



Pneumorrhachis as a Primary Manifestation of Colorectal Malignancy

Christa Beyer, PA-Student, Peter Sandor, PA-C

Quinnipiac University Physician Assistant Program



Introduction

- Pneumorrhachis (PR) is a rare condition characterized by air within the spinal canal¹
- In a retrospective study of patients presenting with pneumomediastinum, pneumorrhachis was found in the computed tomography (CT) scans of 5.8% of cases²
- The mean age of patients with concurrent pneumomediastinum and PR was 51.0 years²
- Air can be found in either the epidural space or subarachnoid space, and can extend anywhere from the sacral to the cervical regions of the spinal canal^{1,3}
- Pneumorrhachis often occurs along with air pockets formed in other regions of the body such as pneumocephalus, pneumopericardium, or subcutaneous emphysema, likely due to a common underlying pathology^{1,3}
- Because of the high probability that PR is associated with air in other compartments of the body, it is important to look for these other collections on diagnostic imaging³
- There are three types of pneumorrhachis based on etiology: nontraumatic, traumatic, and iatrogenic (Table 1)³
- This finding is usually asymptomatic, and is therefore often diagnosed incidentally with radiology^{1,3}
- Symptomatic pneumorrhachis presents as either neurological deficits, pain, or as signs and symptoms of an underlying cause³
- The diagnostic imaging of choice to confirm this condition is a spinal CT scan, although magnetic resonance imaging (MRI) is more sensitive^{1,3}
- Complications of PR include intracranial and intraspinal hypertension, which can lead to hypotension in other areas of the body³
- Management of pneumorrhachis is focused on treatment of the underlying cause, and therefore varies patient to patient¹
- In most cases, PR itself is managed conservatively, as the air tends to reabsorb spontaneously into circulation without recurrence³

Table 1. Classification of Pneumorrhachis Based on Etiology³

Classification	Nontraumatic	Traumatic	Iatrogenic
Examples	Acute bronchitis, post-cardiopulmonary resuscitation, inhalation drug abuse, invasive tumor	Head, neck, spine, thorax, pelvic or abdominal trauma	Surgery (head, neck, thorax, abdomen, spine), anesthesia (epidural, intubation, etc), diagnostic tests

Case Description

History

- A 56 year old white male with no known past medical history
- Never had a colonoscopy
- Had not seen a physician in over 20 years due to problems with insurance
- Presented to the emergency department with a one-week history of left gluteal pain and recent 20 lb. weight loss
- Patient stated that the pain was exacerbated with bowel movements
- Noted associated signs/symptoms of periodic hematochezia and an avocado-sized stool directly prior to onset of pain
- Patient stated he had some unintentional weight loss on and off over the past year
- Denied relieving factors
- Denied abdominal pain or trauma
- Denied previous episodes of gluteal pain
- Denied numbness, tingling, incontinence of urine/bowel, saddle paresthesia

Objective Findings

- Patient is alert and mildly cachectic looking
- Heart rate 88bpm, blood pressure 121/64mmhg, temperature 97.9°F
- Chest: Clear to auscultation bilaterally
- Abdomen: soft, non-tender, non-distended
- Genitourinary: 15.7x12x15cm hydrocele present in the left side of the scrotum with no overlying skin changes
- Buttocks: left buttocks firm with crepitus, tender to palpation, no overlying erythema
- Neuro: A&Ox3, CN I-XII intact, 5/5 strength of all extremities, sensation intact

Initial Diagnostic Testing

- Hemoglobin 8.1g/dL
- Hematocrit 24.2%
- White blood cells 17.1 thousand/mm³
- Platelets 831 thousand/mm³
- CT abdomen and pelvis with contrast revealed:
 - Numerous presacral and posterior pelvic collections
 - Locules of air extending into the gluteal regions bilaterally and spinal cord from S2-L5.
 - Three left lower lung nodules
- Blood cultures revealed gram negative rods

Differential Diagnosis

- Gluteal Abscess
- Colorectal Malignancy
- Gluteal Pyomyositis
- Crohns Disease Complicated by Fistula
- Perforated Diverticulitis

Further Diagnostic Testing

- Barium enema post-op day 3 status post incision and drainage of left gluteal pyomyositis revealed:
 - Blocked flow from rectum to sigmoid colon
 - Probable obstructing lesion
- Colonoscopy on post-op day 3 status post incision and drainage revealed:
 - Distal Sigmoid colon stricture
 - Biopsy revealed perforated colorectal cancer
- IR drain check on post-op day 4 status post incision and drainage showed:
 - Three pre-sacral abscess cavities that all communicate with each other
 - Communication of the superior left presacral abscess with the S1 neural foramen
- Lab results post-op day 1 status post cystoscopy with bilateral ureteral stents, exploratory laparotomy, ileocecectomy with ileocolic anastomosis, and descending colon end colostomy with mucus fistula:
 - Hemoglobin (Hgb) 10.0 g/dL
 - Hematocrit (HCT) 30.8%
 - White blood cells (WBC) 11.1 thousand/mm³
 - Platelets 623 thousand/mm³

Fig 1. Surgical Management

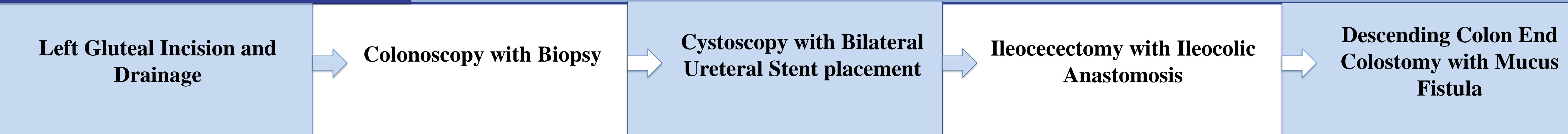


Fig 2. CT Showing Pneumorrhachis

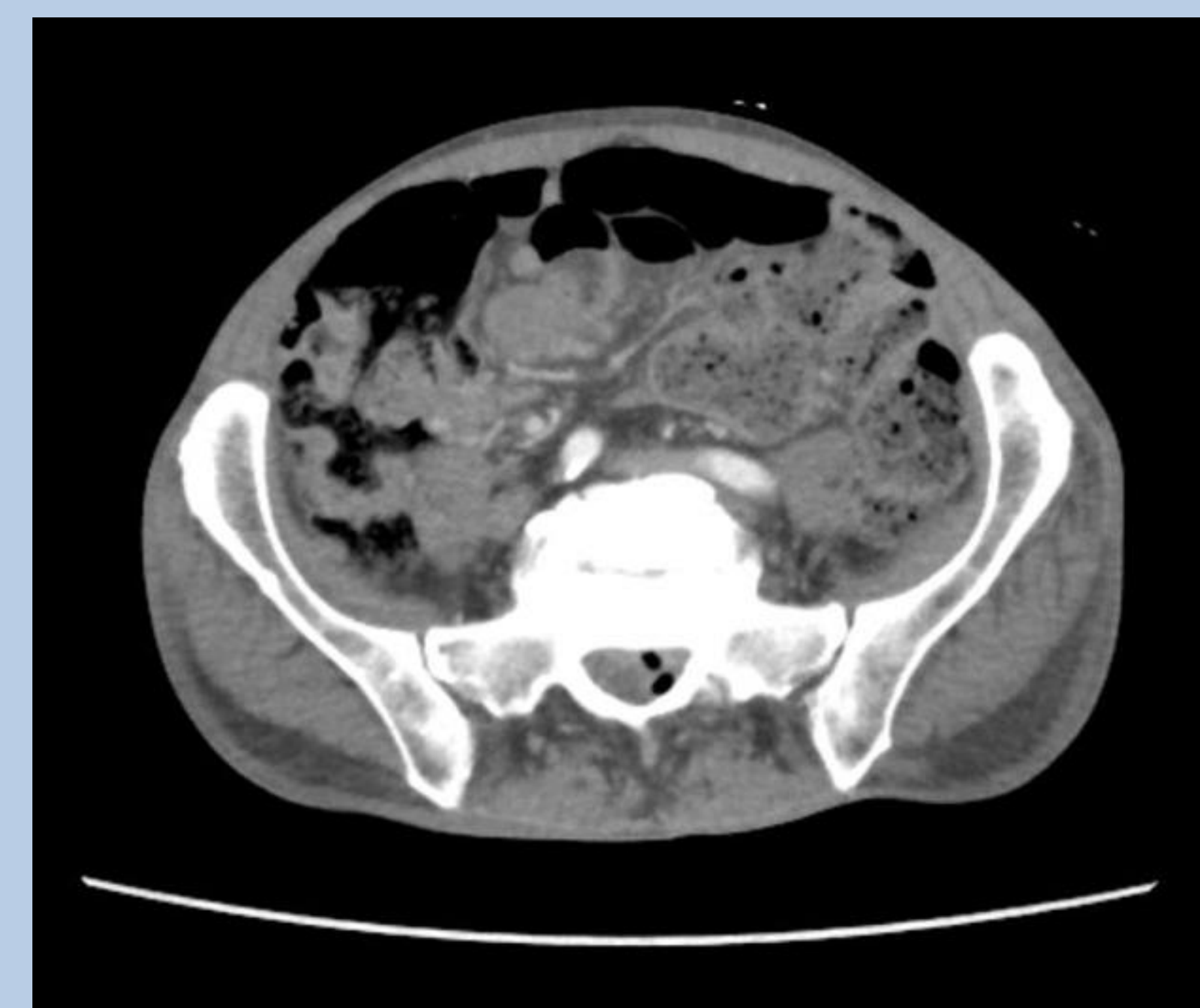


Fig 3. CT Showing Gluteal Pyomyositis



Patient Management

- Left gluteal incision and drainage was performed for suspected gluteal abscess
 - Revealed pyomyositis growing *E. coli*, which was treated with intravenous cefepime and clindamycin
- Interventional radiology placed three presacral drains which output 20-50cc of fecopurulent fluid per day.
- Colonoscopy and biopsy revealed perforated colorectal cancer
- Patient underwent cystoscopy with bilateral ureteral stents, exploratory laparotomy, ileocecectomy with ileocolic anastomosis, and descending colon end colostomy with mucus fistula.
- Follow up labs on post-operative day 1 showed WBC 11,100/mm³, Hgb 10.0g/dL, and HCT 30.8%
- Patient tolerated the procedure well, and was discharged 12 days later with plan for outpatient follow up with oncology and biopsy of the left lower lung nodules found on imaging

Discussion

- No treatment guidelines for pneumorrhachis exist due to the rarity of the disease and its wide range of underlying causes^{3,4}
- It is also worth mentioning that the primary cause of this patient's condition was colorectal cancer, which is detected by the following screening guidelines:

Table 2. Colon Cancer Screening Guidelines⁵

	Colonoscopy	Fecal Occult Blood Test
Average Risk	Every 10 years from age 45-75	Annually from age 45-75
Increased Risk (ex: 1 st degree relative <60 years)	Starting at age 40, or 10 years before the diagnosis of a 1 st degree relative (Interval between tests vary)	Annually starting at age 40, or 10 years before the diagnosis of a 1 st degree relative

Conclusion

- Pneumorrhachis is an important radiological finding that healthcare providers should be aware of in order to identify a potentially dangerous source of gas leak into the spinal canal
- PR is an unusual condition that is most often found incidentally on imaging (this patient's PR most likely would have not been found if it had not been detected incidentally on CT)
- Though asymptomatic in most cases, it can be a sign of a more serious underlying cause such as trauma, surgical complications, or in this case, an invasive tumor

References

1. Singh GP, Kapoor I. Chapter 9: Pneumorrhachis. In: *Complications in Neuroanesthesia*. 1st ed. Academic Pr; 2016:71-75.
2. Behr G, Mema E, Costa K, Garg A. Proportion and Clinical Relevance of Intraspinal Air in Patients With Pneumomediastinum. *AJR Am J Roentgenol*. 2018;211(2):321-326. doi: 10.2214/AJR.17.19256.
3. Oertel MF, Korinth MC, Reinges MH, et al. Pathogenesis, diagnosis and management of pneumorrhachis. *Eur Spine J*. 2006;15 Suppl 5(Suppl 5):636-43. doi: 10.1007/s00586-006-0160-6.
4. Moayedi S, Babin L. Pneumorrhachis Secondary to a Sacral Decubitus Ulcer. *West J Emerg Med*. 2016;17(4):466-8. doi: 10.5811/westjem.2016.4.30296.
5. Recommendation: Colorectal Cancer: Screening. United States Preventive Services Taskforce. <https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/colorectal-cancer-screening>. Published June 15, 2016. Accessed January 6, 2021.