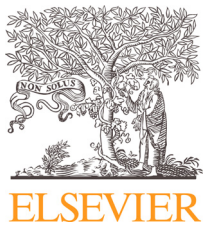
Radiology Case Reports 19 (2024) 4280–4282



Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Whole spinal pneumorrhachis following perforation of the rectum: A case report ☆

Hiroshi Kageyama, MD, PhD

Department of Neurosurgery (Spinal surgery), Shin-Kuki General Hospital, Kamihayami 418-1, Kuki, Saitama, Japan

ARTICLE INFO

Article history:
Received 2 May 2024
Accepted 28 June 2024

Keywords:
Pneumorrhachis
Spine
Colon
Rectum

ABSTRACT

Spinal pneumorrhachis is a relatively rare condition. Herein, we describe a case of whole spinal pneumorrhachis. A 68-year-old male, with a history of total proctocolectomy due to ulcerative colitis, had fever, diarrhea, and inflammatory reactions. Computed tomography (CT) revealed extensive epidural pneumorrhachis in the spinal canal from the cervical to sacral vertebrae. The patient was diagnosed with perforation of the rectal anastomosis and retroperitoneal abscess. Antibiotics were administered, and the abscess cavity was reduced on the follow-up CT. Pneumorrhachis in the spinal canal is often found only in the cervical, thoracic, or lumbar regions and is rarely found in the entire spinal canal. Spinal pneumorrhachis resulting from perforation of the colon or rectum has only been reported in 6 previous cases. To differentiate diseases that cause pneumorrhachis in the spinal canal, retroperitoneal abscess, and emphysema associated with perforation of the colon and rectum should be considered.

Introduction

Pneumorrhachis means the presence of intraspinal air. Spinal pneumorrhachis is a rare condition caused by various factors, including traumatic, medically induced, and nontraumatic causes [1]. Particularly involvement of the entire spinal pneumorrhachis is very uncommon [1]. Here, we present a case of whole spine pneumorrhachis extending from the cervical to the lumbar spine following perforation of the rectum, along with a review of the literature.

Case presentation

The patient was a 68-year-old male. His medical history included cerebral infarction, myocardial infarction, hypertension, and ulcerative colitis. He had undergone a total colorectal resection for ulcerative colitis 12 years prior.

Patient visited a different hospital due to a 1-week history of fever and diarrhea. Upon examination, the patient had a high inflammatory response hence, was referred to our hospital for further examination and treatment. Body temperature

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

E-mail address: kageyamahiroshi29@gmail.com

https://doi.org/10.1016/j.radcr.2024.06.075

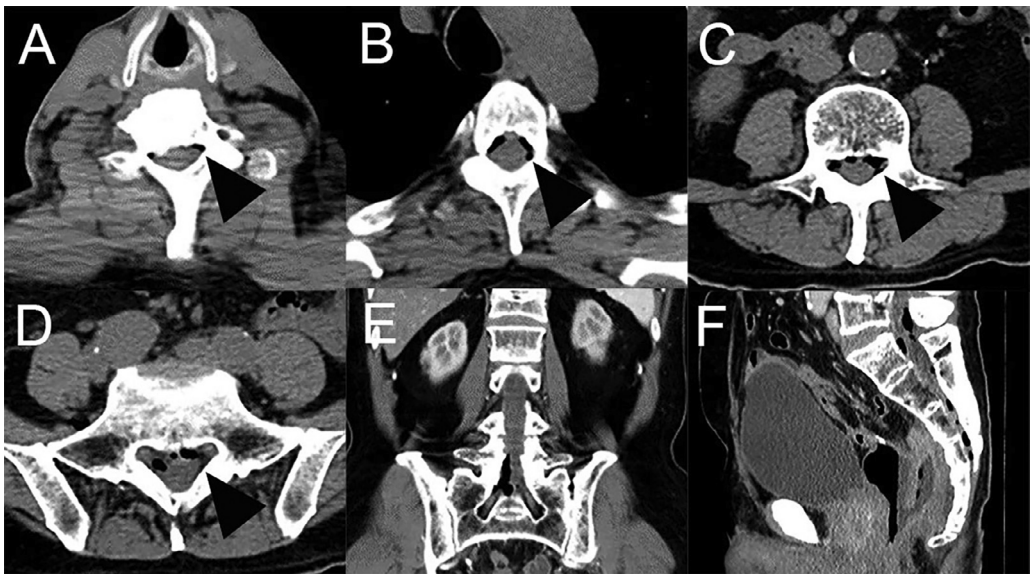


Fig. 1 – (A-D) Plain CT scans of the epidural pneumorrhachis scattered from cervical to sacral vertebrae level (black arrow heads). (A) C7 vertebral level, (B) T4, (C) L4, (D) Sacrum. (E and F) Contrast enhanced CT: (E) Emphysema in the right sacral foramen. (F) Abscesses in retroperitoneal cavity and anterior sacral surface.

upon admission was 37.8°C. Although bowel sounds were hyperactive, there were no signs of peritoneal irritation. No meningeal irritation was observed. Blood test on admission revealed elevated inflammatory response and other abnormal values (WBC 10000/μL, CRP 11.26 mg/dL, Hb 11.4 g/dL, Alb 2.6 g/dL, AST 123 U/L, ALT 117 U/L, ALP 440 U/L, γ-GTP 170 U/L, CPK 268 U/L, T-bil 1.6 mg/dL, T-chol 222 mg/dL, Bun 37.7 mg/dL, Cr 1.79 mg/dL, UA 9.4 mg/dL, Na 131 mEq/L).

Moreover, computed tomography (CT) scans of the cervical-to-trunk region taken upon admission revealed diffuse epidural pneumorrhachis in the spinal canal at the cervical, thoracic, lumbar, and sacral levels. The pneumorrhachis was continuous outside the spinal canal, along the right sacral foramen. Contrast-enhanced CT was suspicious of an abscess formation on the anterior surface of the sacrum (Fig. 1).

After surgical consultation, the patient was diagnosed with perforation at the anastomosis site of the rectum with retroperitoneal abscess and epidural pneumorrhachis in the spinal canal. The patient was managed conservatively with antibiotics and had a resolution of fever. The patient improved and was then discharged on the 10th day, and a follow-up CT scan 2 weeks later showed a shrinking of the abscess.

Discussion

Pneumorrhachis of the spinal canal may have intradural or extradural involvement. They are often localized to the cervical, thoracic, or lumbar regions, and rarely affect the entire spine [1]. The causes are broadly classified as traumatic or nontraumatic [1]. The most common cause of traumatic pneumorrhachis is vomiting [1], particularly in conditions that cause airway injury from increased intrathoracic pressure (*e.g.* coughing, asthma, bronchitis, asphyxia, and post-cardiopulmonary resuscitation). Drug intoxication from marijuana, methamphetamine, or cocaine as well as diabetic ketoacidosis have also been reported as conditions that induce vomiting [1]. This is also thought to cause airway pressure damage from increased intrathoracic pressure.

There are 2 possible routes of inflow for spinal pneumorrhachis directly from the body surface, as in traumatic spinal fluid leaks and perforating spinal trauma, and from the soft tissues of the paraspinal column [2]. When the spinal pneumorrhachis flows into the paraspinal soft tissues, it moves through the soft tissue interstices of low resistance and enters the spinal canal through the intervertebral foramen along the vascular or nerve roots [2]. When mediastinal spinal pneumorrhachis occurs due to an airway pressure injury, the most common pathway involved is migration from the mediastinum through the retropharyngeal interspace along the fascia of the neck, then to the spinal canal through the neural foramen [2].

Based on the imaging findings in our case, the spinal pneumorrhachis flowed into the spinal canal from the rectum into the retroperitoneal space via the sacral foramen. Apart from this case, there have been 7 reported cases of spinal epidural pneumorrhachis associated with perforation of the colon or rectum (Table 1). Most cases were postoperative colorectal cases, and as in the present case, one of these cases had a previous history of total colorectal resection for ulcerative colitis. In both cases, the retroperitoneal emphysema, which developed due to the perforation in the gastrointestinal tract in front of the sacrum and within the retroperitoneal space, likely flowed into the spinal canal through the sacral foramen and other pathways. Although this is a relatively rare condition, the possibility of a retroperitoneal abscess associated with perforation of the rectocolon should be included in the differential diagnosis when pneumorrhachis is found in the spinal canal in a febrile patient presenting with gastrointestinal symptoms but no evident locus of infection.

Table 1 – Reported cases of spinal pneumorrhachis associated with perforation of colon or rectum.

Case	Perforation site	Pathology
1 [4]	Ileoanal anastomosis	Total proctocolectomy
2 [5]	Splenic flexure of the colon	Colonoscopic polypectomy
3 [6]	Sigmoid colon	Sigmoid colon perforation
4 [7]	Ileoanal anastomosis	Postoperative and postradiation chemotherapy for rectal cancer
5 [8]	Colon	Colon cancer recurrence
6 [3]	Sigmoid colon	Sigmoid colon cancer
Present case	Rectum	Total proctocolectomy

These numbers are the reference number of the case cited.

Most cases of spinal pneumorrhachis, including symptomatic cases, are resolved by treating the underlying disease alone. If the neurological symptoms are exacerbated, hyperbaric oxygen therapy or emphysema aspiration may be helpful [3].

Conclusion

We report a case of extensive whole spinal pneumorrhachis associated with rectal perforation and retroperitoneal abscess after total colorectal resection. Retroperitoneal abscesses and emphysema associated with perforation of the colon and rectum should be considered in the differential diagnosis of spinal pneumorrhachis.

Patient consent

A written informed consent was obtained from the patient for the publication of this case report.

REFERENCES

[1] Oertel MF, Korinth MC, Reinges MHT, Krings T, Terbeck S, Gilsbach JM. Pathogenesis, diagnosis and management of pneumorrhachis. Eur Spine J 2006;15:636–43. doi:10.1007/s00586-006-0160-6.

[2] Defouilloy C, Galy C, Lobjoie E, Strunski V, Ossart M. Epidural pneumatosis: a benign complication of benign pneumomediastinum. Eur Respir J 1995;8:1806–7. doi:10.1183/09031936.95.08101806.

[3] Sumitro K, Basir DN, Metussin A, Lim KC, Chong VH. Pneumorrhachis secondary to klebsiella pneumoniae gas-forming paraspinal abscess: a case report and review of literature. Cureus 2023;15:e45851. doi:10.7759/CUREUS.45851.

[4] Amit A, Toll EC, Siddique S, Nelson RJ. Pneumorrhachis with pneumocranium: an unusual complication of intra-abdominal sepsis. Br J Neurosurg 2011;25:111–12. doi:10.3109/02688697.2010.500420.

[5] Tafreshi A, Liew MS, Yap LP, Azad A. Malignant enterocutaneous fistula complicated by pneumorrhachis. Spine Journal 2012;12:1161–2. doi:10.1016/j.spinee.2012.09.038.

[6] Iacoangeli M, Di Rienzo A, Fianchini A, Marmorale C, Alvaro L, Nocchi N, et al. Acute tension pneumocephalus secondary to whole spine pneumorrhachis as an unusual presentation of a colon cancer complicated by a transsacral cerebrospinal fluid leak. J Clin Neurosci 2013;20:469–71. doi:10.1016/j.jocn.2012.02.032.

[7] Anaye A, Moschopoulos C, Agneessens E, Hainaux B. Pneumoscrotum, pneumomediastinum, pneumothorax, and pneumorrhachis following colon surgery. Radiol Case Rep 2008;3:216. doi:10.2484/rcr.v3i4.216.

[8] Holton LH, Migaly J, Rolandelli RH. Pneumorrhachis, subcutaneous emphysema, pneumomediastinum, pneumopericardium, and pneumoretroperitoneum after proctocolectomy for ulcerative colitis: report of a case. Dis Colon Rectum 2002;45:567–70. doi:10.1007/s10350-004-6241-x.