieved by using bedside, fluoroscopic, or endoscopic techniques. However, the current methods have variable success, are logistically difficult, and/or may be associated with significant complications.

Blind bedside placement of postpyloric feeding tubes is time consuming, often ineffective, and technically difficult. Radiographic confirmation of the tube position is mandatory, and significant complications have been reported.[9] As a result, postpyloric feeding tubes are most commonly placed under fluoroscopic guidance. However, this requires patient transportation to the radiology suite and nursing and respiratory therapy support. Complications may occur during transport, and fluoroscopy exposes patients and staff to radiation. Endoscopic placement of

0016-5107/$30.00
doi:10.1016/j.gie.2005.04.027

NETs is well described but is less frequently used because of increased costs, the need for sedation, and the lack of accepted standard placement techniques. Despite these drawbacks, endoscopic placement is still used with excellent results when other methods fail.[10]

Recently, ultrathin endoscopes have become widely available and allow transnasal, unsedated endoscopy. A technique for transnasal endoscopic placement of NETs has been described that can be performed at the bedside without the requirement of additional sedation.[11] Bedside placement negates the cost and the complications of transportation and, because additional sedation is not required, reduces the risk for hemodynamic and respiratory complications in these critically ill patients. The transnasal endoscopic approach eliminates the additional time and the difficulty of oronasal transfer techniques used with other endoscopic NET placement methods. The aim of this prospective study was to compare the efficacy of transnasal endoscopic placement of NETs by using an ultrathin endoscope with standard fluoroscopic NET placement in critically ill patients.

Capsule Summary

What is already known on this topic

- NETs may be placed by multiple methods, including endoscopic, fluoroscopic, or bedside techniques.
- Recently, a transnasal endoscopic method with an ultrathin endoscope has been developed but not compared with the standard widely used fluoroscopic placement.

What this study adds to our knowledge

- The study found that both methods were equally successful in postpyloric placement and after ligament of Treitz placement.
- In addition, endoscopic procedure duration was significantly shorter without radiation exposure, the need for transport to radiology, or additional sedation.
- The results of this paper suggest that endoscopic placement of NETs when using an ultrathin endoscope technique is an alternative to traditional fluoroscopic placement.

PATIENTS AND METHODS

A total of 100 consecutive patients in the medical or surgical intensive care units (ICU) at the University of Utah Hospital, who required nasoenteric feeding tube placement were randomized to routine fluoroscopic placement vs. bedside placement with an ultrathin nasal endoscope. Randomization was by computer-generated random numbers in consecutively numbered, sealed opaque envelopes to assure concealed allocation. Inclusion criteria were the following: the need for short-term enteral support, as determined by the treating ICU physicians, and the absence of contraindications to standard upper endoscopy. Exclusion criteria were the following: preexisting nasopharyngeal abnormalities that make nasal intubation unusually difficult or impossible, ileus or mechanical bowel obstruction, or the inability to obtain informed consent from the patient or the authorized legal representative. The study protocol was approved by the University of Utah Health Sciences Center Institutional Review Board before study initiation. Written informed consent was obtained from each patient or authorized legal representative before initiation of the study protocol.

All endoscopies were performed at the bedside in the ICU by one of two endoscopists (J.C.F., J.A.D.) who had performed 4 procedures combined with the technique before study initiation. Gastroenterology fellows assisted on 12 of the 50 endoscopic placements. Patients were supine during the procedure, and no additional intravenous sedation was used. Patients in either group could be receiving sedatives before tube placement per their usual ICU care. Local anesthesia was provided with 1.5 mL of a 4% lidocaine and 1% phenylephrine solution delivered by an atomizer into a nare. A 5.1-mm outer diameter, ultrathin endoscope (EG-1540; Pentax, Melville, NY) was passed transnasally into the esophagus, and a standard EGD was performed. A 0.038-inch, 260-cm guidewire (Jagwire; Microvasive Endoscopy, Boston Scientific Corp, Natick, Mass) was passed through the accessory channel of the endoscope as far distally into the small bowel as possible by using tactile sensation and visual guidance. The endoscope then was withdrawn while maintaining the wire position. A 9F nasoenteric feeding tube (Sandoz Nutrition, Minneapolis, Minn) then was passed over the wire, as deeply as possibly, the wire was removed, and the NET was secured at the nares with a suture. The final position was determined by abdominal radiograph interpreted by the on-duty attending radiologist.

Fluoroscopic placement was performed in the fluoroscopy suite in the radiology department or at the bedside by using C-arm fluoroscopy per standard protocol by attending or resident (under attending supervision) radiologists assigned to fluoroscopy. An 8F, 120-cm polyurethane Fredrick-Miller tube with an internal polytetrafluoroethylene-coated guidewire was passed transnasally, with the patient supine, and was advanced into the gastric antrum under fluoroscopic guidance. The patient was turned to the left posterior oblique position for further manipulation of the catheter through the pylorus and into the distal duodenum or jejunum. Attending radiologists or radiology residents performed all procedures. The final position was determined by abdominal radiograph interpreted by the on-duty attending radiologist.

Data were collected for the success rate, tube position, procedure duration, and complications of placement (bleeding, aspiration, pulmonary, hemodynamic). Procedure