

# Advances in Pediatric Gastrostomy Placement



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## KEYWORDS

- Gastrostomy • Percutaneous endoscopic gastrostomy • Gastrojejunostomy
- Enteral feeding • Laparoscopic gastrostomy • Complications • Children

## KEY POINTS

- Percutaneous endoscopic gastrostomy (PEG) is a common method of establishing an indwelling gastrostomy tube that can support infants and children with a host of complex medical issues.
- PEG placement is generally safe, but can be associated with a range of intraprocedural and postprocedural complications, with most occurring within the first year of placement.
- Laparoscopic gastrostomy is a burgeoning, minimally invasive method for gastrostomy tube placement that may avoid the routine need for exchange to a balloon-based device.
- Regardless of method of placement, a focus on long-term pediatric enteral tube care represents a critical component of improving outcomes of gastrostomy tubes in children.

## BACKGROUND

Placement of gastrostomy tubes were first developed as a method for enteral feeding in children and adults in the late nineteenth and early twentieth century.<sup>1</sup> Initial gastrostomies were established via open surgical approaches, such as the Stamm gastrostomy procedure, which still remains a commonly used method for primary gastrostomy tube placement in the United States and internationally.<sup>1</sup>

With ongoing advances in surgical techniques and the increasing demand for less invasive methods of enteral access, newer gastrostomy techniques have emerged as feasible and safe in children. In 1980, percutaneous endoscopic gastrostomy

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(also known as the PEG procedure) was codeveloped by a pediatric surgeon, M.W.L. Gauderer, and a gastroenterologist, J.L. Ponsky, as a novel, minimally invasive endoscopic-based technique for primary gastrostomy tube placement.<sup>2</sup> Since its development, the PEG procedure has been adopted by both adult and pediatric surgeons, gastroenterologists, and radiologists, as a method of gastrostomy tube placement that can be performed in a variety of settings. It also has quickly become one of the most common approaches to primary gastrostomy tube placement in infants and children.<sup>3-7</sup>

Within pediatrics, the PEG procedure has proved effective in a variety of patient populations with complex medical needs. In particular, it has been shown to be safe to perform in small infants, even those weighing less than 6 kg, and in patients with complex neurologic disability, congenital heart disease, cancer, or other complex medical comorbidities.<sup>2,3,8-11</sup> The PEG procedure has also proved beneficial in that helps to minimize exposure to anesthesia, requires a less invasive surgical approach, may occur outside of operating room settings, and is associated with both rapid post-operative recovery times and initiation of enteral feedings. In addition, PEG stomas are considered likely to spontaneously close, when and if a patient elects to remove the gastrostomy tube.<sup>12-14</sup>

## PERCUTANEOUS ENDOSCOPIC GASTROSTOMY PROCEDURE

The classic PEG procedure uses a pull technique.<sup>2</sup> At the start of the procedure, after a standardized antiseptic skin preparation is applied to the abdomen and antibiotics are provided to the patient, a gastroscope is inserted through the patient's mouth and into the stomach. Gastric distension is then performed by air insufflation, which in turn inflates the anterior gastric wall up against the abdominal wall. Transillumination of the abdominal wall by the lighted gastroscope is then visualized externally in the mid-epigastrium to guide placement, and a small stab abdominal incision is performed through which a needle, followed by a guide wire, are passed. This wire is then snared by the gastroscope, pulled out in a retrograde fashion from the stomach, through the esophagus, into the mouth, and released. A PEG tube is then tied to this wire, lubricated, and pulled back down through the mouth, esophagus, and stomach, affixing the gastric and abdominal walls together. The gastroscope is then reintroduced to confirm intragastric position of the PEG tube, and an external bumper is applied to secure the tube against the skin.<sup>5,15,16</sup>

As a primary tube, a PEG will typically be left in place for a minimum of 6 weeks to 6 months, after which time it may be permanently removed, or exchanged for a skin-level or other balloon-based gastrostomy if the patient continues to require an indwelling tube. A PEG exchange can be accomplished by 1 of 2 basic methods: (1) performing a percutaneous pull, or (2) performing an endoscopic exchange of the PEG tube via endoscopic snaring and retrograde removal of the PEG inner bolster.<sup>17</sup> The latter generally involves general anesthesia and allows for easy visual confirmation of the new intragastric position of the gastrostomy tube using the endoscope; whereas a percutaneous pull may require minimal or even no sedation, and is most safely immediately followed by fluoroscopy to confirm the intragastric position of the new tube.<sup>17</sup>

### ***Complications of Percutaneous Endoscopic Gastrostomy***

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Since its original description, the PEG procedure has been widely adopted. In turn, multiple PEG-related complications have been documented (**Box 1**).<sup>3,15,18,19</sup> Published retrospective rates of complications associated with the PEG procedure have

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