

Systemic Candidiasis with *Candida tropicalis* Following Dislodgement of Percutaneous Endoscopic Gastrostomy (PEG) Tube

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Background	Percutaneous endoscopic gastrostomy (PEG) tubes are placed frequently for a variety of indications. Complications include infection, of which 70 percent are minor, and the majority are from bacterial organisms. However, fungal infections can occur, and we report the first case of systemic fungemia by an uncommon organism related to dislodgement of a PEG tube into the subcutaneous tissues.
Summary	A 72-year-old man was admitted with a stroke and had persistent neurologic deficit and dysphagia for three months. He also developed cytomegalovirus (CMV) colitis during his hospitalization, suggesting an immunosuppressed state. Due to his dysphagia and neurologic symptoms, a PEG tube was placed for feeding. He was discharged, but about five months after PEG placement he presented to the emergency department with leukocytosis and abdominal pain while flushing the tube or administering feeding. Computed tomography (CT) showed that the PEG tube was dislodged into the anterior abdominal wall just outside the gastric wall with stranding, fluid, and free air adjacent to the stomach. He started spiking temperatures and was taken to surgery for diagnostic laparoscopy and replacement of the PEG tube. There was no sign of soft tissue infection of the abdominal wall, and on laparoscopy there was some white fibrinous material around the intraperitoneal area of the PEG tract, but no evidence of intraperitoneal leakage from the stomach. A new PEG tube was placed through the old PEG tract using the pull technique. After the procedure, the patient was continued on antibiotics but continued to spike temperatures and blood cultures grew <i>Candida tropicalis</i> (<i>C. tropicalis</i>). He improved after starting fluconazole and was discharged home once he recovered.
Conclusion	Patients with a PEG tube who present with abdominal pain and fevers need to be evaluated for dislodgement of PEG tube with possible intraperitoneal leakage or soft tissue infection around the PEG site. Although bacterial infections are the most common organisms associated with PEG dislodgement, fungal infections may also occur. This case demonstrates that a systemic infection may occur even without gross spillage of gastric contents into the peritoneal cavity. Also, if dislodgement of a PEG tube is identified and the patient does not improve with antibiotic therapy and/or the patient is immunosuppressed, then a fungal infection should be suspected and appropriate antifungal coverage should be initiated as soon as possible.
Keywords	PEG, dislodgement, fungemia, infection, candidiasis

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Case Description

Percutaneous endoscopic gastrostomy (PEG) is a medical procedure involving the placement of a feeding tube into the stomach through the abdominal wall. The indications for PEG tube include impaired swallowing or inadequate oral intake often as a result of cerebral vascular diseases, amyotrophic lateral sclerosis (ALS), dementia, and head and neck cancer.¹ There are minor and major complications that may develop after inserting a PEG tube. Major complications include necrotizing fasciitis, hemorrhage, aspiration pneumonia, and perforation of the bowel. However, wound infection, peritonitis, tube blockage, dislodgement, and peri-PEG leakage are considered to be minor complications.¹ More than 70 percent of PEG infections are known to be minor infections but major infections can occur at a rate of less than 1.6 percent.² In 2015, Krishna et al.³ demonstrated the prevalence of different organisms causing PEG tube site infections. It was noted that *Pseudomonas aeruginosa* was the most common organism isolated, and was involved in 37.6 percent of cases. The study also showed that fungal infections accounted for 15.4 percent of all cases.³ Risk factors for invasive fungal infections include immunosuppressed state, use of parenteral nutrition, antibiotic use, diabetes mellitus, prolonged hospital length of stay, renal dysfunction, and major surgery.⁴

This is a case report of a patient at Cleveland Clinic Abu Dhabi who developed systemic fungemia after PEG tube dislodgement. The case is unique in that the patient became extremely unwell although there was no gross leakage of gastric contents or feeding into the peritoneal cavity. A rare fungal organism was isolated and patient was successfully managed with replacement of the PEG tube and systemic antifungal therapy.

A 72-year-old man was admitted for acute management of stroke. He had multiple co-morbidities including diabetes mellitus, hypertension and hypercholesterolemia and had a prolonged hospitalization. His hospital course was complicated by cytomegalovirus (CMV) colitis which was treated with ganciclovir and this suggested an immunosuppressed state that may have been related to his illness. Also, he developed a deep vein thrombosis of his upper extremity related to a peripherally inserted central catheter (PICC) line, so was started on therapeutic enoxaparin.

He continued to have residual deficits from his stroke including left hemiparesis and dysphagia even three months after admission, so he underwent placement of a PEG tube. An externally removable 24-Fr PEG was placed

using the pull technique, and the internal bumper was noted to be in good position. He was started on PEG tube feeding, which he tolerated, and was discharged home about two weeks later.

He did fine at home, but presented to the emergency department about six weeks after discharge for drainage around the PEG tube. The external bolster was tightened and the leakage stopped. About two months later he again presented to the emergency department with a one-day history of abdominal pain with administration of feeding and medication through the PEG tube. He had no fever, but white blood cell (WBC) elevated to 15.8. Attempts at flushing the tube in the emergency department (ED) resulted in severe pain. The decision was made by emergency physicians to perform computed tomography (CT) of the abdomen and pelvis, which showed a dislodged PEG tube into the anterior abdominal wall just outside of the gastric wall. There was also fat stranding, free air, and free fluid adjacent to the stomach and in the supracolic omentum (Figure 1).



Figure 1. CT scan of the abdomen and pelvis showing dislodged PEG tube into the anterior abdominal wall just outside of the gastric wall with soft tissue inflammation and edema adjacent to the stomach.

He also started spiking temperature to greater than 39 degrees Celsius so he was taken to the operating room for diagnostic laparoscopy due to the concern for leakage of tube feeds into the peritoneal cavity. On laparoscopy there was no evidence of intraperitoneal leakage from the stomach. There was some whitish fibrinous tissue adjacent to the PEG tract in the peritoneal cavity and a sample of this was sent for bacterial culture. There was no inflammation or signs of infection of the skin at the PEG tube insertion site. Esophagogastroduodenoscopy was performed and the previous internal gastric opening from the PEG was sealed, so a new PEG tube was placed through the old abdominal wall site under laparoscopic and endoscopic guidance using the pull technique. Three percutaneous t-fasteners were also placed into the stomach to help secure the stomach to the abdominal wall (Figure 2).



Figure 2. New PEG tube secured with t-fasteners through abdominal wall into stomach.

The patient tolerated the procedure well and was continued on Meropenem postoperatively. His WBC normalized by postoperative day (POD) one but he continued to spike temperatures. Blood cultures returned by POD three and showed growth of *Candida tropicalis* (*C. tropicalis*) so he was started on fluconazole by Infectious Disease. Within 12 hours of starting the fluconazole his fevers subsided and tube feeds were restarted. He tolerated the feedings fine and continued to improve until he was discharged from the hospital in good condition.

Discussion

We report a case of a patient who developed a systemic fungal infection after dislodgment of a PEG tube. The fungal organism isolated in the blood was *C. tropicalis* which is considered to be normal flora. This organism colonizes the skin, oral cavity, gastrointestinal tract, and female genitourinary tract. As *C. tropicalis* colonizes the stomach, the systemic infection that occurred in this patient was like-

ly related to dislodgement of the PEG tube and passage of fungal organisms from the colonized tube through the peritoneal cavity or soft tissues into the blood stream, particularly since there was no gross leakage of gastric contents and no local soft tissue infection. Furthermore, this patient had multiple risk factors predisposing him to an invasive fungal infection such as diabetes mellitus, a three-month hospitalization after his stroke, and likely immunosuppressed state as suggested by CMV colitis while hospitalized.

There are very few cases reported with fungemia caused by *C. tropicalis*. A paper published in 2014⁵ studied the cases of *C. tropicalis* fungemia over a period of 24 years including risk factors and mortality. The paper demonstrated that patients who were older, had cancer, or had HIV were more prone to infection with *C. tropicalis*. Also, the study showed that patients who were neutropenic, on corticosteroid treatment and who were in septic shock had a high mortality rate. There are no cases reported regarding this fungal infection related to PEG tubes. In 2008, there was a case reported of a patient who developed necrotizing soft tissue infection following PEG tube placement that was caused by *Candida albicans* (*C. albicans*). This patient was managed by performing an ultrasound of the abdomen and culture was taken from the PEG site prior to commencing intravenous penicillin. Wound debridement was also performed in order to remove the necrotic tissue. This patient died two days later and the postmortem revealed that PEG site and tissue culture grew *C. albicans*.⁶ Therefore, it is important to consider a fungal organism when treating infections related to PEG tubes even though bacteria are more commonly the causative organisms.

C. tropicalis can be identified in the laboratory using standard fungal culture methods.⁷ The core treatment for *C. tropicalis* is to administer antifungal medications. *C. tropicalis* is usually susceptible to antifungal drugs such as amphotericin B, azoles and caspofungin.⁸ Although these antifungal drugs are useful to treat *C. tropicalis* infection, some patients may develop resistance against these drugs. Few multicenter studies have reported the incidence of resistance to Azoles in patients infected with *C. tropicalis*. A study conducted in 289 hospitals in Spain reported 781 cases of candidemia, 7.8 percent of them were caused by *C. tropicalis* and 20 percent of them were resistant to azoles.⁹ A similar study done in China reported 389 cases of candidemia and *C. tropicalis* was isolated in 17.2 percent of the cases. Fluconazole and Voriconazole were found to be resistant in 37.3 percent and 10 percent of the patients with *C. tropicalis* respectively.¹⁰

In the current case, workup of his abdominal pain and leukocytosis was performed with CT. However, for evaluation of a PEG tube for dislodgement, an abdominal X ray and contrast study through the PEG tube are typically the initial studies performed. Also, in this patient the PEG tube was replaced through the same tract in the abdominal wall because there was no evidence of soft tissue infection and on laparoscopy the portion of the stomach adherent to the abdominal wall was best accessed through the same tract. In situations where a PEG is dislodged or needs to be replaced and there is evidence of infection or inflammation of the abdominal wall insertion site, then the new tube should be inserted through a new location on the skin.

Fungal organisms are known to colonize the stomach. However, there are only a limited number of cases of severe fungal infections related to PEG tubes. It should be noted that wound problems and infections related to PEG tube dislodgement are not uncommon but are most commonly associated with bacterial organisms. This is the first case of systemic fungemia related to dislodgement of a PEG tube in a patient. In addition, this case demonstrates that displacement of the tube out of the stomach into the subcutaneous tissues can result in a localized or systemic infection even if there is no gross spillage of gastric contents or tube feedings into the peritoneal cavity. This patient made a full recovery to his baseline status after the PEG tube was repositioned in the stomach and he was started on antifungal therapy with fluconazole.

In conclusion, in patients with PEG tubes who develop a systemic infection of unclear etiology, the position of the PEG tube needs to be confirmed, and this is typically done with a fluoroscopy study through the PEG tube. Also, if dislodgement of PEG is identified and patient continues to be sick despite repositioning and antibiotic therapy, then a fungal infection should be suspected and appropriate antifungal coverage should be initiated as soon as possible.

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