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Percutaneous Endoscopic Gastrostomy with Jejunal Extension Tube for the Delivery of Levodopa Carbidopa Intestinal Gel: Clinical Practice Guidelines of the Romanian Society of Digestive Endoscopy

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ABSTRACT

Percutaneous endoscopic gastrostomy with jejunal extension (PEG/J) was first described in 1998 and has become the standard technique for fixing the tube in place for levodopa carbidopa intestinal gel (LCIG) infusion. The Romanian Society of Digestive Endoscopy (RSDE) decided to create a consensus paper to meet the needs in medical training and practice. After reviewing the available published data and existing recommendations, a consensus process was carried out involving the leaders of opinion in this field. The resulting text and recommendations were approved, after reaching expert consensus, and reflects the views of the RSDE for the best practice of PEG/J tube placement. The pull through method ("pull technique") is the prevailing PEG-tube placement procedure in Romania. The procedure can be performed with intravenous sedation combined with local anesthesia. Although minor complications are common, serious complications are infrequent, and the tube insertion procedures have a good safety record. Redo procedures are sometimes necessary and clinicians should be aware of these situations.

Key words: percutaneous endoscopic gastrostomy – jejunal extension – levodopa carbidopa intestinal gel.

Abbreviations: LCIG: levodopa; NCJ: needle catheter jejunostomy; PEG: percutaneous endoscopic gastrostomy; PEG/J: percutaneous endoscopic gastrostomy with jejunal extension; PFG: percutaneous fluoroscopic gastrostomy; PFJ: percutaneous fluoroscopic jejunostomy; PLG: percutaneous laparoscopic gastrostomy; PLJ: percutaneous laparoscopic jejunostomy, PSG: percutaneous sonographic gastrostomy; PSJ: percutaneous sonographic jejunostomy; carbidopa intestinal gel; RSDE: Romanian Society of Digestive Endoscopy.

INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) is a minimally invasive procedure having the main goal to facilitate the enteral nutrition in patients with limited oral intake capacity who have an intact and functional gastrointestinal tract. PEG was first described in 1980 by Gauderer and Ponsky [1]. Since then, the procedure has been modified and improved several times. Percutaneous endoscopic gastrostomy with jejunal extension (PEG/J) was described in 1998 [2] and has become the most frequent technique for tube fixation in the jejunum, allowing intestinal infusion with levodopa carbidopa intestinal gel (LCIG). PEG/J is now the standard procedure for LCIG treatment [3]. LCIG infusion provides continuous levodopa administration directly into the small intestine through PEG/J delivered via a programmable portable pump [4-7].

Romanian Society of Digestive Endoscopy (RSDE) has elaborated this consensus paper as a guide for the management of patients requiring PEG/J tube placement for the delivery of LCIG. After reviewing the available published data from all major databases and existing recommendations, a consensus process was carried out involving all the leaders of opinion from the main Romanian university centers, who wished to participate. All the recommendations in this guideline were subjected to a voting process by the experts and were accepted to be part of the guide only after receiving more than 80% of the votes of the experts. This consensus paper was approved and contains the recommandations for the best practice of PEG/J tube placement for the delivery of LCIG in Romania.

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY WITH JEJUNAL EXTENSION TUBE

Tube systems that reach the level of the jejunum can be placed through nasal insertion, guided by percutaneous application, or through surgical techniques.

In patients with advanced Parkinson disease, PEG/J tube placement has rapidly spread to become routine practice worldwide and is currently the method of choice for LCIG treatment. Placement of a PEG/J tube is simple, safe and well-tolerated by patients if the guideline recommendations are followed [8]. A PEG tube can be placed using either the pull through method ("pull technique") or by the Seldinger technique ("push technique"). The authors agreed that the inside-out pull technique is the simplest and safest technique and has become the prevailing technique for LCIG treatment in Romania.

In addition to the routine endoscopic technique for percutaneous placement of an enteral tube, there are alternative, well-standardized techniques: laparoscopic [percutaneous laparoscopic gastrostomy (PLG); percutaneous laparoscopic jejunostomy (PLJ)], sonographic [percutaneous sonographic gastrostomy (PSG); percutaneous sonographic jejunostomy (PSJ)], fluoroscopic [percutaneous fluoroscopic gastrostomy (PFG); percutaneous fluoroscopic jejunostomy (PFJ)] and surgical (needle catheter jejunostomy (NCJ); Witzel or Stamm fistula) [8]. These techniques are preferred in children, the elderly, unsuccessful PEG-J attempt or in any other situations considered difficult or at risk for PEG/J, the strongest advantage beeing that they allow placement of the PEG under direct or sonographic / fluoroscopic observation of the intraperitoneal cavity. All techniques are effective for long-term enteral intubation in selected individuals, though current evidence is insufficient to recommend one technique over the other. Choice of technique should be based on indications and contraindications, operator experience and the facilities available [9, 10].

Selection of patients for LCIG via PEG/J-tube

For Parkinson's disease treatment, neurologists usually recommend to patients to undergo a temporary test treatment with LCIG administered through a nasojejunal tube to evaluate the response to levodopa/carbidopa treatment prior to PEG/J-tube placement. Written informed consent concerning the procedure, complications and aftercare must be obtained from the patient before the procedure.

Absolute contraindications to PEG/J are as follows: serious coagulation disorders (INR ≥ 1.5, Quick ≤ 50%, partial thromboplastin time (PTT) ≥ 50 sec, platelets ≤ 50,000/mm3), interposed organs (e.g. liver, colon), peritonitis, severe ascites, and severe psychosis [11-13]. Low dose aspirin does not represent a contraindication for PEG-placement. The lack of diaphanoscopy (transillumination of the endoscopic light through the abdominal wall) at the puncture area is no longer an absolute contraindication; a negative needle aspiration test (using a syringe containing 5 ml saline solution, puncture under continuous aspiration towards the air-filled stomach without prior air aspiration) proved to be even safer than an adequate diaphanoscopy [14]. The presence of mild to moderate ascites does no longer represent a contraindication, as an increased rate of complications has not been demonstrated under these circumstances [15]. Peritoneal dialysis treatment is also not a contraindication for the use of a PEG tube [16, 17]. Oesophageal stenoses, previously considered a contraindication, can be nowdays passed by a very thin endoscope (direct puncture technique) or can be treated with endoscopic dilatation (pull technique).

Upper gastrointestinal endsocopy is routinely conducted prior to insertion of a PEG/J tube to detect posible local contraindications. Severe erosive gastritis or an ulcer should be healed before an enteral feeding tube is inserted. Extensive tumour infiltration in the area of the puncture site represents a local contraindication. Previous gastrointestinal surgery (such as Billroth I or II resection or total gastrectomy) is no longer considered a contraindication for the use of PEG/J tube systems. Although, the primary success rate for endoscopic placement of enteral tubes is lower in patients who have undergone previous gastrointestinal surgery, the procedure can be carried out without a significant increase in risk, if diaphanoscopy is successful and/or the needle aspiration test is negative.

Preparatory measures prior to PEG/J-tube

As the endoscopic insertion of an enteral feeding tube represents an elective invasive procedure, it is essential to obtain legally valid consent [16]. The nature and scope of the information should be provided to the patient; the related documentation should follow the general guidelines for obtaining informed consent from patients prior to other endoscopic procedures.

Preparatory measures prior to endoscopic tube insertion are required. An indwelling venous catheter should be inserted for appropriate sedation. The patient should be fasted for at least 8 hours prior to the procedure for insertion of a PEG system, or longer in cases in which there is evidence of impairment of gastric motility. If there is extensive hair growth on the abdomen, the epigastric region should be shaved above the umbilicus. The necesary investigations are based on the risk assessment determined by the medical history and physical examination [19]: coagulation studies (prothrombin time, INR, partial thromboplastin time, and platelet count), chest x-ray film, electrocardiogram, blood cross-matching, hemoglobin level, and chemistry tests for renal or hepatic dysfunction. The management of antiplatelet and anticoagulant agents therapy during the periendoscopic period follow the international guidelines [20, 21]. Medication for Parkinson's disease can and should be taken to ensure that the patient is in a stable condition during the procedure. Systemic antibiotic prophylaxis given 1–2 hours before the procedure (e.g. 2 g of cephazolin i.v.) are associated with a significant reduction in infections [22, 23].

The prior upper gastrointestinal endosocopy should be conducted with the patient in the supine position and his head turned to the side. An aspirator should be available. The PEG insertion procedure is conducted using standard surgical procedures under sterile conditions (skin disinfection, sterile surgical drapes, sterile gloves for the PEG insertion, sterile dressing, etc.).

PEG/J-tube procedure

The common diameter of the PEG tubes is 15-24 F and the PEG/J extension tube diameter is 9-12 F. The procedure can be performed with intravenous sedation combined with local anaesthesia under appropriate monitoring conditions of vital signs. The patient is placed in the supine position during the whole procedure.

The ideal site of PEG insertion is the anterior gastric wall, in the region of the distal corpus or the transition between the corpus and antrum of the stomach. In the thread pull through method, the puncture site is selected by means of diaphanoscopy (transillumination of the abdominal wall) and endoscopically visible digital impression, or the needle aspiration test (the assurance of safe track by percutaneous puncture of the stomach with syringe aspiration during extraction of the needle to ensure that no gut is interposed between the stomach and the abdominal wall). A positive needle aspiration is an absolute contraindication for PEG insertion [20].

After adequate skin disinfection and local anaesthesia, a 8-10 mm skin incision is made at the selected site, through which the stomach (previously fully dilated with air) is punctured using a 2 mm trochar under endoscopic control. The double thread (introducer loop) is inserted through the cannula sheath into the stomach, grasped using the biopsy forceps by the endoscopist and taken out through the mouth together with the gastroscope. The introducer loop and the loop at the tip of the PEG-tube are fastened tightly and a continuous traction on the PEG tube is applied until this one is pulled in through the mouth, down through the oesophagus and stomach and out through the abdominal wall at the selected puncture site. The internal fixation plate must pull the anterior wall of the stomach onto the abdominal wall, taking care not to exert too much pressure to the gastric mucosa. Also, to avoid causing damage to the mucosa while pulling the wire, it must be ensured that the cannula sheath remains in the puncture canal during the positioning phase until the conical tip of the tube is locked in its intragastric end.

To prevent wound infection, the incision at the puncture site should be sufficiently large so that the tube does not cause pressure-related lesions in the skin area with subsequent ischaemia and a Y-compress should be used to avoid the formation of a moist cavity under the external fixation plate and, furthermore, to cushion movements. However, an incision larger than 10 mm should be avoided. Five to ten percent of the subjects on LCGI lose weight during the treatment [24, 25], and in case of a larger incision, this can result in an increased risk of gastric leakage.

The external fixation plate should be initially subjected to very low traction, without tension, overnight. To avoid local ischaemia, no tension on the stoma canal should be applied, and the tube should have at least 5 mm of free movement between the external fixation plate and the abdominal wall [8].

The PEG-tube is cut to an external length of 20-25 cm. The stop plate, the Y-connector and the connector for the J-tube are adapted. The J-tube is straightened by advancing its wire to the tip and locking it within the tube.

The endoscope is reintroduced, while the J-tube is inserted through the PEG till the tip is visible in the stomach. It may then easily be grasped with the forceps. The tip of the guide wire shoud be inside of the J tube in order to prevent bowel perforation. The J-tube is then further introduced through the PEG-tube while the tip of the J-tube is advanced endoscopically through the pylorus and as far as possible into the duodenum, ideally distal to the ligament of Treitz. When the optimal position is achieved, the endoscope is withdrawn in the stomach, while the J tube is fixed with the biopsy forceps. Next, the guidewire is gently withdrawn allowing the tip of the J-tube to regain its pig-tail shape. This will result in a tip withdrawal of about 5 cm.

If the jejunal tube migrates retrograde into the stomach during endoscope withdrawal, a „wedge" technique for inserting the jejunal extension tube can be used, utilizing single-balloon enteroscopy to anchor it in place. Another method that could prevent recurrent migration of the jejunal tube is the use of an jejunal anchor [26, 27].

The endoscopic procedure is completed by exsufflation of air and removal of the endoscope. The outer stop plate is locked in place and the connecters mounted. A sterile Y-shaped dressing should be placed for the next 24 hours. The pump is connected and the LCIG treatment can be started.

Aftercare

Radiological or endoscopic control is not required on a routine basis after an uncomplicated PEG/J procedure. The patients may drink clear fluids one hour after the procedure. If the fluids are well tolerated, then oral feeding can be resumed.

If not contraindicated, oral painkillers should be given to prevent postoperative pain and inflammatory response. Opioid analgesics should be given only when necessary.

The first change of dressing should be performed 24 hours after PEG/J placement. Until granulation of the stoma canal is achieved (usually first 7-10 days), the stoma site should be daily inspected (bleeding, erythema, secretion, induration, allergic skin reaction etc.). The wound dressing should be performed under good aseptic conditions (cleaning, desinfection, sterile dressing). The wound should be dry before dressing. Desinfectants like octenidin dihydrochlorid-phenoxyethanol (e.g., Octanosept®) and povidone-iodine (e.g., Braunol®) should not be used because they can affect the mecahnical properties of the tube. In order to avoid adhesions (buried bumper syndrome, see below), the PEG/J tube should be mobilized daily through a pushing and pulling technique (3-4 cm into the stomach and back) but should not be rotated. This maneuver should be performed every time the dressing is changed. However, for the first 24-48 hours after initial procedure, the in/out movement of the PEG/J tube should be avoided [8].

After 7-10 days, wound cleansing and dressing should be performed every 2–3 days. Showering is possible after initial wound healing (1–2 weeks after insertion of PEG/J). Dressings should always be removed before washing, residual soap rinsed away and the tube dried well before a new dressing is applied [8]. In order to prevent clogging, both the PEG and the J-tube must be flushed with clean water every day. To prevent material fatigue, the C-clamp should be repositioned daily or preferably left open if not needed [8].

Patients may be allowed to return home on the day of procedure or day after. On discharge the patient and the

relatives should be properly trained how to take care of the PEG/J assembly. The presence of qualified neurological nurses with training in PEG/J aftercare allows outpatient management. The management of the LCIG treatment is led by the neurologist.

The PEG/J-tubes can be used as long as they are functioning. They may work for more than 5 years. The patients must be informed that redo procedures could be necessary.

Complications

The rate of complications after endoscopic placement of enteral tubes is estimated to up to 80%, but still 90% of patients were satisfied with the treatment. Serious complications requiring treatment occur in approximately 1–4% of cases. Acute and severe complications, such as perforation, serious abdominal haemorrhage or peritonitis, which require surgical intervention, occur in fewer than 0.5% of cases [8, 28].

Acute infection of the stoma site occurs frequently (in approximately 15% of cases) [8, 29]. Independent risk factors for peristomal infection include: hospitalization of the patient, tube size, with increased infection risk for 20 F tubes compared to 15 F; experience of the endoscopist [30]; and excessive traction on the tube [31]. Less than 5 mm of reddening around the outer stoma canal is frequent. It is largely induced by movement and is not necessarily a sign of wound infection. Treatment is dependent on the severity of the infection. Most of the peristomal forms of infection can be readily treated by means of antiseptic measures and daily change of dressings under sterile conditions. After taking a swab for microbiological examination, persistent local infections should additionally be treated by antibiotics.

Secretion of gastric contents along the tubes may cause skin problems. Application of skin protecting agents may be helpful. If the problem persists and is serious, removal of the tubes must be considered.

Radiological evidence of pneumoperitoneum is very frequently observed after placement of a PEG system (≥ 50% of cases). Nevertheless, a pneumoperitoneum is not regarded as a complication since there is no clinical evidence of adverse consequences. Even in cases of pneumoperitoneum and abdominal pain the patients first should be treated conservatively since severe cases are definitely rare [8].

Accidental removal of the PEG during the first week after insertion, although a rare occurrence, may lead to peritonitis due to leakage of gastric contents to the peritoneal cavity. This should be considered as a potential emergency.

The possible long-term complications after placement of a PEG/J tube include occlusion of the tube, tube porosity and fracture with subsequent leakage from the tube or the tube connection, development of cellulitis, eczema or hypergranulation tissue (proud flesh). The development of most of these potential long-term complications is exclusively dependent on the quality of aftercare given to the tubing system, and can be effectively avoided if the proper measures are taken [8].

Loss of efficacy of LCIG and problems with flushing of the J-tube may indicate a problem related to the J-tube, such as occlusion, dislocation, or knotting. J-tube occlusion may be resolved by flushing with fluids containing acid or enzymes that can break down the amino acid deposits [32, 33]. If flushing is not possible or the problem is not resolved, changing the tubes is recommended. Dislocation of the J-tube can take place in two ways: retrograde dislocation to the stomach, or detachment of the J-tube from the connectors and distal dislocation; in this last situation, it will pass through the bowel spontaneously. A redo procedure is necessary to restart the LCIG treatment. If knotting occurs and the tube is malfunctioning it should be replaced by a new tube.

Buried bumper is a rare complication defined as herniation of the inner stop plate into the gastric wall and covering of the plate with gastric mucosa. The condition should be suspected if the PEG-tube cannot be flushed or moved in and out of the gastrostoma. It is confirmed by endoscopy and can be treated by endoscopic incision of the mucosa using a needle knife sphincterotome. This complication can be avoided by adequate aftercare treatment (by avoiding traction on the tubes and tension between the stop plates).

After removal of the PEG-tube the gastrostomy will usually close spontaneously within a few days. However, in some cases a gastrocutaneous fistula persists and a should be closed surgically.

Redo procedures

The durability of a PEG tube system is primarily linked to its careful handling. There is no need to exchange a tube system at regular intervals. In cases of adequate handling, PEG tubes can stay in situ for 5 years and more [8]. There is a debate on how frequently the PEG/J tube needs to be replaced. Some authorities suggest changing the tubes every 2 years but currently there is no consensus about this subject [3].

Removal of the J-tube

Simple and gentle withdrawal of the J-tube through the PEG is usually possible. In some cases, this is not possible due to knotting or sticking of the J-tube. Consequently, we recommend to cut the J-tube and perform endoscopic removal.

Removal of the PEG-tube

There are three options for the removal of the PEG-tube: (1) extraction through the gastrostoma; (2) cut the tube and let it enter the stomach to pass naturally (the PEG-tube will probably pass the intestinal tract driven by the peristalsis after a few days); or (3) endoscopic removal, which is recommended. In cases where endoscopic exchange of tubes is planned, we recommend removal of old tubes as part of the procedure.

Exchange of the J-tube

The indwelling tube is removed through the PEG-tube or endoscopically, usually by grasping with an endoscopy snare. The tube must be detached or cut [8] at the outside and removed through the mouth. The reinsertion should be carried out according to the recommendations for the primary procedure.

Simple exchange of the J-tube without endoscopy may be possible. In most cases the J-tube will pass to the proximal jejunum by the forces of peristalsis in the course of a day. If this does not occur and the effect of LCIG is poor, the tubes are repositioned by endoscopy.

Exchange of both PEG- and J-tube

In order to reduce the number of endoscope insertions, the removal of indwelling tubes and grasping of the introducer loop should be carried out simultaneously. The introducer loop may be inserted through the PEG-tube or through the gastrostoma along the PEG-tube. The tubes are cut 1–2 cm outside the abdominal wall before extraction through the mouth. The reinsertion of the tubes should be carried out according to the recommendations for the primary procedure.

CONCLUSION

PEG/J represents an effective, minimally invasive method in patients with advanced Parkinson disease. The tube insertion procedures have a good safety record. Although minor complications are common, serious complications are infrequent. However, redo procedures are often necessary.

Key recommendations

• The pull through method ("pull technique") is the prevailing PEG-tube placement procedure in Romania.

• Prior to the PEG/J tube procedure, it is important to establish the patient's response to levodopa/carbidopa via a temporary treatment with LCIG administered through a nasojejunal tube.

• Medication for Parkinson's disease should continue to be taken to ensure the stability of the patient during the PEG/J tube procedure based on physician's judgment.

• Systemic antibiotic prophylaxis given 1-2 h before the procedure significantly reduce the risk of infections.

• The procedure can be performed with intravenous sedation combined with local anesthesia. The patient should be placed in the supine position throughout the procedure.

• The ideal site for PEG insertion is the transition between the corpus and antrum of the stomach. However, transillumination of the abdominal wall is recommended to ensure a safe track for percutaneous puncture.

• After the procedure patients may drink clear fluids as soon as they have recovered from the anesthesia.

• If not contraindicated, post-procedure oral painkillers may be given to prevent postoperative pain and inflammatory responses.

• Both the PEG and the J-tube must be flushed with clean water every day in order to prevent clogging.

• Severe complications are infrequent and mostly preventable by well-organized patient education and aftercare.

• Redo procedures are sometimes necessary. Clinicians should be aware of the various factors that may lead to the necessity for redo procedures.

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Authors' contribution: C.G. and E.D. literature review, wrote and revised the paper. All the other authors contributed with expert opinion on the concept paper and critically revising the article. All authors approved the final article version to be published.

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