Techniques in Gastrointestinal Endoscopy 17 (2015) 152–160

Contents lists available at ScienceDirect

Techniques in Gastrointestinal Endoscopy

journal homepage: www.techgiendoscopy.com/locate/tgie

Advances in nutritional delivery interventions

Bryan Silon, MD, John C. Fang, MD*

Division of Gastroenterology, Hepatology and Nutrition University of Utah School of Medicine, 30 N 1900 E SOM 4R118, Salt Lake City, Utah 84132

ARTICLE INFO

Article history:
Received 31 August 2015
Accepted 31 January 2016

Keywords:
Enteral nutrition
Nasoenteric tubes
Percutaneous endoscopic gastrostomy
Percutaneous gastrojejunostomy
Direct percutaneous endoscopic jejunostomy

ABSTRACT

Enteral feeding is the preferred method of nutrition support when oral feeding is inadequate and a functional gastrointestinal tract is present. Endoscopic directed access for enteral nutrition may be established for nasoenteric tubes, percutaneous endoscopic gastrostomy, percutaneous gastrojejunostomy, or direct percutaneous endoscopic jejunostomy. This article would review the most common endoscopic methods with emphasis on helpful expert tips as well as recent innovations to facilitate placement success and decrease complications. Recent innovations include the modified drag technique and pull technique and electromagnetic sensor–guided placement of nasoenteric tubes. The introducer method using gastropexy and transnasal endoscopy can be useful in certain situations for percutaneous endoscopic gastrostomy. The drag and clip technique and transgastrostomy endoscopy for percutaneous gastrojejunostomy, and balloon-assisted enteroscopy for direct percutaneous endoscopic jejunostomy can improve success and efficiency for jejunal access. Finally new techniques for stoma fistula closure, periprocedural anticoagulation management and indications for radiologic placement of feeding tubes are detailed as well. The expert endoscopist should have a variety of tools and techniques in his armamentarium for successful and safe enteral feeding tube placement.

1. Introduction

Enteral feeding is the preferred method of nutrition support when oral feeding is inadequate and a functional gastrointestinal (GI) tract is present. Endoscopic insertion of enteral feeding tubes was a major advance in the delivery of nutrition therapy with the first report of the percutaneous endoscopic gastrostomy (PEG) in 1980 [1]. As that report endoscopic techniques for placement of nasoenteric tubes (NET), percutaneous gastrojejunostomy (PEGJ), and direct percutaneous endoscopic jejunostomy (DPEJ) have been described as well.

This article would review the standard endoscopic techniques for enteric feeding tube placement (NET, PEG, PEGJ, and DPEJ) and highlight expert tips and recent innovations designed to enhance the endoscopist's technical success and outcomes. Additionally, innovations in nonendoscopic methods for NET placement, developments in periprocedural anticoagulation management, and comparison with radiologic feeding tube placement that the endoscopist should be aware of, would be detailed as well.

2. Nasoenteric feeding tubes

NET are inserted when short-term access (< 4 weeks) is required for enteral nutrition and can be placed blindly at the bedside, using fluoroscopy or with endoscopic guidance. Contraindications to endoscopic insertion are obstructing head, neck, and esophageal pathology. The drag method and pull method has traditionally been the standard endoscopic technique employed. A forceps is used to grasp the distal end for the feeding tube or a suture attached to the end of a feeding tube, which is then dragged into position in the small bowel. Alternatively, when using the over-the-guidewire technique, the endoscope is advanced into the small bowel and a guidewire is then passed through the working channel into the proximal jejunum. The guidewire is subsequently advanced whereas the endoscope is withdrawn, maintaining position of the guidewire tip in the jejunum. As the guidewire is traditionally passed with transoral endoscopy, an oral-nasal transfer of the guidewire must be performed. The feeding tube is then passed back over the guidewire into position. The over-the-guidewire technique can also be performed with transnasal endoscopy using a small caliber (5-6 mm diameter) endoscope to obviate the need for oral-nasal transfer and can be performed

John C. Fang is the Owner and CMO of Veritract and is also a consultant for Boston Scientific. The other author attests that he has no commercial associations (eg, equity ownership or interest, consultancy, patent, and licensing agreement, or institutional and corporate associations) that might be a conflict of interest in relation to the submitted review.

* Corresponding author.
E-mail address: John.Fang@hsc.utah.edu (J.C. Fang).

http://dx.doi.org/10.1016/j.tgie.2016.01.005
0049-0172/

with minimal or no sedation. The smaller caliber endoscope passed orally or nasally may be used in patients with stenosis, partial obstruction, malignancy, upper GI stents, or otherwise altered anatomy [2]. The trade-off, however, is that these ultrathin endoscopes are more prone to coiling limiting the distal extent reached in the small bowel.

2.1. Expert tips

Coiling is problematic with each of the aforementioned techniques and several expert tips can facilitate successful deep enteral access. Selecting a stiffer scope reduces the risk of coiling and a pediatric colonoscope is preferred over a small bowel enteroscope for transoral endoscopy. Similarly, stiffer guidewires can help prevent coiling to maximize the depth of tube placement [3]. Optimal wire length is also integral to deep access and should be at least twice the length of the endoscope plus 20 cm to allow the endoscope to be fully withdrawn without displacing the tip of the guidewire [3]. Keeping the stomach decompressed to minimize gastric volume can also reduce coiling when advancing ultrathin endoscopes and is also important when withdrawing any type of endoscope as leaving the guidewire as straight as possible would allow deeper placement of the feeding tube. In addition, leaving the feeding tube less looped in the stomach would help prevent retrograde migration after placement.

2.2. Innovations

2.2.1. Modified drag-and-pull (drag and clip) technique

Maintaining the position of NET beyond the pylorus is often problematic because of retrograde migration, which occurs in up to 31% of the patients [4]. This can occur at the time of initial placement as the endoscope is withdrawn or after placement if there is excessive looping of the feeding tube in the stomach. Use of an endoscopic recloseable clip to attach the distal tip of a feeding tube to the small bowel mucosa can prevent retrograde migration. In a randomized trial comparing standard over-the-wire to clip-assisted placement (in which the feeding tube with a nonabsorbable suture fixed to the tip is picked up in the stomach and then clipped to the duodenal wall) (Figure 1), spontaneous retrograde tube migration was reduced from 4.2%-1.4% [4]. The number needed to clip to avoid 1 repeat endoscopy was 4.8 (95% CI: 3.1-11.3) [4]. Clip placement added 3 minutes to mean procedure time and increased mean cost per patient, which may be offset when radiographs are excluded from the clip group [4]. A systematic review identifying 5 cohort series with 41 patients did not observe any spontaneous migration of feeding tubes after clipping [5]. Although a single clip usually prevents retrograde migration, this would not always prevent dislodgement as the endoscope is withdrawn that occurs more frequently with larger diameter endoscopes. In this situation, 2-3 clips can be deployed to secure the tip of the tube.

2.2.2. Electromagnetic sensor-guided enteral access system

NET placed blindly at the bedside have the potential for significant complications including bronchial placement, pneumonia, pneumothorax, bronchopleural fistula, perforation, mediastinitis, and death [6]. A recent development to assist with bedside placement is the electromagnetic sensor-guided enteral access system (EMS-EAS) (Cortrak, Corpak MedSystems, Inc, IL). This system was introduced in 2005 and uses an electromagnetic stylet to transmit a signal from the tip of the feeding tube that is tracked

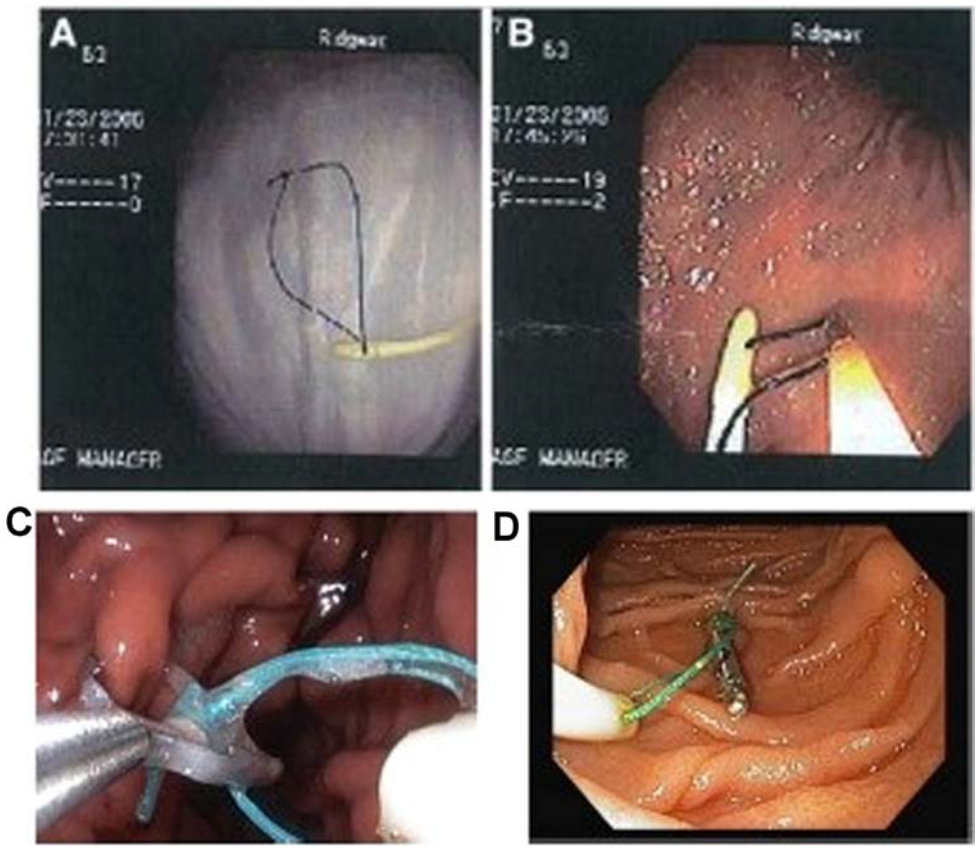

Fig. 1. Endoclip use in the placement of jejunal feeding tubes. (A) A nonabsorbable suture is attached to the distal tip of the feeding tube, which is then advanced blindly into the stomach via the nasopharynx. (B and C) The suture is grabbed with a reclosable clip in the stomach and dragged into the jejunum. (D) The suture is clipped to the bowel mucosa to prevent retrograde migration. (Reprinted with permission from Schrijver et al and Udorah et al [5,33]). (Color version of figure is available online.)