

CASE STUDY

Extended Post-Traumatic Pneumorachis: A Case Report and Review of the Literature

Salma Lahlou^{1,*}, Karim Baayoud¹, Amine El Khamouye¹, Abdelmajid Chellaoui^{1,2},
Khadija Ibahiouin^{1,2}, and Abdelhakim Lakhdar^{1,2}

ABSTRACT

Pneumorachis is an uncommon condition wherein air infiltrates the spinal canal. The pathophysiology of this condition is still a matter of debate, depending on the type of traumatic mechanism (open or closed) and the assessment of the associated injuries. This report aims to present a case of pneumorachis and comprehensively review the literature to gain a better understanding of the etiologies, associated lesions, and neurological symptoms. By doing so, we hope to enhance our knowledge of the management and modalities of treatment for this condition. Although there are many cases of pneumorachis reported in the literature, none are widespread.

Keywords: Cervical, deficit, extensive, Pneumorachis.

Submitted: April 21, 2024

Published: June 12, 2024

 10.24018/lejmed.2024.6.3.2111

¹Department of Neurosurgery, Ibn Rochd, University Hospital, Morocco.

²Laboratory of Research on Neurology, Neurosensorial Diseases and Disability, Faculty of Medicine, Hassan II University, Morocco.

*Corresponding Author:
e-mail: drlahloulmal@gmail.com

1. INTRODUCTION

Pneumorachis, or traumatic pneumomyelogram, is the presence of air in the spinal canal. It is a rare phenomenon, particularly if it is not associated with severe bone damage. This pressurised air can penetrate the epidural space [1]. Or move further into the subarachnoid compartment along the nerve root.

On the other hand, subarachnoid air can move cranially and caudally, causing pain as well as compression of the brain parenchyma through a valve mechanism.

Pneumorachis does not usually cause neurological symptoms. Management is medical, rarely becoming surgical if spinal cord compression is present.

2. CASE REPORT

Our patient is Y.H., a 36-year-old male with no previous pathological history. He was the victim of an MVA (motorcyclist struck by a car), resulting in cranio-facio-cervico-thoracic polytrauma with initial loss of consciousness and vomiting.

He admitted with a Glasgow score of 15/15, pupils reactive and symmetrical. Neurological examination revealed 1/5 monoplegia of the left upper limb with anaesthesia, cervical subcutaneous emphysema and torticollis.

After conditioning, a body scan revealed diffuse cerebral pneumocephalus (Fig. 1), localized in the posterior

cerebral fossa and extending from the clivus to the second thoracic vertebra (Fig. 2). The rest of the body scan revealed a moderate bilateral pneumothorax.

A spinal MRI revealed small areas of contusion in the cervical cord (Fig. 3). The patient was hospitalized for 20 days in the neurosurgery department for clinical monitoring, physical rehabilitation and medical treatment with corticosteroids.

On leaving the hospital, he had recovered sensitivity in the affected limb, with a marked improvement in motricity to 3/5ths.

3. DISCUSSION

Pneumorachis is defined as the accumulation of air in the spinal cavity, which may be present in intradural or extradural spaces. This process typically manifests following a traumatic event, although it can also occur following damage. It can also occur following injuries to the base of the skull, ribs, chest, or abdomen [2]–[4].

The subarachnoid space of the brain is in communication with the spinal canal. This communication is essential for the proper functioning of the central nervous system. It was demonstrated by Dandy in 1918 by injecting air into the spinal canal to obtain images of the brain known as *myelography* [5].

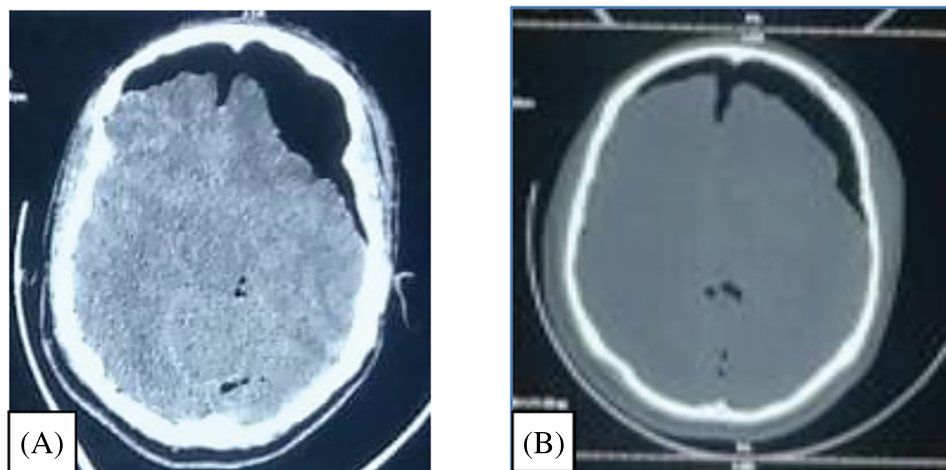


Fig. 1. Axial-slice CT scan of the brain showing diffuse pneumocephalus: A) parenchymal section and B) bone section.

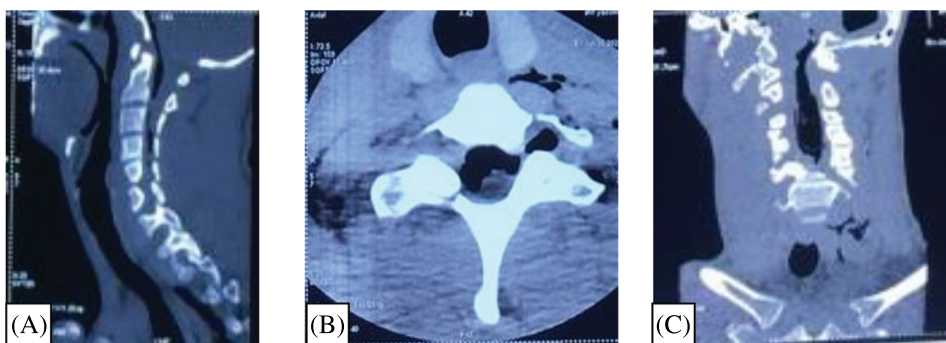


Fig. 2. Cervical CT scan in axial and sagittal sections showing the extent of the pneumorachis: A) sagittal slice, B) axial slice, and C) coronal section.

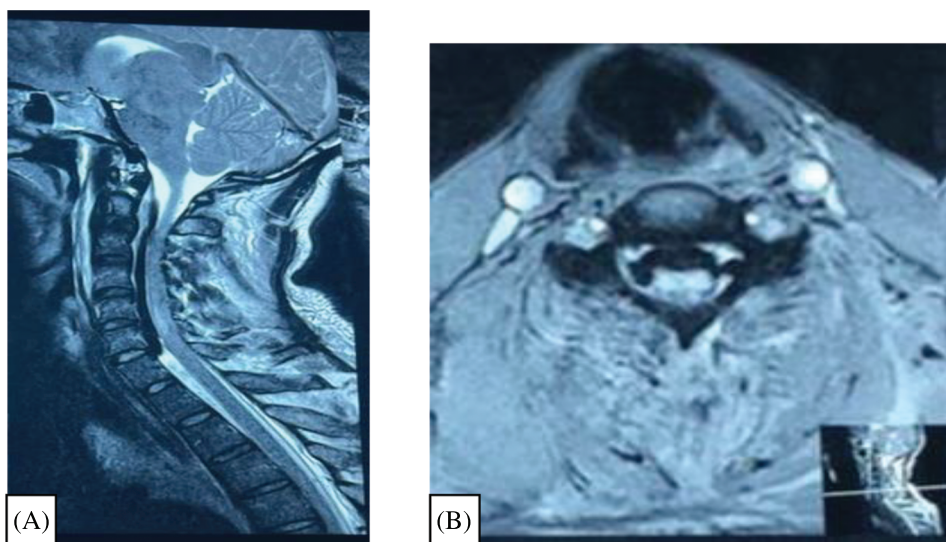


Fig. 3. Cervical spinal cord MRI in T2 sequence showing minimal contusions: A) sagittal slices and B) axial slices.

Pneumorachis is an infrequently occurring condition that rarely presents with neurological symptoms. A total of 50 patients were included in 42 studies, with only 10% exhibiting neurological signs. These symptoms ranged from simple paresis to plegia, with the presence of a deficit prompting a search for a cause other than pneumorachis to explain the symptomatology [6]–[8].

Pneumorachis is a medical condition that must be confirmed through a CT scan or MRI, as a simple X-ray may

not be sufficient. This condition involves the presence of air within the spinal canal and can be accompanied by other serious injuries, such as spinal cord contusions. While air absorption can resolve on its own, it is important to take immediate action if it doesn't. The air entry point must be identified and eliminated to prevent further complications. Do not hesitate to seek medical attention if you suspect you may have pneumorachis [9].

The findings of this study indicate that pneumorrhachis is more commonly associated with a secondary lesion. In the majority of cases, the use of aggressive therapy to relieve pneumorrhachis is not indicated, as evidenced by this study. The majority of cases of pneumorrhachis resolve with conservative treatment or treatment of the underlying cause. Oxygen therapy may facilitate air absorption [10].

Nevertheless, patients with pneumorrhachis should be closely monitored clinically and radiographically. In the event that patients present with symptoms that fail to improve despite treatment of the underlying cause, they may undergo decompressive surgery.

4. CONCLUSION

Pneumorrhachis is a relatively rare phenomenon. In most cases, it is associated with intracranial or respiratory lesions. Pneumorrhachis can cause symptoms of spinal cord compression. Management is aimed at treating the underlying cause and rarely requires surgical evacuation.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

REFERENCES

- [1] Katz DS, Groskin SA, Wasenko JJ. Pneumorrhachis associated with spontaneous pneumomediastinum. *Clin Imaging*. 1994;18: 85–7.
- [2] Newbold RG, Wiener MD, Vogler JB III, Martinez S. Traumatic pneumorrhachis. *AJR Am J Roentgenol*. 1987;148:615–6.
- [3] Yip L, Sweeny PJ, McCarroll KA. The traumatic air myelogram. *Am J Emerg Med*. 1990;8:332–4.
- [4] Thompson GR III, Crawford GE. Pneumorrhachis caused by metastatic gas gangrene. *Diagn Microbiol Infect Dis*. 2009;63: 108–10.
- [5] Dandy WE. Roentgenography of the brain after injection of air into the spinal canal. *Ann Surg*. 1919;70:397–403.
- [6] Chibbaro S, Selem M, Tacconi L. Cervicothoracolumbar pneumorrhachis. Case report and review of the literature. *Surg Neurol*. 2005;64:80–2.
- [7] Prabhakar H, Bithal PK, Ghosh I, Dash HH. Pneumorrhachis presenting as quadriplegia following surgery in the prone position. *Br J Anaesth*. 2006;97:901–3.
- [8] Lin LC, Liao YM, Yang RC. Pneumorrhachis following lumbar puncture: a case report. *Kaohsiung J Med Sci*. 2006;22:39–43.
- [9] Chibbaro S, Selem M, Tacconi L. Cervicothoracolumbar pneumorrhachis. Case report and review of the literature. *Surg Neurol*. 2005;64(1):80–2. doi: 10.1016/j.surneu.2004.09.047.
- [10] Gore PA, Maan H, Chang S, Pitt AM, Spetzler RF, Nakaji P. Normobaric oxygen therapy strategies in the treatment of postcraniotomy pneumocephalus. *J Neurosurg*. 2008;108:926–9.