

# Gastrostomy Tubes

## Care and Feeding

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**Abstract:** Parents often bring their children to the emergency department for adverse events with their child's gastrostomy tube or button. This review will discuss the possible complications and the methods to handle them.

**Key Words:** gastrostomy tube, PEG, low-profile gastrostomy tube (button)

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### TARGET AUDIENCE

This CME activity is intended for pediatric emergency medicine practitioners.

### LEARNING OBJECTIVES

After completion of this article, the reader should be able to:

1. Describe the difference between a long gastrostomy tube and a low-profile gastrostomy tube (button).
2. Review the procedure for changing a low-profile gastrostomy tube (button).
3. Discuss options for treating granulation tissue around the gastrostomy site.

When discussing gastrostomy tubes (G-tubes), it is important to specify the type of tube. It can be a percutaneous endoscopic gastrostomy (PEG) tube, a long G-tube (see Fig. 1), or a low-profile tube or “button.” The most common type of button is called a MIC-KEY (although a recent advance has been an even lower-profile tube called a MINI-ONE; see Fig. 2). Both are devices that are placed through a gastrostomy—an opening between the abdominal wall and the stomach. Indications for G-tubes include the following: to provide or supplement nutritional needs, bypass an obstruction, avoid risks of aspiration, maintain hydration, deliver an unpalatable diet, decompress gastric stasis, enhance adherence to medication, and improve quality of life for patients and caregivers.<sup>1</sup> The method of insertion has changed over the years, which affects complication rates and replacement in the emergency department (ED).

### PEG TUBE INSERTION AND REPLACEMENT ISSUES

The insertion of the PEG tube or a long G-tube is usually done by a surgical technique. It can be performed by an open

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technique (Stamm) or via a pull technique (Seldinger/Gauderer). A subsequent surgical procedure is needed to convert these tubes to a low-profile tube, approximately 8 weeks later. The PEG tube has an internal bumper, the long G-tube has a balloon, and when inserted, they usually have a special external retaining device, so if one of these tubes comes out, it is best for the specialist who inserted the tube to replace it.<sup>1</sup> It is also possible to reinsert a PEG with fluoroscopic guidance, by an interventional radiologist or, endoscopically, by a gastroenterologist.

The push technique and balloon gastrostomy can be used either to insert a long tube or to allow for initial placement of a low-profile tube or button.<sup>1</sup> Once again, if the long tube is inserted and subsequently dislodged, it is best to have the inserting specialist replace it. If the device is a button, the length of time since surgery helps to guide who should replace it. If the interval is greater than 8 weeks, the tube has recently come out, and the opening is visible, the emergency physician can replace the tube. If less than 8 weeks, it is best to consult with the inserting specialist.

### LAPAROSCOPIC-ASSISTED PERCUTANEOUS GASTROSTOMY

This approach has gained popularity because it allows for direct visualization of the stomach and allows for placement of a low-profile tube or button right away. There are several techniques used: mini-open, Seldinger, Rothenberg, and Georgeson.<sup>2,3</sup> A particular benefit is that this method can be used in infants weighing less than 2 kg, but a downside is technical difficulty in obese children.<sup>2</sup>

### Complication Rates

Numerous studies have looked at the complication rates of these methods. Complications can be divided into early (at insertion or <7 days after placement) and late (>7 days after placement).

Early complications include pneumoperitoneum, pneumomediastinum, peritonitis, wound dehiscence, malposition of the tube, abdominal wall bleeding, wound infection, ileus, pain, and feeding intolerance. Late complications include granulation tissues at the site, tube dislodgement, drainage around the tube, macerated peristomal skin, cellulitis, gastrocutaneous fistula, and buried bumper syndrome.<sup>1,3,4</sup>

A meta-analysis compared open, PEG, and laparoscopic approaches and found increased risk for major complications with the PEG compared with the laparoscopic method. These included increased visceral injury, dislodgement, leakage, gastrocutaneous fistula, malposition of tube, pain, and significant stomal issues (granulation tissues, skin maceration).<sup>5</sup> Two other studies showed higher complication rates for PEG vs laparoscopic placement,<sup>1,6</sup> but similar operative time.<sup>1</sup> Another study found that granulation tissue and dislodgement were the most common complications.<sup>4</sup>

### Caregiver Concerns

When a child goes home with either a PEG or button, parents should have received both written and verbal instructions. Practice with all of the equipment should be provided before discharge.



FIGURE 1. Long G-tube.

Although some parents feel that the G-tube makes caregiving easier, others do not agree. Issues such as logistics of feeding, stocking of equipment, and disruption of family meals have been reported and can lead to increased postoperative complications.<sup>7</sup> Despite obtaining postoperative education, parents are often at a loss when an adverse event occurs. Studies have shown that parents are most concerned about leakage and dislodgement.<sup>8</sup> Some parents are willing to learn how to change a button, whereas others will never be comfortable with this procedure.

### Parental Instructions for PEG Postoperative Care

Caregivers should always perform appropriate hand hygiene, and the site, including the external fixation device, should be cleaned daily with warm soapy water and then dried thoroughly. They should be instructed not to use alcohol or hydrogen peroxide for cleaning, and not to apply antibiotic creams or powders. Baths can be given once the incision site has healed, after approximately 5 days. Swimming is permitted but ideally not until at least 2 weeks after procedure, and only with clamping of the tube beforehand.<sup>1</sup>

Caregivers should flush the G-tube to maintain patency and to prevent tube blockage with 5 to 10 mL of water after each use or as instructed by the responsible physician.<sup>1,9,10</sup> They should be told to not pull on the tube and to avoid placing tension on the tube. If the tube is pulled frequently or with excessive force, the bumper or dome of the tube may migrate into the submucosa of the gastric wall and lead to “buried bumper syndrome.”

### Parental Instructions for Button Postoperative Care

Caregivers should perform appropriate hand hygiene, then use warm water, soap, and a gauze pad to gently clean the skin around the tube every day. For the first 2 weeks, they should

not let the children lift more than 5 lb or place infants on their stomach. Children should not swim or take a bath for a few weeks, and when bathing or swimming, the tube should be clamped.<sup>11</sup>

## COMPLICATIONS

Many complications can be handled by the emergency physician. In some cases, such as dislodgement shortly after placement, the inserting specialist may need to be consulted. Follow-up with the service that usually provides care is recommended routinely.

### Dislodged Long G-tube

If the tube has been in place more than 8 weeks and any fixation device that had been applied has been removed, the emergency physician should determine the diameter of the tube and obtain all necessary supplies: new tube, syringe with saline, empty syringe, gauze pads, lubricating jelly, and securing tape. Depending on the child and the caregiver, an assistant may be needed to hold the child's hands during the procedure. The physician should perform hand hygiene and wear gloves. After noting the centimeter mark of the outside bumper from the old tube if possible, the physician positions the new tube bumper 1 to 2 cm distal to where old tube was placed (eg, if old bumper was at 3 cm, position new tube at 5 cm for insertion). Apply lubricating jelly to the tip of tube, insert the tube, inflate the balloon with saline (amount is indicated on the tube), and secure the device. Lastly, the bumper is adjusted to the appropriate skin level (old level, if known, or until the bumper is resting against the skin, but not too tight).<sup>12</sup> If the tube has an established tract and no dilatation was needed to replace tube, confirm placement by instillation of 10 to 20 mL of saline with immediate aspiration. If no fluid or gastric contents

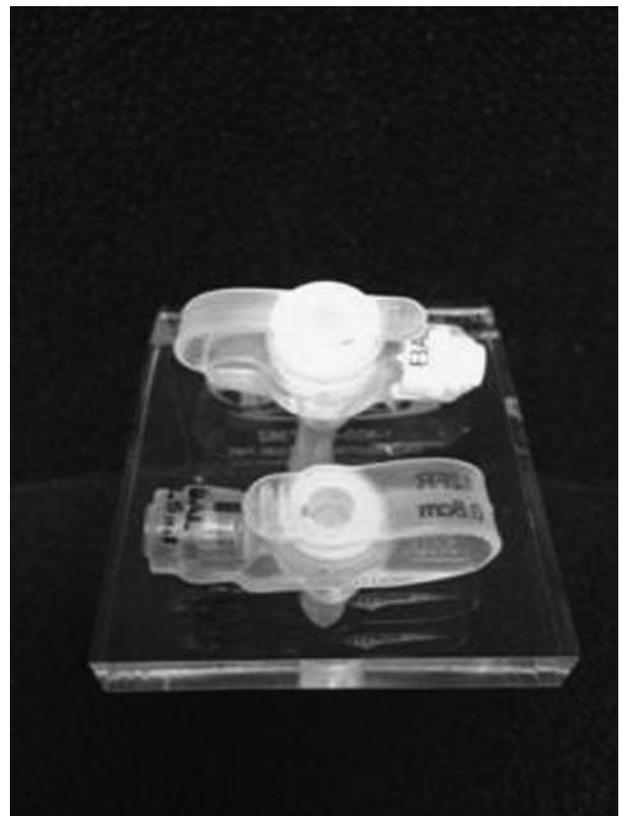


FIGURE 2. MIC-KEY (above) MINI-ONE (below).

are aspirated back, confirmation by fluoroscopy is needed. In addition, if any trouble was encountered during tube insertion, consider confirming the position by fluoroscopy.

### Dislodged Button

If it is more than 8 weeks since insertion, the emergency physician can replace the button. The physician should determine the type (MIC-KEY or MINI), size (French), and length of the tube then gather all necessary supplies. (The new tube kits usually come with the needed supplies, except saline.) Depending on the child and the caregiver, the physician may need an assistant to hold the child's hands during the procedure. The physician should perform hand hygiene, wear gloves, and test the new tube balloon for leakage, then remove any fluid that had been instilled into the balloon. The amount of fluid required for the MINI is indicated on the balloon port of the tube; the standard MIC-KEY usually takes 3 to 5 mL of fluid. If the parents have kept the gastrostomy open with an old tube or the triage nurse has inserted a catheter to hold it open, the fluid must be withdrawn from the old tube or catheter before removal from the stomach. The physician should apply water-based lubricating jelly to new balloon and, with the mini, slide the small trocar into the button before insertion (Fig. 3). Next, the physician inserts the button, inflates the balloon with saline, and, in the case of the MINI, removes the trocar. It is important to note that the balloon port has a valve, so non-Luer lock syringes (included in the kit) work better to inflate the balloon (Fig. 4). It is often helpful to just twist the new tube at the level of the skin during insertion, to facilitate passage through the gastrostomy. Confirmation of position includes aspiration of gastric contents or instillation of 10 to 20 mL of saline followed



FIGURE 3. MINI-ONE with insertion trocar.



FIGURE 4. Non-Luer lock syringe.

by withdrawal of most of this fluid. If no fluid or gastric contents are aspirated back or if any trouble was encountered during insertion, confirmation by fluoroscopic guidance or ultrasound should be considered.<sup>11–13</sup>

### Button Cannot be Inserted

A gastrostomy opening will begin to close in 1 to 6 hours after the tube is dislodged,<sup>11</sup> making it difficult to reinsert the same size tube. In this case, the opening will need to be dilated. This can be accomplished by using smaller-sized Foley catheters or red rubber catheters, which are latex-free. The physician should insert a catheter with a diameter that is 1 to 2 sizes smaller, allow it to remain in place for 5 to 10 minutes, remove it, and then place a catheter that is one size larger, until the original diameter button can be placed (eg, for a 12F button, use 8F, 10F and 12F catheters, then insert new 12F button). In these cases, conformation of tube position should be by fluoroscopy.

### Leakage

If the leakage is small, place a gauze dressing under the G-tube. If all of the feeds or medication is leaking, more water may be needed in the balloon or the tube may need to be replaced, because the balloon may be broken.

### Tube Blockage

Crushed tablets, especially potassium and iron supplements, are known to cause tube blockage. If the tube is blocked, the physician should try to flush the tube with saline under higher pressure, generated by using a smaller-volume syringe than the standard bicarbonate-containing or phosphate-containing soft drinks.

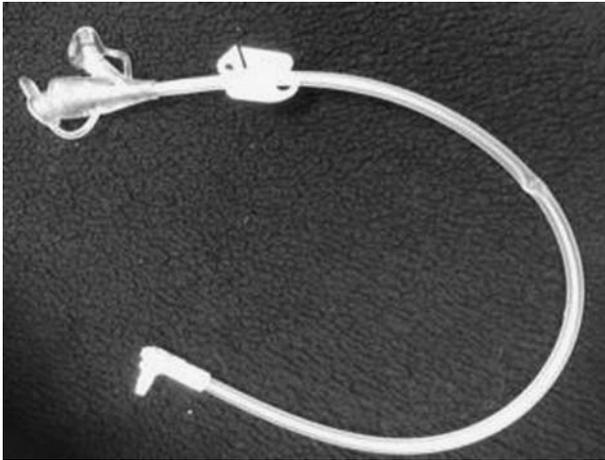


FIGURE 5. MIC-KEY and MINI-ONE extension tubing.

Alternatively, or in addition, warm water can be instilled into the tube and left in place for 30 minutes. If the tube cannot be cleared, it should be replaced.<sup>1,9</sup>

### Leakage Around the Tube/Skin Maceration

Leakage around the site can lead to skin maceration. Application of triamcinolone cream is often helpful. If candidiasis is suspected, nystatin or clotrimazole cream should be applied.

### Cellulitis

If the skin around the site is red, tender, swollen, warm, or foul smelling, cellulitis should be suspected. Depending on the child's underlying medical condition (eg, immunosuppression), and the presence or absence of fever, oral or intravenous antibiotics will be needed. The most common etiology is an infection cause by methicillin-resistant *Staphylococcus aureus*.<sup>14,15</sup> Other etiologies include methicillin-sensitive *S. aureus*, normal skin flora, or group B streptococci.<sup>15</sup>

### Granulation Tissue

Granulation tissue is pink tissue that occurs as a reaction to the tube. Treatment includes 0.1% triamcinolone cream, stomadhesive powder, silver nitrate, cryotherapy, or surgical debridement.<sup>1,14</sup> In the ED, the use of silver nitrate stick is a rapid method. It is important to only touch the granulation tissue with the silver nitrate stick, which will not cause pain, and is meant to shrink the tissue. The silver nitrate should not make contact with the surrounding skin, and any excess silver nitrate should be fully removed by blotting the granulation tissue with gauze at the completion of the application. The granulation tissue is then covered with gauze. If overgrowth of granulation tissue leads to excessive pain, leakage, and recurrent skin infection, surgical debridement will be needed.<sup>1</sup>

### Buried Bumper

A buried bumper occurs from excessive pulling on the tube or due to a large change in body habitus. The balloon is pulled into the submucosa of the gastric wall, leading to pain and sometimes peritonitis. Laparotomy is often required to fix this problem.<sup>1,16</sup>

### Abdominal Distension

If the child has a button, connect the extension tubing, unclamp, and allow air to escape. (Just opening the port cover will not vent the stomach due to a valve.)<sup>11</sup>

## FEEDING

Children with G-tubes (long tubes or buttons) may receive bolus feeds several times daily, continuous feeds (often during the night by a pump), or a combination of both. If the child has a button, an extension tube is needed for feeding (see Fig. 5). This tube must lock into place (placing, then turning, the extension tube as noted on the button). These extension tubes have a clamp, a feeding port (larger opening), and a medication port.

Bolus feeds can be given by pump or gravity. For gravity feeds, the parent or clinician uses the feeding port of a long G-tube and the extension tubing for a button. After clamping the tubing, the caregiver or nurse fills the syringe or bag with the desired amount of breast milk or formula (leaving the plunger off), hangs or holds the bag or syringe above the child, and unclamps the tube. It is important to not hang the syringe or bag more than 18 in. above the gastrostomy site. If the feed occurs during the night, the child's head should be elevated 6 to 8 in.<sup>9,10</sup>

If the child starts to vomit during the feed, the parent or nurse should clamp the tube and stop the feeding immediately, then re-evaluate after 5 minutes. All feeds should be followed with a flush of 5 to 10 mL of water and cleaning of the extension tubing and the feeding syringe.<sup>9,10</sup>

For children with reflux and a fundoplication, the tube/button may need to be vented after each feed, by keeping the empty the syringe or bag attached to the open extension tube for 10 to 15 minutes to allow air to escape.<sup>9</sup>

Bolus feeds and continuous feeds can be given by an infusion pump. This allows feeding over a longer period and is helpful for nighttime feeds. The amount and rate should be set by the child's physician or dietitian. At the end of the feeding, it is important to



FIGURE 6. Syringe in feeding port.

flush the extension tube and wash the tube as previously mentioned. For those with reflux and a fundoplication, stopping the feeds every 4 hours and allowing the tube to vent may be helpful.<sup>9</sup>

### Medication Delivery

There is a medication port on the extension tube (smaller opening). Medications given through the tube are optimally prescribed in a liquid form. If pills are crushed into a powder, they should be mixed with water (1–10 mL) for delivery and the extension tube should be flushed with an additional 5 to 10 mL of water after use.<sup>9</sup>

It is also possible to administer medications directly to the port of the button, as long as the syringe can open the valve (Luer lock syringes do not work), with adequate (10 mL) flushing with water after delivery (see Fig. 6).

### CONCLUSIONS

Troubleshooting problems with G-tubes is a common occurrence in the ED. In most cases, pediatric emergency physicians can perform the appropriate procedures to resolve the problems.

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### APPENDIX: Web Sites for Parents

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