

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Endoscopic Options for Enteral Feeding

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G&H Can you describe the differences between and applications of both enteral and parenteral nutrition?

MD By strict definition, enteral feeding is the placement of nutrients into the gut or digestive system. Normal eating by mouth would be considered enteral feeding. Patients who are unwilling to eat, or perhaps cannot swallow due to an esophageal tumor or poststroke mechanical dysfunction, can have a tube placed into their stomach or their small intestine to provide them with the same sort of enteral nutrients that are garnered with table food. Enteral feeding tubes deliver what is essentially a commercial blend of nutrients, which provides the daily supply of protein, calories, vitamins, and minerals. Beyond providing nourishment, enteral feeding helps to stimulate the immune system, most of which is part of the intestine, and also provides a feeling of satiety.

Parenteral nutrition is administered directly into the bloodstream in patients who cannot be fed enterally. For the most part, these are patients with a small intestinal obstruction or lack of sufficient small intestinal absorptive surface. As with enteral nutrition, parenteral nutrition provides a combination of fats, proteins, carbohydrates, vitamins, and minerals via intravenous (IV) pump over the course of 12–24 hours. Parenteral nutrition is considerably more expensive than enteral nutrition as a daily infusion and is associated with a number of more serious complications, including the possible development of infections in the bloodstream and in and around the catheter, as well as liver disease and bone disease. These complications manifest due to a number of factors. As

mentioned above, parenteral nutrition does not stimulate the gut immune system. Further, parenteral nutrition requires the administration of sugars directly into the bloodstream, which attract bacteria and fungi and favor infection. The concentrated sugars can also cause hyperglycemia. With regard to hepatic function, parenteral nutrition can promote fatty liver disease or hepatic steatosis, occasionally to the point where liver failure develops, requiring transplantation. Finally, although the mechanism is not known, it has been documented that patients on parenteral therapy for an extended period of time will develop a combination of osteomalacia and osteoporosis, wherein the bone matrix begins to degenerate. Regardless, in the hospital setting, parenteral nutrition is sometimes preferred, simply because most hospitalized patients have an existing IV line.

G&H Can you describe the historic evolution of the various methods for the placement of an enteral feeding tube?

MD In the late 1970s, the first endoscopic feeding tube was placed percutaneously and subsequently became known as a percutaneous endoscopic gastrostomy (PEG) tube. Ultimately, the PEG tube became one of the most common feeding tubes placed by endoscopists, in the endoscopy suite, with conscious sedation. The PEG tube is placed by pulling it down through the mouth and esophagus into the stomach, via a guidewire through the abdominal wall that is run all the way up to the oral cavity. The dilator on the end of the PEG tube helps transverse the abdominal wall, and the PEG tube is placed. A device on the end of the PEG tube, referred to as the internal bumper or bolster, keeps it from falling out.

More recently, emphasis has been placed on access to the small intestine, particularly the jejunum, so as to accommodate patients with gastroparesis or other disorders that require complete bypass of the stomach. In these cases, a surgeon was initially required to sew a feeding tube directly into the small intestine. Over the last 10 years, two procedures have been developed for the gastroenterologist to provide similar access. The first is known as percutaneous endoscopic gastrojuenostomy (PEG-J). The PEG-J procedure pushes a small J tube through a PEG tube, down into the small intestine, thus providing enteral access via two tubes, which can provide nutrition into the small bowel while decompressing the stomach or providing medication as necessary. The problem with this system is that the small-intestinal J tube is very small and has a tendency to clog or regurgitate back into the stomach.

Also in the last 8–10 years, another procedure, direct percutaneous small bowel access, or percutaneous endoscopic jejunostomy, has been developed. This procedure involves the placement of a PEG tube directly in the small intestine by locating and anchoring the small intestine while performing the percutaneous procedure. When a tube is placed, we often use a small needle, called a finder needle, to poke through the abdominal wall and serve as a marker inside the small bowel to provide guidance for placing the jejunal tube.

After the small bowel is located, it still may shift in the course of entry with the larger trochar needle, and the feeding tube may not be correctly placed. In order to avoid this problem, we have learned to place the finder needle in the small bowel and then fix it within the small bowel lumen with a snare, so that the small intestine is held in place for the remainder of the procedure. A small incision can be made next to the finder needle to accommodate the trochar for insertion. The endoscopic snare can then come off the finder needle, grasp the trochar, and move into position to perform J tube placement. This procedure requires the use of a longer endoscope, possibly a pediatric colonoscope or an enteroscope. There has also been success reported in using a double-balloon enteroscope to access the small bowel and place a jejunal feeding tube.

G&H How do clinicians in other specialties approach the placement of enteral nutritional catheters?

MD As mentioned above, surgeons can place a small-bowel feeding tube in the operating room by performing surgical gastrostomy. If the patient is undergoing open surgery for another procedure, a surgical gastrostomy may be performed concurrently. However, in comparing the

surgical procedure to PEG placement, the PEG tube is associated with fewer complications.

Interventional radiologists can also place feeding tubes percutaneously in the stomach and small bowel. Recent Medicare data show significant growth in the placement of gastrostomy tubes among radiologists versus a smaller increase among gastroenterologists. The radiologist provides a unique method of placement when the endoscopist cannot maneuver the endoscope into the stomach, as in cases of an obstructive esophageal or oral tumor. Radiologists can slide a small nasogastric tube into the stomach, expand the stomach with air, and perform the PEG procedure from the outside, visualizing it with fluoroscopy and utilizing a “peel-away” catheter. In this procedure, the stomach is entered under fluoroscopy with a needle. When the correct location has been established, a guidewire is run from the outside into the stomach. Over that guidewire, larger and larger dilators are passed to create a larger stoma or tract. The feeding tube is placed over that guidewire, and the feeding-tube tip, which is enclosed in a peel-away wrapper, can be exposed and the internal bolster opened. Thus, radiologists perform more of an external push procedure, whereas endoscopists do a pull or oral push procedure through the abdominal wall.

G&H What are the advantages and disadvantages of the endoscopic versus radiologic methods for feeding tube placement?

MD Both methods are effective for gaining access to the stomach and successfully providing enteral nutrition. With the endoscopic method, there have been some case reports of what is referred to as tumor migration or seeding as a result of running the tube past an esophageal tumor and reseeding it in another part of the anatomy. Wound infection can also occur with the endoscopic method, as it drags bacteria down from the back of the throat, though the incidence is very low. On the other hand, continual dilation with separate dilators required in the radiologic procedure exposes the patient to the possibility of a tear in the stomach during the procedure and perforation or leakage of the tube.

Looking at overall cost, the radiologic procedure tends to be a little less expensive than endoscopy, and both are much less expensive than surgical placement. Radiologic placement is most helpful when endoscopic access runs the risk of the above-mentioned tumor seeding, such as in cases of head and neck cancer. However, gastroenterologic access has the advantage of endoscopic evaluation of the entire digestive system and can provide other valuable diagnostic information, particularly in

older, high-risk patients with significant comorbidities. Further, the endoscopist follows the patient after placement, maintaining the tube and providing instruction to the patient on what nutritional formulations to use.

G&H Are the risks of either procedure heightened in patients receiving enteral nutrition in the home-care setting?

MD In the outpatient setting, the risk for peritoneal leakage is higher with radiologically placed tubes and can develop after 6 or 7 days, whereas the incidence of developing an infection around a tube is higher with the endoscopic method. The other major difference is that some of the radiologic tubes are not designed to hook up to standard pump- or syringe-based feeding devices. This will no doubt change over the next few years, but at this point the radiology-based equipment companies are often not providing enteral feeding-compatible devices. They are much more focused on vascular procedures.

G&H How are novel endoscopic techniques, such as the NOTES procedure, going to affect endoscopic methods of enteral feeding?

MD The novel natural orifice transgastric endoscopic surgery (NOTES) method creates a hole in the stomach to gain access to the peritoneal cavity. Although the goal is

different from that of enteral feeding, the safety concerns are the same. In order for a NOTES endoscopist to get into the peritoneal cavity through the stomach without any infection, there must be a method of sterile placement of the scope through the mouth and esophagus. Sterilizing devices, such as condom-like devices, will ultimately be used for NOTES procedures and also for enteral access because endoscopic placement of a PEG tube involves the same concerns in terms of infection.

Suggested Reading

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