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# Direct Percutaneous Endoscopic Jejunostomy

Todd H. Baron

Department of Medicine, Division of Gastroenterology and Hepatology, Mayo Clinic, Rochester, Minn., USA

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## Abstract

Direct percutaneous endoscopic jejunostomy is a method of placing a jejunal feeding tube directly into the small bowel in a manner similar to placement of a percutaneous endoscopic gastrostomy tube. The advantages over other endoscopic methods of jejunal feeding include anchoring of the tube into the small bowel and large luminal diameter. Successful placement is achieved in approximately 85% of patients and the procedure is more technically challenging to perform than for percutaneous endoscopic gastrostomy. This chapter reviews the method of direct percutaneous endoscopic jejunostomy tube placement and outcome following attempted placement.

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Direct percutaneous endoscopic jejunostomy (DPEJ) was described more than 20 years ago. The technique for DPEJ placement has been described [1, 2] though is not standardized. The alternative to DPEJ placement is percutaneous endoscopic gastrostomy (PEG) placement with jejunal extension (PEG-J). The advantages of DPEJ over PEG-J are the ability to place a larger diameter feeding tube (decreased clogging) and the anchoring of the tube into the jejunum since the J-extension tube of a PEG-J often migrates back into the stomach. In fact, DPEJ has been shown to provide better long-term placement than PEG-J [3].

## Indications for and Contraindications of DPEJ Placement

Long-term jejunal feeding is necessary in a variety of clinical situations (table 1). These include patients considered at high risk for or have been documented to have aspiration of gastric feedings, those with non-functional stomachs (diabetic gastroparesis), patients with esophageal obstruction, and patients needing tube placement for feeding and venting and whose stomachs are not accessible or amenable for PEG placement (subtotal gastrectomy, distal esophagectomy with gastric pull-up).

## Preprocedural Evaluation

Prior to the DPEJ, laboratory evaluation as for PEG should be undertaken including CBC, platelets, and coagulation parameters. The type of endoscope used is based on whether the patient

has native gastrointestinal anatomy or surgically altered anatomy. In patients with native anatomy, colonoscopes or enteroscopes are required to pass beyond the ligament of Treitz. Surgeries in which a standard upper endoscope is long enough to reach the jejunum are seen in table 2. Preprocedural antibiotics should be administered as in PEG placement.

### **Required Accessories**

A standard PEG tray is needed. A colonic length polypectomy snare is needed when a longer endoscope is used, since the standard PEG tray snare has a length for passage through a standard upper endoscope. Glucagon or another antiperistaltic agent should be readily available to administer in order to reduce motility.

### **Position**

The patient is kept in the supine position. If possible the head of bed can be raised to reduce the risk of aspiration if retained food (e.g. in the setting gastroparesis) is present. Alternatively, the patient can be placed in the left lateral decubitus position until the small bowel is entered.

### **DPEJ Insertion**

After the endoscope has been passed into the duodenum, an antiperistaltic agent can be administered. Immediately after the endoscope has been passed into the jejunum the endoscopist and assistant should look for an area of transillumination, since on occasion, an ideal location will be found upon insertion and not withdrawal of the endoscope. In most cases, the light transillumination will be located in the left upper quadrant, though one should be aware that the light may be seen virtually anywhere in the abdomen and may be found in the left flank or in the pelvis. Abdominal scars do not necessarily need to be avoided since a loop of small bowel may be adhered and fixed at this point. Although transillumination and indentation are required to safely perform DPEJ, the transillumination is frequently not as bright as for PEG placement. Thus, the transillumination button on the processor should be used liberally and all room lights and extra-neous display monitors should be turned off.

Once an area of transillumination and indentation has been identified, the person performing the non-endoscopic portion of the procedure needs to act quickly, since the transillumination location may change during the course of the procedure. The abdomen is quickly prepped and draped and lidocaine is used for local anesthesia. At this point, the middle-length needle in the PEG tray is used as a 'finder needle'. Once this needle has been passed transabdominally and is identified endoscopically, it should be grasped as firmly as possible with the snare to fix the small bowel close to the abdominal wall. The trocar is then passed percutaneously alongside the finder needle in the same trajectory (fig. 1). When the trocar is visible endoscopically, the finder needle is released from the snare and the trocar is endoscopically grasped with the snare (fig. 2). Care must be taken to grasp the trocar tightly enough that it is not released, but not so tight that it kinks the catheter once the stylet has been removed. The remainder of the examination proceeds as with PEG placement as the loop is passed through the trocar and grasped (fig. 3) and the endoscope is

**Table 1.** Indications and contraindications for DPEJ placement

*Indications*

1. Patients whose stomach is obstructed or non-functional (diabetic gastroparesis)
2. Patients at high-risk or with documented aspiration of gastric feedings
3. Patients with previous gastric resection or gastric bypass in whom PEG placement (for feeding or venting) is not feasible
4. Intrathoracic stomach in those patients requiring enteral access
5. Patients with complications of acute and chronic pancreatitis
6. Patients with distal esophageal carcinoma - preoperative nutritional support to avoid PEG which may interfere with gastric pull-up

*Contraindications*

1. Large volume ascites
2. Uncorrected coagulopathy
3. Inability to obtain informed consent
4. Intra-abdominal perforation
5. Pregnancy

**Table 2.** Postsurgical anatomy in which an upper endoscope may be used for DPEJ placement

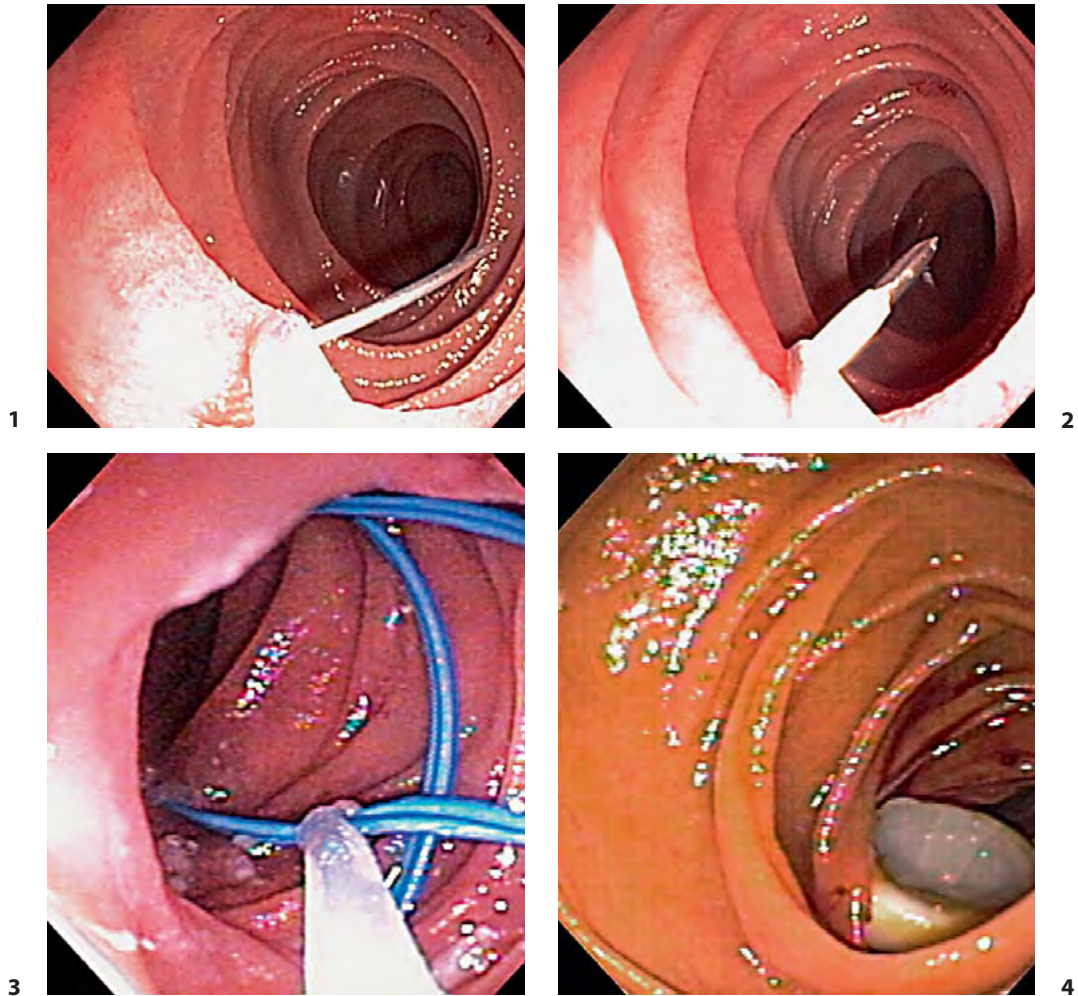
Prior subtotal gastrectomy with inability to transilluminate or indent  
Prior total gastrectomy  
Ivor-Lewis (distal esophagus and proximal gastric resection)  
Billroth II  
Gastric bypass with Roux-en-Y gastrojejunostomy  
Pancreaticoduodenectomy with antrectomy (Whipple procedure) with inability to transilluminate and indent

withdrawn. The endoscope does not need to be reinserted to confirm proper location (fig. 4) after it has been pulled into position unless excessive resistance is encountered (which occasionally occurs at the pylorus), or if the tube feels like it is in place under the skin but the length of external tube is excessive (the tube should be at the 2- to 3-cm mark externally when in correct position).

Fluoroscopy has been described as being helpful during DPEJ placement, although it may allow one to identify the tip of the endoscope in relation to the surface of the abdomen. Its use, however, is not a substitute for adequate transillumination and indentation.

### **Special Considerations**

*Altered Anatomy.* In patients with Billroth II or Whipple anatomy where there is an afferent and efferent jejunal limb, the tube should be placed into the efferent limb or the location where the limbs meet. For example, in patients with Billroth II anatomy, one can locate the papilla or proximal stump of the afferent limb endoscopically, then withdraw the endoscope and pass the endoscope into the other limb. On occasion, in patients with Billroth II anatomy the best transillumination is found at the branch point between the two limbs. Assuming that the patient did well



**Fig. 1.** Endoscopic view taken during DPEJ placement. The middle-length needle is grasped with the snare to maintain adherence to the anterior abdominal wall. **Fig. 2.** The trocar has been passed into the jejunal limb and grasped. **Fig. 3.** The loop has been passed through the trocar and grasped with the snare. **Fig. 4.** Endoscopic view showing position of the 20-french tube in the jejunum.

with per oral intake prior to PEG (neurologic dysphagia), this location should be adequate for jejunal feeding. In patients with Roux-en-Y gastrojejunostomy, the jejunal limb is the only efferent limb leading away from the stomach and usually easily reached with an upper endoscope.

*Gastric Decompression.* Some patients with severe gastroparesis require both gastric decompression and jejunal feeding.

*Transgastric DPEJ.* In some instances, a patient with an existing PEG needs DPEJ feeding. It is technically feasible to pass a small caliber endoscope transgastrically through a mature PEG tract beyond the ligament of Treitz and perform DPEJ. The feeding tube is pulled through the PEG tract [4, 5].

## Timing of Postprocedural Feeding

In the absence of complications, the tube may be used for fluid and medications 4 h after placement. Tube feeding is usually initiated 12 h after placement.

## DPEJ Removal and Replacement

There is almost no published information concerning removal of DPEJ tubes. It is unknown what duration of time is required for maturation of the PEJ tract and safety of traction removal. Based upon PEG data, the tract should be mature at 4 weeks. At that time, conversion to skin level devices may be undertaken in the usual fashion. One should consider fluoroscopic confirmation of correct tube positioning after traction removal and replacement. If balloon replacement tubes are used, we inflate with less than the recommended volume of water (half the recommended volume) to keep the balloon volume small enough to prevent obstruction of the jejunal lumen.

Complications have been noted with traction removal of DPEJ tubes including bleeding and tract disruption with intraabdominal leakage. Therefore, some endoscopists prefer endoscopic removal by passing the endoscope into the jejunum, grasping the bumper with a snare, and cutting the tube externally. The endoscope is then withdrawn with the tube. In each individual patient the risk of traction removal of the tube must be weighed against the risk of endoscopic removal (which carries risks of sedation and perforation).

## Outcomes

In the largest series to date, of over 300 patients undergoing DPEJ placement the success rate was approximately 70%. Adverse events from DPEJ placement or removal occurred in 22.5% of cases including bowel perforation, jejunal volvulus, bleeding, abdominal wall infection and aspiration. Persistent enterocutaneous fistula after removal occurs at a higher rate than with PEG removal and up to 15% [6]. Obesity appears defined as a body mass index of at least 30, decreases DPEJ tube placement success rates and increased complication rates. The success rate was 96% for underweight patients, 81% for patients with a normal body mass index, 73% for overweight patients, and 60% for obese patients [7]. Thus, DPEJ placement, though a viable alternative for long-term enteral feeding, has a lower success rate and higher complication rate than PEG in adults. Limited data suggest DPEJ placement is safe and effective [8].

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Todd H. Baron, MD  
200 First Street SW, Charlton 8  
Rochester, MN 55905  
Tel. +1 507 266 6931, Fax +1 507 266 3939, E-Mail baron.todd@mayo.edu