Selection and management of commonly used enteral feeding tubes

Do you know the difference between an NGT, PEG tube and BGT? Which type of tube is used for short-term enteral feeding? Long-term enteral feeding? Gastric feeding? Post-pyloric feeding? How are the different tubes held in place? How are they cared for? This article provides a practical guide to the most commonly used enteral feeding tubes.

Enteral feeding

Enteral tube feeding is the administration of feed and/or fluid via a tube into the gastrointestinal tract (parenteral nutrition uses the venous route). This feeding tube can also be used:

- To administer medication;
- For gastric aspiration;
- For gastric decompression.

If enteral tube feeding is likely to be needed only for a short time (less than four weeks), a feeding tube is usually inserted into the stomach through the nose (nasogastric tube, Fig 1); for longer periods gastrostomy feeding should be considered (National Institute for Health and Care Excellence, 2006). Serious complications after gastrostomy tube insertion are uncommon. However, in 2010, the National Patient Safety Agency (NPSA) issued a rapid response report following several patient deaths that occurred after gastrostomy insertion (Box 1, page 44).

If enteral feed or medication cannot be administered into the stomach (for example, if there is delayed gastric emptying or pyloric obstruction), there is the option of post-pyloric feeding. In this procedure, enteral feed is administered into the small intestine – usually into the jejunum, more rarely into the duodenum. For short-term post-pyloric feeding, the nasal route can be used; for long-term post-pyloric feeding, a jejunostomy (surgical opening from the skin into the jejunum) may be considered. Alternatively, an existing gastrostomy can be used to insert a longer tube into the small intestine.

Gastrostomies and jejunostomies can be created, and their related tubes inserted:

- Endoscopically (using an endoscope);
- Radiologically (under X-ray guidance);
- Surgically under direct vision (open or laparoscopic).

Fig 2 (page 44) shows access points and routes for enteral nutrition.

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Short-term gastric feeding

Nasogastric tube

A nasogastric tube (NGT) is passed through the nostril along the nasopharynx...
and oesophagus into the stomach. Depending on the type (Table 1), NGTs are used for: gastric aspiration; gastric decompression; or administering enteral feed, fluid or medication. NGTs used for enteral feeding should be 6-12Fg (National Nurses Nutrition Group, 2016a). The smaller the gauge the higher the risk of blockage, while tubes over 12Fg are more likely to cause discomfort.

The NGT is secured externally at the nose or cheek by adhesive tape or a fixation device. The area should be checked daily for signs of pressure damage and to ensure the fixture device is intact (NICE, 2006). The NGT position should be checked in all patients:

- After insertion;
- At least once a day;
- After episodes of vomiting, retching or coughing;
- Whenever displacement is suspected;
- In the presence of any new and/or unexplained respiratory symptoms or reduction in oxygen saturation.

The NGT position should be checked using one of the following methods:

- Obtain, via the NGT, aspirate with a pH of ≤5.5 (NHS Improvement 2016; NPSA, 2011); inspect the tube on X-ray, using the four criteria outlined in Box 2.
- Obtain senior advice urgently (NHS Improvement 2016; NPSA, 2011); ensure the NGT is not causing any new symptoms of being bitten or displaced by the tongue (NHS Improvement, 2016). Their position needs to be checked using the same methods as for NGTs.

Orogastric tube

An orogastric tube is passed through the mouth, throat and oesophagus, into the stomach. It is an alternative to an NGT when using the nasogastric route is not possible. Orogastric tubes are used primarily in neonates; they are usually avoided in all other patients due to the risk of being bitten or displaced by the tongue (NHS Improvement, 2016). Their position needs to be checked using the same methods as for NGTs.

Long-term gastric feeding

Percutaneous endoscopic gastrostomy

A percutaneous endoscopic gastrostomy (PEG) is created under endoscopic guidance. A PEG tube (Fig 3) is the long-term enteral gastric feeding tube of choice for patients with an uncompromised airway:

Feeding routes through the nose (alternatively through the mouth)

1. Nasogastric (orogastric)
2. Nasoduodenal
3. Nasojugal

Gastrostomy options

- Percutaneous endoscopic gastrostomy (PEG)
- Balloon gastrostomy
- Button gastrostomy

Jejunostomy options

- Percutaneous endoscopic jejunostomy (PEJ)
- Percutaneous radiologic jejunostomy (PRJ)
- Surgically placed jejunostomy
- Percutaneous endoscopic gastrojejunoostomy (PEGJ)

### Table 1. Types of nasogastric tube

<table>
<thead>
<tr>
<th>Tube type</th>
<th>Usage/notes</th>
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<tbody>
<tr>
<td>PVC tube</td>
<td>Used for enteral feeding for up to 10 days, for gastric decompression and for aspiration of gastric contents (National Nurses Nutrition Group, 2016a)</td>
</tr>
<tr>
<td>Polyurethane (fine-bore) tube</td>
<td>Normally used for 6-8 weeks (NNNG, 2016a) so is the NGT of choice if nasogastric feeding is needed for more than 10 days</td>
</tr>
<tr>
<td>Ryles tube (PVC)</td>
<td>Usually a larger-bore tube (up to 24Fg) Only used for gastric decompression and aspiration of gastric contents, not for feeding Not always ENFit-compliant (ENFit connectors at the end of enteral feeding tubes are not compatible with intravenous syringes/devices)</td>
</tr>
</tbody>
</table>
but accessible gastric region, who are able to undergo an endoscopic procedure. It can be used for administering enteral feed, fluid or medication, starting four hours after placement (NICE, 2006).

Daily care of a PEG tube consists of:
- Cleaning the stoma site (Box 3);
- Monitoring for signs of inflammation, infection, over-granulation and gastric leakage (NICE, 2006);
- Recording centimetre markers on the tube to ensure it is not migrating into the stomach (NICE, 2006); if markers fade with time it may be necessary to mark the tube with a pen;
- Flushing the tube once a day to keep it patent if it is not being used (Box 4).

A PEG tube also needs to be ‘advanced and rotated’ (Box 5) at least once a week depending on local policy. Flushing the tube once a day to keep it patent if it is not being used is recommended with a syringe, close the tube cap and re-open the clamp.

If the answer is “yes” to all four criteria, the tube is correctly positioned.

A PEG tube requires replacement every two to three years.

Radiologically inserted gastrostomy

A radiologically inserted gastrostomy (RIG) is placed under X-ray guidance. The type of tube used varies – a balloon gastrostomy tube (BGT, Fig 4) is the more common option. A RIG can be used:
- When a PEG is unsuitable – for example, in respiratory-compromised patients and in those with head and neck cancers, in whom seeding (potential spreading of cancer cells to adjacent tissues) may be a risk (Abd Rahim et al, 2014);
- When an endoscopic procedure is not technically possible – for example, in patients with pharyngeal stricture (Busch et al, 2016);
- When an attempt at PEG placement has been unsuccessful (Petrocelli et al, 2016) – for example, because the patient could not tolerate the procedure or because it was not possible to transilluminate through the abdomen. Transillumination refers to the ability to clearly see illumination from the tip of the endoscope in the patient’s stomach through the abdominal wall.

In a RIG, the gastrostomy tract is created via gastropexy and secured by skin fasteners or sutures on the abdomen. Gastropexy is a surgical procedure in which the stomach is sutured to the abdominal wall to provide a safe tract through which a gastrostomy tube is placed. The number of gastropexy fasteners or sutures varies from one to four (Lowe et al, 2012). The length of time for which gastropexy fasteners remain in place varies from 7-14 days (Lowe et al, 2012). If they are removed:
- The procedure

1. Draw the required amount of water into the syringe, dispensing excess air
2. If the tube has a clamp, close it
3. Open the end of the tube and connect the syringe
4. Open the clamp
5. Gently insert the water
6. Close the clamp
7. Remove the syringe, refill it with water
8. Repeat as needed to obtain the desired flushing volume
9. Once completed, remove the syringe, close the tube cap and re-open the clamp

Equipment required
- Freshly run tap water/cooled boiled water/sterile water (as per local policy)
- 60ml enteral syringe

Box 3. Cleaning the stoma site
- How the stoma site is cleaned will differ depending on local policy. Initially, cleansing may be done using sterile saline and gauze. Once the stoma site has healed, cleansing is likely to be undertaken with non-sterile equipment or using a shower
- After cleaning, the stoma site needs to be dried gently and the fixation plate or bolster repositioned (Box 4)
- Further management includes protecting the skin with a barrier film and leaving the site open to the air as much as possible

removed too soon, the formation of the tract could be compromised.

Once the gastrostomy tract has healed and fasteners have been removed, care of the RIG tube depends on the type of tube inserted during the procedure.

**Balloon gastrostomy tube**
A BGT is held in place in the abdomen by a water-filled balloon. It can be inserted radiologically or surgically or, if replacing a water-filled balloon. It can be inserted percutaneously (NNNG, 2016b). BGTs need to be replaced every two to nine months depending on the type of tube use; an extension set is attached to the RIG tube, which depends on the type of tube inserted during the procedure.

Factors including gastric pH, frequency of tube use and fungal infection may affect the longevity of the balloon (NNNG, 2016b). BGTs need to be replaced every three to nine months depending on the manufacturer. Replacement can be undertaken in secondary or primary care (Ojo, 2011). If a BGT is to be changed in the community, the procedure should, where possible, be undertaken during office hours so support and advice is available if there are any problems (NNNG, 2016b).

The size of the balloon varies between devices. It is normal for the balloon to lose some water but the amount is individual to each person and the size of the BGT in situ. To monitor water loss, you will need to document how much water is removed from a balloon and how much is used to inflate it each time it is changed. Osmotic pressure may cause water to cross the balloon’s membrane and leak out, but a leak may also indicate balloon damage, in which case there is a risk of the tube falling out. If there is significant water loss or no water can be withdrawn, expert advice should be sought to consider replacing the tube.

**Box 6. Checking balloon in a balloon-held tube**
To check the balloon, the water it contains must be removed, measured and replaced.

**Equipment required**
- Two Luer slip syringes (5-20ml, depending on balloon size)
- Sterile water or cooled, boiled water (depending on local policy)

**The procedure**
1. Ensure there is clear access to the gastrostomy tube
2. Check the balloon port on the feeding tube for the volume of water required
3. Draw up the required amount of water into one syringe
4. Release the bolster and gently push the gastrostomy tube into the abdomen by approximately 2-3cm; to prevent the tube being expelled, ask the patient not to move quickly and, if possible, not to cough
5. Use the other syringe to withdraw the water that is in the balloon through the balloon port; dispose of that syringe and immediately use the previously filled syringe to insert the required volume of water through the same port
6. Remove the second syringe
7. Gently pull the gastrostomy tube until you feel resistance
8. Secure the bolster in its correct position (1cm from the abdominal wall)
9. Record the volume of water removed and the amount inserted. If the level of water removed has decreased significantly in one week it may be an indication that the tube needs to be changed

**Button gastrostomy tube with balloon**
A button gastrostomy tube with balloon is a low-profile device – also called button low-profile gastrostomy tube (LPGT). This device is much shorter than the BGT so the tip of the tube sits against the abdomen. It is more discrete than the BGT, as there is no external length of tubing when it is not in use; an extension set is attached to administer nutrition or medication. Before insertion, the stoma tract needs to be measured so the correct size tube can be fitted. This type of feeding tube needs to be fitted to the individual to ensure correct fit (Lord, 2018); failure to do so will lead to an ill-fitting tube and increase the risk of leakage and stoma-site complications.

Button gastrostomy tubes with balloon are used when:
- A more discrete method of gastrostomy feeding is needed – for example, in children or young adults;
- There is a risk that a longer tube would become dislodged – for example, in children or physically active patients. Care is the same as for BGTs.

**Capsule gastrostomy tube**
A capsule gastrostomy tube, also known as a Monarch tube, is inserted percutaneously and held in place internally by a silicone bolster. It provides an alternative in case of intolerance to balloon-held devices.

A capsule gastrostomy tube requires less-frequent changes than a BGT (usually every nine months) and can be changed without sedation in the patient’s home by a trained health professional, relative or the patient themselves. Care is as for BGTs, without the weekly checks of the balloon.

**Short-term post-pyloric feeding**

**Nasojejunal tube**
A nasojejunal (NJ) tube (Fig 6) is passed through the nostril, nasopharynx, oesophagus and stomach into the jejunum. NJ tubes are used for short-term enteral
feeding when gastric feeding is not possible. Like an NGT, an NJ tube is secured externally at the nose or cheek by adhesive tape or a fixation device.

As there is no fluid pool in the jejunum, pH testing cannot be used to check the position of an NJ tube. NICE (2006) recommends checking centimetre markers at the nose daily for signs of tube movement to ensure it does not migrate into the stomach.

**Long-term post-pyloric feeding**

**Percutaneous endoscopic gastrojejunostomy (PEGJ) tube**

The jejunal extension tube is introduced through an existing PEG tube and secured to the PEG tube externally. It is used when post-pyloric administration of nutrition or medication is required due to a patient’s intolerance of gastric feeding caused by gastroparesis or delayed gastric emptying.

The gastric port can be used for gastric decompression while feeding is provided internally with a cuff and silicone wings, so preventing blockages is essential as some jejunal tubes are often smaller-bore tubes compared with gastrostomy tubes. These tubes can be placed without sedation or anaesthesia at the patient’s bedside. The balloon should be checked on weekly. Balloon size is likely to be smaller than a gastrostomy placed in the stomach as the jejunum cannot accommodate a large balloon.

**Surgically placed jejunostomy tube**

A surgically placed jejunostomy tube is inserted into the small intestine during a surgical procedure. It is an alternative to a PEGJ for patients who need post-pyloric feeding but cannot tolerate a PEGJ, or in whom PEGJ tube insertion is not possible. It may be used for patients with complex gastric or small-intestine pathology, who may have had repeated surgery.

**Balloon jejunal feeding tube**

A balloon jejunal feeding tube needs to be inserted at least 6cm into the existing tract to minimise fluid leakage. These tubes can be placed without sedation or anaesthesia at the patient’s bedside. The balloon should be checked on weekly. Balloon size is likely to be smaller than a gastrostomy placed in the stomach as the jejunum cannot accommodate a large balloon.

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**Fig 7. Percutaneous endoscopic gastrojejunostomy tube**

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**References**


National Nurses Nutrition Group (2016a) Safe Insertion and Ongoing Care of Nasogastric (NG) Feeding Tubes in Adults. Bit.ly/NNGNasogastric


