Technical Innovation

Direct Percutaneous Transperitoneal Duodenostomy: An Alternative Form of Enteral Feeding

James H. Turner[1,2] and Gerhard R. Wittich[1]

Over the last few decades, various ways of placing feeding tubes into the gastrointestinal tract have become available, namely surgical, percutaneous endoscopic, and radiologic imaging-guided percutaneous placements [1–3]. Most commonly, imaging-guided gastrostomy or enterostomy is performed on patients with an impaired swallowing mechanism caused by neurologic insult and for mechanical obstruction caused by malignancy of the upper gastrointestinal tract. In patients with altered upper gastrointestinal anatomy, the standard methods of placement may not be possible. In such cases, variations of the standard placements have been devised. The transhepatic approach for gastrostomy placement, direct percutaneous jejunostomy, and translumbar duodenostomy have been described [4, 5]. We report a case of transperitoneal duodenostomy as an alternative for enteral feeding in a patient with altered upper gastrointestinal anatomy.

Subject and Methods

The patient was a 43-year-old man with a history of congenital esophageal atresia and tracheoesophageal fistula treated with a colonic interposition graft as a child. As an adult, he developed a stricture in the graft, which was treated with resection of the graft and a gastric pull-up. The patient required long-term enteral access and nutrition because of an anoxic brain injury that occurred during a prolonged hospital stay. The referral was made from the gastroenterology service, which had been unable to place a feeding tube endoscopically.

A portable C-arm (Stenoscope Plus; General Electric Medical Systems, Milwaukee, WI) was brought to the CT suite. With the patient on the CT table (9800 HiLight Advantage; General Electric Medical Systems), the C-arm was used to place a Dotter retrieval basket (Cook, Bloomington, IN) through the mouth into the second portion of the duodenum (Figs. 1A and 1B). Using CT guidance, we found a narrow anatomic window to allow percutaneous puncture with an 18-gauge, Pencil Point needle (Cook). The needle was passed medial and inferior to the right lobe of the liver and to the right of any loops of small intestine. The needle passed inferior to the large intestine. A Rosen guidewire (Cook) was passed through the needle. The guidewire was grasped with the basket and pulled into the gastric remnant. The percutaneous tract was dilated with dilators and a vanSonnenberg 10-French feeding tube (Boston Scientific, Watertown, MA) was placed over the guidewire (Fig. 1C). The patient returned 30 days later, and a 14-French gastrostomy feeding tube (Cook) was advanced into the jejunum. The tube functioned well until the patient's death 5 months later.

Discussion

In patients who have had a gastrectomy or gastric pull-up, the jejunum or duodenum becomes a potential target for percutaneous placement of feeding tubes. Access to a jejunal loop is feasible using fluoroscopic, sonographic, or CT guidance, particularly if the loop is fixed in position as a result of adhesions. However, placement of a feeding tube into a mobile jejunal loop can be technically challenging. Conversely, the second portion of the duodenum is fixed in a retroperitoneal position and, therefore, presents an easier target. A disadvantage of the translumbar route is the inconvenient posterior position of the feeding tube. Disadvantages of the transhepatic route include complications such as ascending cholangitis or vascular injury. An anterior transperitoneal route to duodenal puncture is feasible with careful imaging guidance. We have successfully placed duodenal feeding tubes using an anterior supramesocolic approach after defining the inferior margin of the liver with sonography and after identifying the transverse colon with radiography. The patient described here presented a special anatomic challenge because of the cranial position of the transverse mesocolon. Using CT guidance, a narrow but safe inframesocolic, extrahepatic window was found. Fluoroscopic placement of a large retrieval basket into the second portion of the duodenum facilitated puncture of the duodenum as well as insertion of a guidewire and feeding tube.

With the advent of imaging-guided percutaneously placed feeding tubes, there has been discussion as to whether fixation of the anterior wall of the gastrointestinal tract (gastropexy or enteropexy) should be performed with place-

Received May 5, 2000; accepted after revision June 23, 2000.

[1]Department of Radiology, University of Texas Medical Branch, 301 University Blvd., Galveston, TX 77555. Address correspondence to G. R. Wittich.

[2]Present address: Department of Radiology, Denver Health Medical Center, 777 Bannock St., Denver, CO 80204.

AJR 2001;176:159–160 0361–803X/01/1761–159

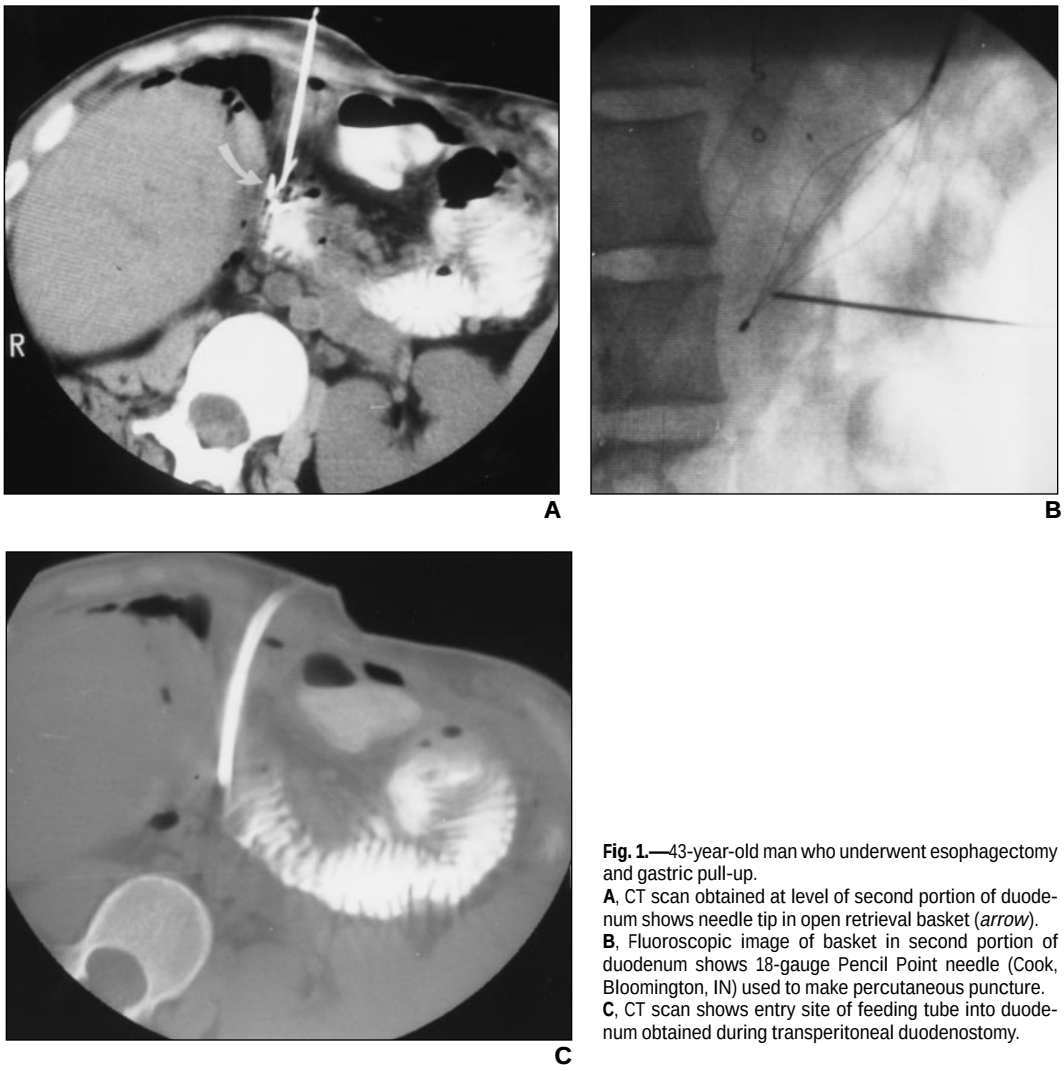

Fig. 1.—43-year-old man who underwent esophagectomy and gastric pull-up.
A, CT scan obtained at level of second portion of duodenum shows needle tip in open retrieval basket (*arrow*).
B, Fluoroscopic image of basket in second portion of duodenum shows 18-gauge Pencil Point needle (Cook, Bloomington, IN) used to make percutaneous puncture.
C, CT scan shows entry site of feeding tube into duodenum obtained during transperitoneal duodenostomy.

ment of the feeding tube. Gastropexy or enteropexy allows large-bore tubes (14-French or larger) to be placed initially, and it facilitates replacement of the feeding tube should it become dislodged [6]. However, older series report good function of the feeding tubes without gastropexy or enteropexy [7, 8]. Therefore, fixation of the stomach or small intestine to the anterior abdominal wall is not an absolute requirement for a functional percutaneous feeding tube.

CT facilitates accurate anatomic localization. The transperitoneal route was successful in this patient because we were able to avoid loops of small intestine to the left and the large intestine superiorly. Without CT such precise localization might not have been possible. We conclude, therefore, that combined CT and fluoroscopic guidance for transperitoneal percutaneous puncture of the duodenum may provide a safe alternative for enteral access in patients with altered upper gastrointestinal anatomy.

References

1. vanSonnenberg E, Wittich GR, Cabrera O, et al. Percutaneous gastrostomy and gastroenterostomy. 2. Clinical experience. *AJR* **1986**;146:581–586
2. Barkmeier JM, Trerotola SO, Wiebke EA, et al. Percutaneous radiologic, surgical endoscopic, and percutaneous endoscopic gastrostomy/gastrojejunostomy: comparative study and cost analysis. *Cardiovasc Intervent Radiol* **1998**;21:324–328
3. Cosentini EP, Sautner T, Gnant M, Winkelbauer F, Teleky B, Jakesz R. Outcomes of surgical, percutaneous endoscopic, and percutaneous radiologic gastrostomies. *Arch Surg* **1998**;133:1076–1083
4. Kanazawa S, Naomoto Y, Hiraki Y, Yasui K, Matsuno T. Percutaneous feeding gastrostomy in patients with a partial gastrectomy: transhepatic approach with CT guidance. *Abdom Imaging* **1995**;20:302–306
5. Koolpe HA, Dorfman D, Kramer M. Translumbar duodenostomy for enteral feeding. *AJR* **1989**;153: 299–300
6. Ryan JM, Hahn PF, Boland GW, McDowell RK, Saini S, Mueller RR. Percutaneous gastrostomy with T-fastener gastropexy: results of 316 consecutive procedures. *Radiology* **1997**;203:496–500
7. Halkier BK, Ho CS, Yee AC. Percutaneous feeding gastrostomy with the Seldinger technique: review of 252 patients. *Radiology* **1989**;171: 359–362
8. Hicks ME, Surratt RS, Picus D, Marx MV, Lang EV. Fluoroscopically guided percutaneous gastrostomy and gastroenterostomy: analysis of 158 consecutive cases. *AJR* **1990**;154:725–728