Nutritional Therapy & Metabolism Gallery

Unusual images in Clinical Nutrition

Fig. 1 - *PEG infection in the first patient.*

Fig. 2 - *PEG infection in the second patient.*

PEG infection by *Pseudomonas aeruginosa* in two patients hospitalized in the same room

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INTRODUCTION

Enteral feeding was developed as a useful alternative to parenteral feeding for patients with a functioning gastrointestinal tract but the inability to take food by mouth. Enteral nutrition can be accomplished through nasogastric, gastrostomy or jejunostomy tubes. Nasogastric tubes have the advantage of being easy to insert but are often poorly tolerated by patients, are complicated to keep in place, and have a considerable associated risk of aspiration.

Since its introduction by Ponsky-Gauderer in 1980, percutaneous endoscopic gastrostomy (PEG) has proved to be a fast and safe procedure and has become the most popular technique for long-term artificial enteral nutrition (1). A PEG tube is a feeding tube, placed surgically through the anterior abdominal wall, which delivers a fluid diet, or medication, via a clean or sterile delivery system. Although success rates greater than 95% have been reported for PEG, procedure-related complications are serious and common.

Over the last 2 years the nutritional team of the S. Eugenio Hospital in Rome has faced a major increase in referrals for PEG insertion. The most frequent complication reported for PEG is peristomal wound infection, which occurs in as many as 30% of patients (2, 3).

We report 2 cases of PEG infected by *Pseudomonas aeruginosa* (PA) in patients hospitalized in the same room after gastrostomy tube insertion.

CASE REPORT

In 2008 a 65-year-old woman was referred to the department of neurology of S. Eugenio Hospital in Rome with a diagnosis of cerebral stroke due to a thrombotic occlusion of the middle cerebral artery. Initial evaluation showed a patient in a comatose state who showed mild to moderate muscular hypertonia in the upper left arm. She had a history of diabetes mellitus and hypertension. Laboratory tests revealed a high white blood cell count, normal platelets, normal prothrombin time as well as normocytic anemia. A brain CT scan showed a hypodensity in the right temporal-occipital area indicative of ischemic injuries in the acute phase (posterior cerebral artery). There was evidence of pulmonary insufficiency and cardiac shock. Treatment with beta-blockers, anticoagulant and osmotic diuretic agents was started. Informed consent for PEG placement was obtained from the patient's next of kin.

The second patient was a 76-year-old woman admitted to the department of neurology of the same hospital because of the onset of dysphasia and weakness of the left arm. A right hemispheric infarction was diagnosed. Informed consent for PEG placement was obtained from the patient's next of kin.

The PEG procedures were performed in the endoscopy center, first in the first patient, then in the second. Both patients received intravenous sedation with a combination of diazemuls and fentanyl, and antibiotic prophylaxis with cephalosporin-based regimens. They were given additional intranasal oxygen and the oxygen saturation and pulse rate were monitored with pulse oximetry. The procedures were carried out by 2 endoscopists and a nutritionist with trained nursing assistance. PEG was inserted by means of the pull technique (4). Upper gastrointestinal endoscopy allowed endoscopic visualization of the upper gastrointestinal tract up to the second part of the duodenum, also to exclude any intraluminal obstruction. The site for PEG placement was located by transillumination on the abdominal wall. This was followed by an incision and placement of a cannula provided in the PEG-tube kit. The type of tubes inserted were 20-Fr polyurethane gastrostomy tubes with integral loops (Fresenius Freka® PEG Gastric Set).

A guidewire was threaded in the gastric cavity through the cannula and grasped by a snare forceps. The wire was pulled out from the mouth and tied to the PEG tube, which was passed into the gastric cavity by pulling the guidewire through an incisional hole created in the anterior abdominal wall. The PEG tube was placed on the left upper quadrant of the anterior abdominal wall and secured. Correct positioning of the tube was confirmed with a second Esophagogastroduodenoscopy (EGDS). Both patients tolerated the procedure well. The nursing staff was instructed to start standard enteral nutrition at a rate of 40 mL/hour for 24 hours in both patients and to administer medications through the PEG tube that evening.

At the end of the procedure the patients were placed in the same room in the reanimation department. The PEG sites were without erythema, induration, or purulent discharge. The day after PEG placement the first patient was febrile and laboratory studies revealed leukocytosis of 20,000 cells/mm^3. The second patient became febrile after a few days. In both patients skin lesions appeared at the insertion site as erythematous orange-colored painful maculae that became necrotic within several days (Figs. 1 and 2). Empiric treatment with intravenous ampicillin/sulbactam (1.5 g/day), teicoplanin (6 mg/kg/day) and meropenem (1 g/day) was started after obtaining cultures of the insertion site, blood, CSF, urine and stool. Euglycemia was maintained with 4 daily doses of regular insulin administered subcutaneously. All intravenous therapy was given via central venous catheter. Tissue samples were taken with the patients in a febrile state (>38.2°C), and blood samples were taken simultaneously for hemoculture but remained sterile throughout the course of treatment. The patients had cellulitis and developed purulent discharge, which was submitted to bacterial culture. Analysis of biopsies taken from the wounds indicated that PA was isolated from the samples. Gram-stained samples revealed few inflammatory cells and a small number of clustered gram-positive cocci. Parameters such as leukocyte and C-reactive protein values were targeted to define the efficiency of combined antimicrobial and wound therapy. Although leukocyte and C-reactive protein values decreased significantly after combined therapy, the patients' clinical status deteriorated during the next 14 days. The first patient subsequently developed kidney failure, heart failure, and myocardial infarction. After consultation with the patient and her family, care was withdrawn and comfort care measures were initiated until the patient passed away 10 weeks after admission to the hospital. The second patient died after 2 days due to heart failure.

DISCUSSION

We reported 2 cases of PEG infected by PA in patients who were hospitalized in the same room after the insertion procedure. The diagnosis of infection by PA was surprising to all clinicians. It remains unclear where and when the contamination happened and if there was a transmission of PA between the patients.

The standard pull insertion procedure that we used for PEG placement is well established and extensively used. Nosocomial stomal infection occurs in 5-30% of the patients and is usually considered a major complication (5). It has been empirically supposed that because the gastrostomy catheter passes through the oropharynx during introduction, peristomal infection may be caused by the transfer of germs colonizing the oropharynx to the opening created in the abdominal wall (6). Local skin contamination was more often found in cases handled by the pull technique than when the introducer method was used (7).

Many studies have shown that wound care technique and insertion method may influence the rate of infections (8, 9). Use of prophylactic antibiotics is still controversial. Early observational studies of antibiotic prophylaxis have shown no significant difference between patients receiving or not receiving drugs (10). However, more recent randomized controlled trials report that prophylactic antibiotics are effective in reducing the risk of peristomal infection (11). Another study suggested that covering the PEG tube, with or without providing antibiotic therapy, may prevent peristomal infection in spite of the presence of oropharyngeal bacterial flora after PEG (12). Many reports showed no difference in the rate of local skin infections between cases in which enteral feeding started 3 hours after surgery or 24 hours after surgery (13). A recent report suggested that a 14-day grace period after discharge, before PEG insertion, may decrease the peristomal infection rate, length of hospital stay, and need for antibiotics (14). The rate of local skin infection could also considerably be influenced by the type of enteral feeding and the timing of its start.

The pathogens most frequently cultured from peristomal infection sites are Enterobacter species, methicillin-resistant *Staphylococcus aureus* (MRSA), methiclin-sensitive *Staphylococcus aureus* (MSSA), and Pseudomonas species. MRSA and other resistant organisms are emerging as a major peristomal infection risk. Nasopharyngeal decolonization of MRSA can reduce peristomal infection shortly after pull-through PEG insertion (15). Thus screening for MRSA before PEG insertion identifies MRSA colonization, and subsequent decontamination and antibiotic prophylaxis

reduces peristomal MRSA infection rates (16, 17).

PA is an aerobic gram-negative bacterium that grows in moist environments. The most severe contaminations occur in patients with immunological diseases and patients submitted to invasive therapeutic procedures. PA is associated with high morbidity and mortality rates. It is resistant to common antibiotics and is increasingly being isolated as a nosocomial pathogen. Skin and soft tissue infection due to PA may occur in a range of clinical situations including skin graft procedures, subsequent to trauma mainly in aquatic environments, after burns, chronic decubitus ulcers, postoperatively, cellulitis in neutropenic patients, folliculitis acquired in hot tubs, and pyoderma resembling this infection due to other common pathogens.

PA has not been described in previous research as a major PEG contaminant. Different hypotheses may be put forward for the pathogenesis of this infection. Nasopharyngeal colonization is the first one. In a recent report, nasopharyngeal colonization with MRSA was isolated in the cultures from all patients and resistant PA in those from 22% of patients after PEG placement (15). This study demonstrated that nasopharyngeal decolonization of MRSA reduced peristomal wound infection with routine use of antibiotics. The second hypothesis is the bacterial cause from local skin infection (18). Other research revealed that PA was repeatedly identified as the causative agent of infections transmitted by gastrointestinal endoscopy. PA was the most common cause of infections transmitted by bronchoscopy (19).

This is the first report of PEG infection by PA in 2 patients accommodated in the same room after the insertion procedure. Our experience demonstrates that PA should always be considered in the differential diagnosis of PEG contamination.

Abbreviations

PEG: percutaneous endoscopic gastrostomy
CT: computed tomography
CRP: C-reactive protein
MRSA: methicillin resistant *Staphylococcus aureus*
MSSA: methicllin sensitive *Staphylococcus aureus*
PA: *Pseudomonas Aeruginosa*.

Authors' contributions

ML, MB and AB were involved in the conception of the case report, review of the literature, and writing of the paper. ML, MD, PS and GMG participated in data collection and manuscript assessment. All authors read and approved the final manuscript.

Conflict of interest: none declared.
Financial support: none.

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