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Review

Risk of tumor implantation in percutaneous endoscopic gastrostomy in the upper aerodigestive tumors

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Summary. Percutaneous endoscopic gastrostomy (PEG) has become a mainstay in providing enteral access for patients with obstructive head, neck and esophageal tumors. Tumor cell implantation is a rare complication in patients with aerodigestive cancers, who have undergone PEG tube placement. The objective of this review is to determine the incidence and contributing risk factors leading to the implantation of metastases into the abdominal wall following PEG placement. A comprehensive review of the literature in PUBMED (2008-2018) was performed. The literature search revealed reports of more than 50 cases of abdominal wall metastases after PEG placement. As most of these studies were case reports, the exact rate of metastasis remains unknown. Generally pharyngoesophageal location of primary cancer (100%), squamous cell histology (98%), poorly differentiated tumor cells (92%), advanced pathological stage (97%), and large primary cancer size were identified as strong risk factors for the development of stomal metastasis. Abdominal wall metastases following PEG placement are a rare but serious complication in patients with head and neck malignancy. (www.actabiomedica.it)

Key words: percutaneous endoscopic gastrostomy, metastasis, aerodigestive tumors

Background

Patients with cancer are at high risk of malnutrition because both the disease and its treatments threaten the nutritional status. It is estimated that the deaths of 10 e 20% of patients with cancer can be attributed to malnutrition rather than to the malignancy itself (1, 2).

The prevalence of malnutrition in patients with cancer has been reported to range from about 20% to more than 70% in worldwide studies, with differences related to patient age, cancer type, and cancer stage. Patients with gastrointestinal tract, head and neck (HNC), and liver and lung cancers are at high risk for malnutrition (3-6).

It is estimated that approximately 50% of patients with HNC will require alternative means of nutrition support due to dysphagia resulting from obstructing tumors, tumor compression (arising from thyroid and tracheal cancers) within the pharyngeal region, and/or the effects of concurrent chemoradiation therapy (7). Symptoms of disease and/or treatment, such as vomiting, mucositis, xerostomia, dysphagia, and odynophagia, contribute to inadequate oral intake of nutrition and hydration, leading to weight loss, nutrition deficiencies, and dehydration. To effectively treat the patient, nutritional support is essential in stabilizing and restoring weight status, correcting nutrition deficiencies, and maintaining adequate hydration. The decision to place an enteral feeding tube prophylactically can vary based on different protocols and guidelines of treatment. If short term, temporary nutrition support is needed (defined as 4-6 weeks) a nasogastric tube (NGT) can be placed (8). PEG has superseded NGT

placement and surgical gastrostomy as the commonest method of providing long term enteral feeding (9).

It allows long-term tube feeding, when oral feeding is not possible, or when extra feeding is necessary (10). PEG placement involves an upper gastrointestinal endoscopy, usually under conscious sedation and with the use of local anesthesia at the gastrostomy site. Since its introduction in the 1980s, PEG has been associated with superior outcomes with respect to complication and mortality rates compared with surgical gastrostomy (11). Although PEG tube placement is common and well-tolerated, it is not completely benign. Complication of PEG tube placement include local infection, hemorrhage, tube dislodgement which can lead to peritonitis, bowel perforation, and aspiration pneumonia (12). However, specific to head and neck malignancy metastatic "seeding" of the abdominal wall following PEG placement has been documented in case reports and small retrospective analyses.

PEG insertion techniques

There are 3 methods of PEG placement: Gauderer-Ponsky pull, Sachs-Vine push, and the Russell push method, which can be placed in interventional radiology, endoscopic suite, or at the bedside (13).

The Gauderer-Ponsky pull method was first described in 1980 (14). The gastrostomy tube is placed via complete esophagogastroduodenoscopy (EGD). During EGD, the stomach is filled with air, which pushes the stomach wall up toward the abdominal wall. The light at the tip of the endoscope is turned upward, allowing the transillumination of the abdominal wall. A needle or catheter is placed through the abdominal wall into the stomach. After a small incision is made in the abdominal and gastric walls, a guidewire is passed through the needle/catheter site and is captured with a polypectomy snare. The endoscope, snare, and guidewire are pulled out through the stomach, up the esophagus, and out the mouth, and the gastrostomy tube is attached to the guidewire. The guidewire is pulled out of the abdominal wall, pulling the gastrostomy tube from the mouth, down the esophagus and stomach, and out through the abdominal incision (15). This technique requires 2 passages of the endoscope through the oral cavity and 1 passage of the PEG through the oral cavity.

The Sachs-Vine push method, which was first described in 1983, is similar to the Gauderer- Ponsky pull method, except for use of the guidewire (16). In the push method, the PEG is a long, semirigid, tapered tube with a dilator attached to the proximal end. The dilator is inserted over a guidewire and advanced into the mouth, down the esophagus, into the stomach, and out the abdominal wall through the incision site. This technique also requires 2 passes of the endoscope and passage of the PEG through the oral cavity.

The Russell push PEG, which requires only 1 pass of the endoscope, was first described in 1984. With this PEG placement method, the stomach is filled with air and a needle is placed in the stomach as in the Gauderer-Ponsky method. A 16 French peel-away introducer sheath and dilator is pushed over the guidewire into the stomach and abdominal wall. The dilator and guidewire are removed, leaving the introducer sheath in place. A 14 French balloon tip Foley catheter is placed into the introducer sheath, and the catheter balloon is inflated and pulled up against the abdominal wall, bringing the stomach wall into position with the abdominal wall (16).

The advantage of this method is the need of only one passage of the endoscope into the oral cavity and no passage of the PEG through the oral cavity. The disadvantage is that the PEG tube itself is generally smaller, such as 14 French rather than the standard PEG of 20-24 French.

The phenomenon of cancer metastasis to PEG stoma, although rare, is becoming increasingly reported. The purpose of our review is to examine the incidence and the contributing risk factors leading to metastasis to the abdominal wall following PEG placement in patients with upper aerodigestive cancer.

Methods

A comprehensive review of the literature in PUBMED database using Mesh terms "percutaneous endoscopic gastrostomy", "tumor", "metastasis", "abdominal wall" was performed. Medline, Scopus, PubMed publisher and Google Scholar were searched as well.

The research was restricted to the period of publication between 2008 and 2018. Only full text papers in English were included.

Results

During the past 2 decades, there have been increasing reports describing tumor seeding at the PEG exit site, which have caused controversy relating to the technique used in PEG insertion. The first case of spread of a cancer to a gastrostomy site was reported in 1977 by Alagaratnam and Ong (17), and the first report of a gastric and abdominal wall metastasis secondary to PEG placement specifically in a patient with head and neck squamous cell cancer was described in 1989 by Preyer (18). The literature search revealed reports of more than 50 cases of abdominal wall metastases after PEG placement. As most of these were case reports, the exact rate of metastasis remains unknown. An article by Thakore et al cites that Antler et al. reported that autopsy findings may be as high as 9% (19). However the reported frequency of stomal metastases for laryngo-esophageal cancer ranges from 0.5 to 1% (20).

Cruz et al. evaluated the incidence of abdominal wall metastases following PEG placement in 304 patients with head and neck cancer, of whom 218 had active disease and a viable tumor in the oropharynx or hypopharynx when PEG was placed. Metastases were proven in 2/218 (0,92%). However, abdominal wall metastasis was defined as macroscopic evidence of tumor masses on clinical examination or endoscopy (21).

Ellrichmann et al conducted a study of 50 patients with PEG placement (22). Brush cytology from the PEG tubing and incision site was taken immediately after PEG placement and repeated 3–6 months post procedure. Forty patients underwent the pull method, and 10 underwent direct introducer technique. In 22.5% of patients, malignant cell transfer to the abdominal incision site was demonstrated, and abdominal wall metastases were present in 9.4% after 3-6 months; however, at follow-up, none of the patients had macroscopically visible tumor masses. Of the direct introducer group, 9 patients completed the 3 to 6-month follow-up. No malignant cells were found on brush cytology.

These studies suggest that the risk of malignant cell translocation due to PEG placement seems to be underestimated.

Generally pharyngoesophageal location of primary cancer (100%), squamous cell histology (98%), poorly differentiated tumor cells (92%), advanced pathological stage (97%), and large primary cancer size were identified as strong risk factors for the development of stomal metastasis (22). Moreover, the 64% of patients diagnosed with PEG site disease either had simultaneous or subsequent locoregional or distant metastatic disease, which may be indicative of aggressive tumor biology and poor overall tumor characteristics (23).

These results suggest that in patients having these risk factors for malignant tumor cell seeding, an alternative route for PEG placement should be used to avoid direct contact of the PEG tube or secure plate with superficial tumor cells.

There have been numerous theories of the pathogenesis of tumor spread to the gastrostomy site, which include direct surgical inoculation of tumor cells at time of tube placement, tumor desquamation into the alimentary tract with seeding of the PEG site after tube placement, and hematogenous dissemination with preference of circulating tumor cells to the traumatized tissue of the PEG tube site. Both open and laparoscopic-assisted gastrostomy tube insertion do have the benefit of the utilization of separate surgical instruments and no cross-contamination with the tumor. However, open gastrostomy and laparoscopic gastrostomy tube placement were both associated with longer insertion times, increased costs, and higher rates of major complications and morbidity compared to PEG, such as respiratory failure and gastrostomy site hemorrhage (24, 25).

Pickhardt et al. have discussed the advantages of percutaneous radiologic gastrostomy placement, in which direct contact of the tube with the primary tumor is avoided (26).

In this prospective, open, randomized study on long-term PEG-related adverse events in a large cohort of patients with epithelial tumors of the upper gastrointestinal tract (27) demonstrated that the direct puncture device is associated with a higher rate of short-term PEG-related adverse events in comparison

with the traditional pull technique. None of the patients in this study developed a PEG metastasis. Case reports show that PEG insertion using this technique does not eliminate the risk of direct tumor seeding (28, 29).

Conclusions

Abdominal wall metastases following PEG placement are a rare but serious complication in patients with head and neck and esophageal malignancy. This risk is particularly high in older patients and those with higher tumor stages and the occurrence of abdominal wall metastases following PEG indicates poor prognosis. While surgical technique may play a role, factors such as tumor biology may be a significant cause in PEG site metastasis formation, which is irrespective of the technique used. A possible opinion would be to include chemotherapy or chemo-radiotherapy prior to PEG placement in patient with an intention to cure. Larger studies are necessary to confirm the best approach.

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