

ABDOMINAL WALL NECROTIZING FASCIITIS IN A RECENT COVID-19 INFECTION AS A RARE COMPLICATION OF PERCUTANEOUS ENDOSCOPIC GASTROSTOMY – CASE REPORT & REVIEW OF LITERATURE

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INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG-tube) is a commonly performed procedure to provide enteral nutrition in patients with stroke, brain injury, head and neck cancers, chronic appetite loss like in terminal cancers etc¹. Complications² associated with PEG-tube can be minor (wound infection, bleeding, ulceration, tube dysfunction, inadvertent removal, gastric outlet obstruction) or major (colo-cutaneous fistula, necrotizing fasciitis). Abdominal wall necrotizing fasciitis from a leaking or dislodged PEG-tube is a rare but life-threatening complication³.

LATE COMPLICATIONS OF GASTROSTOMY TUBE PLACEMENT

- >Deterioration of the gastrostomy site
- >Buried bumper syndrome
- >Colocutaneous fistula
- >Persistent gastric fistula following gastrostomy tube removal
- >PEG tract tumor seeding
- >Herniation of the stomach through a PEG tube site has been reported
- >Abdominal wall pain can occur and persist after gastrostomy tube placement

EARLY COMPLICATIONS OF GASTROSTOMY TUBE PLACEMENT

- >Pneumoperitoneum
- >Ileus
- >Perforation of the esophagus or stomach (at a site other than the gastrostomy), or damage to other intra-abdominal organs, such as the liver or colon.
- >Small bowel obstruction from a small bowel wall hematoma following gastrostomy tube placement.
- >Transhepatic placement of a gastrostomy tube.
- >Sigmoid volvulus from a PEG tube that had been placed through the colonic mesentery with subsequent rotation of the mesentery around the tube

GASTROSTOMY TUBE COMPLICATIONS THAT MAY OCCUR AT ANY TIME

- >Tube dysfunction
- >Infection
- >Wound infection
- >Necrotizing fasciitis
- >Bleeding
- >Peristomal leakage
- >Ulceration
- >Gastric outlet obstruction
- >Inadvertent gastrostomy tube removal
- >Leakage of gastric contents or tube feeds into the peritoneal cavity

METHODS

Here, we report the case of a lady, who developed this lethal complication while recovering from COVID-infection and survived. The current literature on abdominal wall necrotizing fasciitis due to PEG-tube was reviewed as well.

| Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) | | | |
|--|-----------|---|--|
| CPR (mg/dL) | <15 | 0 | |
| WBC (per mm ³) | >15 | 4 | |
| | 15-20 | 1 | |
| Hemoglobin (g/dL) | >15 | 2 | |
| | 10-14.5 | 1 | |
| Sodium (mEq/L) | <135 | 0 | |
| | <135 | 2 | |
| Cholesterol (mg/dL) | <16 | 0 | |
| | >16 | 2 | |
| Glucose (mg/dL) | <180 | 0 | |
| | >180 | 1 | |
| Composite Score | Score <6 | | |
| | Score 6-7 | | |
| | Score >8 | | |

| Classification of Necrotizing Fasciitis | | | |
|---|-----------------------|---|--|
| Type | Microorganism | Associations | |
| I | Polymicrobial | Diabetes, Immunocompromise, Peripheral Vascular Disease | |
| II | Group A Streptococcus | Distal extremity, history of trauma (may be minor or surgery) | |
| III | Vibrio vulnificus | Marine Exposure | |
| IV | Escherichia coli | Immunocompromise | |

| Test Characteristics of Physical Exam, Imaging, and LRINEC Score for the Identification of Necrotizing Fasciitis | | | |
|--|-----------------|-----------------|--|
| | Sensitivity (%) | Specificity (%) | |
| Physical Exam | 46.0 | 77.0 | |
| • Fever | 25.2 | 95.8 | |
| • Hemorrhagic bullae | 21.0 | 97.7 | |
| • Hypotension | | | |
| Imaging | 46.9 | 94.0 | |
| • Plain radiography | 88.5 | 93.3 | |
| • CT (fluid/gas collection) | 94.3 | 76.6 | |
| • CT (fluid/gas collection or enhancement of fat) | 88.2 | 84.8 | |
| LRINEC | 88.2 | 84.8 | |
| • <6 | 40.8 | 94.9 | |
| • >8 | | | |

Laboratory Risk indicator for necrotizing fasciitis (LRINEC) parameters, classification of necrotizing fasciitis and test characteristics for identifying necrotizing fasciitis.

LITERATURE REVIEW AND IMAGES

| Reference/Author | Type of study | Country of Origin | Population | Comorbidities | Reason for PEG | Duration of PEG Tube | Presenting Symptoms | Site of Necrotizing Fasciitis | Management of Necrotizing Fasciitis | Culture Identified Microorganism | Outcome |
|----------------------------|--|-------------------|--|--|--|-----------------------------|---|--|---|---|--|
| 1. Artul et al., 2014 | Case Report | Israel | N=1, Female | Diabetes mellitus, CVA, chronic carrier of hepatitis C | CVA, high aspiration risk | NR | Fever and abdominal pain | Abdominal wall, subcutaneous fat and soft tissues | Wide surgical debridement and iv antibiotics | Proteus | Discharged after 30 days hospitalization. |
| 2. Said et al., 2017 | Case Report | Malaysia | N=1, Male | Hypertension, DM, Hyperosmolar hyperglycemia state, AKI | Recurrent aspiration pneumonia secondary to CVA | ~Two weeks | Fever, reduced consciousness and pus discharge from PEG site | Abdominal wall with CT identified hypodensity collection from left hypochondrium to left lumbar region | IV antibiotics, aggressive fluid resuscitation | Unidentified | Death |
| 3. Martinez et al., 1999 | Case report | Spain | n=1 | NA | NA | NA | NA | NA | NA | NA | NA |
| 4. Kumar et al., 2004 | Case Report | United Kingdom | N=1 Female | Uncontrolled Type 2 DM, Diabetic neuropathy, Gastroparesis, Obesity, 4 prior CVAs, Hemiparesis, Dysphagia, Sleep Apnoea syndrome with CPAP | CVA, high aspiration risk | One month | Purulent discharge noted from PEG with surrounding bruised and edematous tissue | Anterior abdominal wall | IV antibiotics (patient was too unstable for surgical debridement) | Staph. Aureus | Death |
| 5. Martindale et al., 1987 | Case Report | United States | N=1, Female | DM, Obesity | Severe dysphagia secondary to subglottic mucopidermoid carcinoma | One week | Vague diffuse abdominal pain and increasing abdominal distention | Left abdominal wall | Triple antibiotic coverage (surgical debridement declined by family) | Escherichia coli | Death |
| 6. Rustom et al., 2006 | Comparative Study | United Kingdom | N=78 | NR | Long-term feeding support, head and neck cancer. | NR | NR | NR | NR | NR | 36 patients developed complication. Total mortality at 30 days post gastrostomy insertion was 4 percent. 0 deaths with PEG. |
| 7. Biswas et al., 2014 | Case Report | United States | N=1, Female | Multiple Comorbidities (Unspecified in article) | Dysphagia secondary to CVA | One year | Respiratory distress, hypotension, septic shock | Right lateral abdomen with bullae diffusely spread across abdomen | Intubation, vasopressors, iv antibiotics, bedside I&D, debridement & wound vac. | Klebsiella Pneumoniae Candida Vulgaris | Death |
| 8. Grant et al., 2009 | Prospective Cohort Study and Systemic Review | United Kingdom | n=172 patients: gastrostomy tube for head and neck cancer Systemic review: 27 studies reporting outcomes of n=2353 gastrostomy procedures | NR | Head and neck cancer or other aerodigestive tract tumors | NR | NR | NR | NR | NR | Mortality rates of 1% for PEG and 3.3% for RIG; major complication rates of 3.3% for PEG and 15.6% for RIG. Systemic Review and meta-analysis: PEG fatality rates of 2.2% (95% CI 0.014–0.034) and RIG fatality rates of 1.8% (95% CI 0.010–0.032). Major complications with PEG were 7.4% (95% CI 5.9–9.3%) and with RIG 8.9% (95% CI 7.0–11.2%). |
| 9. McLean et al., 2004 | Case series/reports | United States | n=3(2 female, 1 male) | 1. MVA 2. Dementia 3. Dementia, Meningioma, DM, PVD | MVA, inability to self feed, CVA | 9 months, 5 years, 3 months | fever, abdominal distension, discharge | Anterior abdominal wall | Debridement, with multiple repeats as needed | Staph. Aureus, Candida, E.Coli, Klebsiella, Proteus | Death in 2/3 patients. |
| 10. Our report, 2021 | case report | United States | n=1, Female | CVA, COVID-19 infection, Obesity | CVA, high aspiration risk | 3 months | Fever, vomiting, bleeding from tracheostomy site | Anterior abdominal wall | Wide surgical debridement, iv antibiotics, wound vac | Escherichia coli ESBL Klebsiella Proteus | Discharged after 2 weeks of hospitalization. |

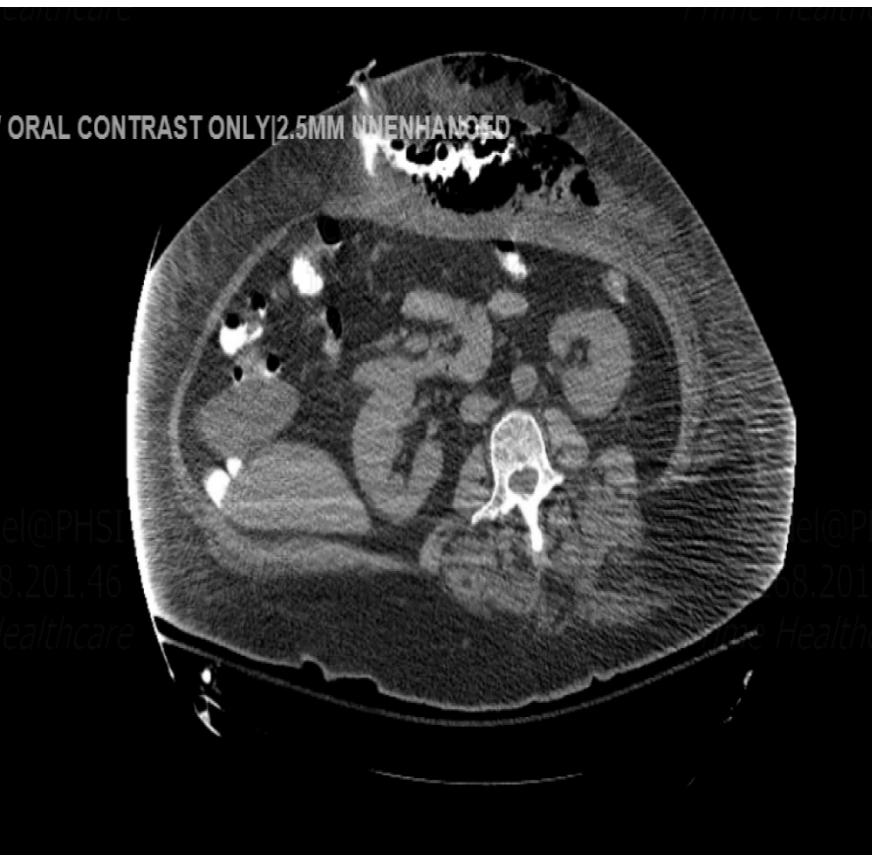
NR: Not reported, NA: Not available; DM: Diabetes mellitus, CVA: Cardiovascular accident, PEG: Percutaneous endoscopic gastrostomy.



Initial presentation of the patient with abdominal wall erythema and cellulitis around the gastrostomy site.



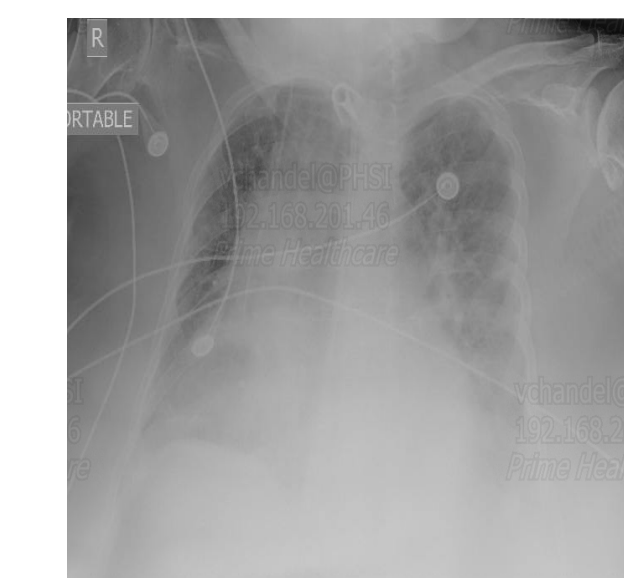
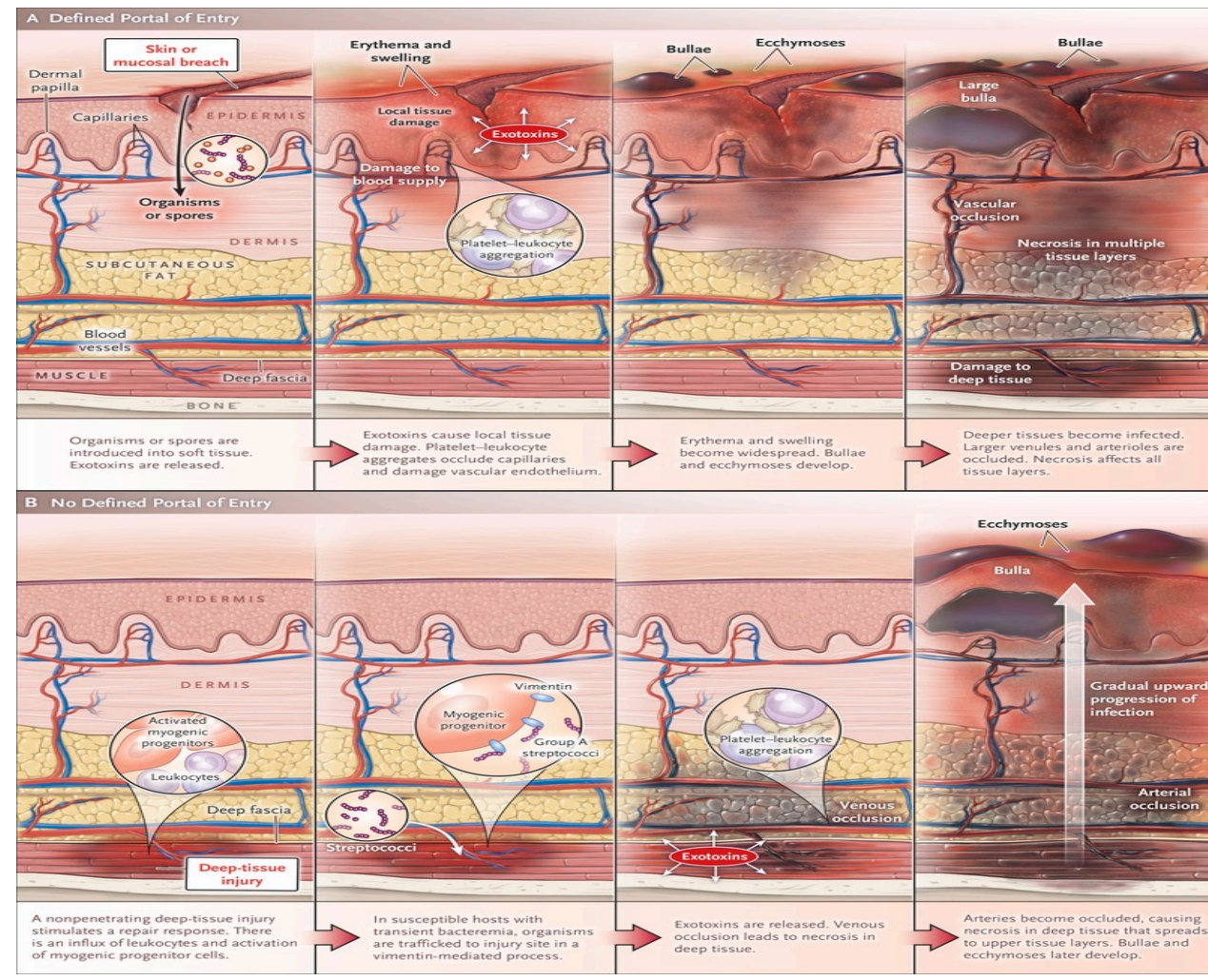
Anterior abdominal wall in the region of abscess collection: Post-debridement after removal of necrotic tissue.



CT chest of our patient (axial view) upon presentation showing contrast extravasation in the anterior abdominal wall.



CT chest of our patient (sagittal view) upon presentation showing contrast extravasation in the anterior abdominal wall.



Initial Chest X-ray of our patient showing vascular congestion and bilateral pulmonary infiltrates especially in lower lobes.

| Major complications | Minor complications |
|---|---|
| Procedure related mortality Reperfusion syndrome Second puncture at time of gastrostomy Bowel perforation Gastrointestinal hemorrhage (one also noted) Gastrocutaneous fistula Intra abdominal abscess Peritoneal abscess Peritonitis requiring surgery Loss of catheter tract Aspiration pneumonia Sepsis | Dislodged tube* Ischemic removal of tube* Tube malfunction* Other tube problems – concomitantly managed* Peritoneal leaks Peritoneal infection/ acid skin reaction Wound granulation Minor wound bleeding Wound hematoma Post procedure ileus Symptomatic gastroenteropancreatic Sclerosing angiosclerosis Regurgitation Relief |

Some common major as well as minor complications encountered due to gastrostomy tube.

DISCUSSION

>Abdominal wall necrotizing fasciitis is a rare complication of PEG-tubes seen in less than 1% of gastrostomy procedures⁴.
>A dislodged tube⁵ will leak⁶ into abdominal wall causing infection by gas-producing organisms.
>Obesity, old age, diabetes mellitus, immunocompromised status, chronically bedridden patients, and even COVID-19 infection are risk factors.
>Buried bumper syndrome⁷ is another factor that may be implicated in some cases. Depending on comorbidities, mortality⁸ varies between 50-80%.
>Review of literature for PEG associated necrotizing fasciitis included 8 case reports of which 5 reported death as the final outcome, one comparative study that demonstrated PEG tubes as having greater safety and fewer complications compared to other gastrostomy techniques, and one systemic review reporting major complication rate of 7.4% and fatality rate of 2.2% following PEG placement.

CONCLUSIONS

>A recent or concurrent COVID-19 infection can cloud the initial presentation in some patients especially with multiple medical comorbidities like we saw in our patient.
>Prompt recognition, aggressive surgical debridement and broad-spectrum antibiotics may afford a favorable outcome⁹.
>Since PEG-tubes are widely used in critically ill patients, physicians must be aware of this rare but life-threatening complication¹⁰ and their silent manifestation in this COVID era.

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