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Progressive subcutaneous emphysema. A rare finding: Pneumorrhachis

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ABSTRACT

Pneumorrhachis is a rare phenomenon which may be caused by trauma, intracraneal infection, pneumomediastinum or iatrogenic factors. Presence of air in the spinal canal is reported in most cases. In this article, we report a case with PR in the spinal canal without any neurological deficit, which developed secondary to subcutaneous emphysema.

1. Introduction

Pneumorrhachis is a rare radiological finding which is characterized by presence of air in intraspinal compartments. It is a rare complication as a result of skull and spinal fractures, epidural abscess, epidural anesthesia and lumbar puncture and (traumatic pneumothorax and pneumomediastinum [1]. In the majority of the cases, air has been reported in thoracic and lumbar region particularly in the cervical region, with the exception of two cases which had air extending in entire spinal canal [2]. We detected air along the entire spinal canal in our case which had no pneumomediastinum but which developed subcutaneous emphysema due to spontaneous pneumothorax. This study reports a rare case of etiological and radiological pneumorrhachis.

2. Case report

A 31-year old asthenic male patient with no trauma history was admitted to the clinic with shortness of breath and chest pain. On physical examination, diminished air entry in left hemithorax and subcutaneous crepitations were identified. Following the posteroanterior chest graphics showing pneumotorax, tracheostomy tube and underwater seal drainage were performed. Upon the continuation of massive air drainage on the 2nd day of the follow up, we examined the case through thoracic CT with the diagnosis of lung bullae. Diffuse air was detected extending from cervical region to the lower lumbar region (Fig. 1). It was initially thought that air might have entered in the spinal from cervical region with subcutaneous emphysema through vertebral foramen (Fig. 2). CT scan showed that air in the spinal canal measures 9,7 mm at the deepest level (Fig. 3). The case with no clear neurological symptom was examined by the neurosurgeon. No neurological deficit was detected in the case and we did not plan any surgical operation for pneumorrhachis. The patient underwent operation due to rupture and bullae in the left upper lobe of the lungs. The patient was discharged from the hospital on the 4th day. The follow up CT scan in the postoperative day 14 showed no subcutaneous emphysema and PR.

3. Comment

The term pneumorrhachis was first used by Newbold et al. [3]. Pneumorrhachis may cause air in different anatomical parts of the spinal canal depending on its mechanism. The majority of the pneumorrhachis cases reported in the literature have air bubbles in the spinal canal. In our case, intraspinal diffuse air has been detected along the entire canal and air measuring 9,7 mm in the

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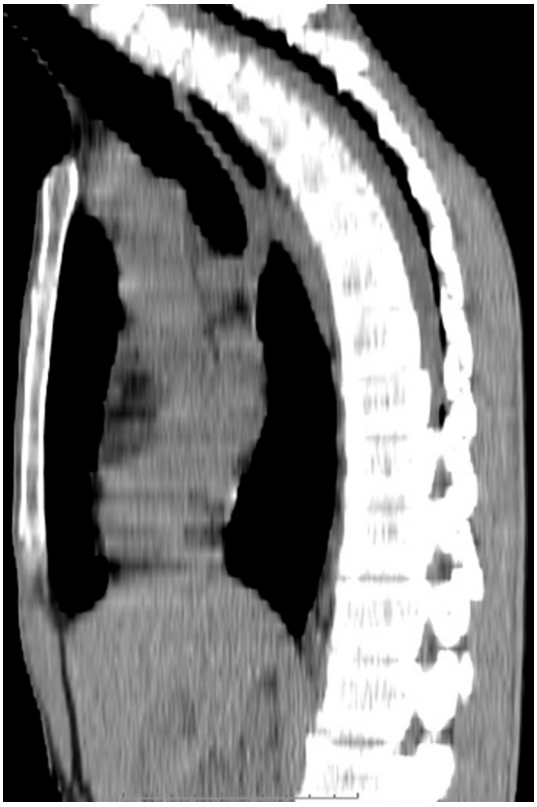

Fig. 1. Diffuse air deposition in to the spinal canal (Cervical and thoracic region).

Fig. 2. Diffuse air deposition in to the spinal canal. (Lumbar region).

cervical region has not been reported in the literature before, to our information.

Pneumorrhachis, which usually occurs after spinal trauma, may be caused by pneumothorax or similar conditions that produce high intrathoracic pressure, barotrauma, a recent iatrogenic manipulations during surgical, anaesthesiological and diagnostic interventions, malignancy and its associated therapy [1]. Iatrogenic pneumorrhachis is mostly caused by epidural anesthesia [3]. In the pneumorrhachis cases whose primary cause is pneumothorax, there is often accompanying pneumomediastinum and air penetration into the spinal canal takes place through posterior mediastinum. There is no facial barrier to prevent air penetration between posterior mediastinum or retropharyngeal space and epidural space. For this reason, in cases of mediastinal emphysema, air can easily enter into epidural space through neural foramina [4]. The pneumorrhachis mechanism in our case was identified as subcutaneous emphysema extending towards the spinal canal through intervertebral foramen in the cervical region.

Pneumorrhachis can occur in two different locations, subdural and epidural. Subdural pneumorrhachis is usually associated with severe trauma. For differential diagnosis, malignancy, inflammation and infectious diseases by gas-forming organisms should be assessed [1].

Pneumorrhachis is first of all a radiological diagnosis. CT is the most reliable and the fastest way of diagnosing pneumorrhachis. On the other hand, it might prove difficult to differentiate epidural and subdural in CT [1]. Location and distribution of the air in the spinal canal entirely depends on the site of the air penetration, volume and rate. The air usually collects in the posterior epidural space where there is low resistance due to loose connective tissue as compared to the anterior space where there is high resistance due to rich vascular network [3]. Presence of air in subdural space is

Fig. 3. Subcutaneous emphysema extending towards the spinal canal through intervertebral foramen in the cervical region.

usually associated with severe trauma. In cases of air in epidural space, the patient's clinical condition is usually better and pneumocephalous is not observed [5]. Intraspinal air does not tend to move. Pneumorrhachis is usually asymptomatic but pain and symptoms causing neurological deficits have been reported in a number of rare cases [1].

There are no standards for the management of pneumorrhachis due to the rareness and different aetiologies of the cases. Non-surgical treatment methods include dexamethasone, decompression and aspiration by a needle, high concentrations and hyperbaric oxygen [1]. There are reports suggesting that asymptomatic patients and pneumorrhachis cases associated with can be treated conservatively with high-flow oxygen inhalation therapy [3].

Intraspinal air, in particular in epidural pneumorrhachis cases, tends to resolve by itself in a few days. Thus a conservative approach is recommended for such cases [1]. In our case, apart from surgical resection of lung bullae which caused pneumothorax and subcutaneous and surgical treatment of pneumothorax, no additional surgical treatment was undertaken for pneumorrhachis. The patient did not have any neurological symptom during the follow up period.

In general prophylactic management with antibiotics is not recommended in cases of epidural pneumorrhachis and in patients with subdural pneumorrhachis with no symptom of meningitis [5].

The management of patients with pneumorrhachis should be decided on an individual basis, and through a multidisciplinary approach. It should aim at identification of etiological factors and the causes and should aim at preventing morbidity and potential mortality.

Conflict of interest

We have not any potential conflicts in this case.

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We didn't have any sources of funding fort he work.

We have read and understood the information on Open Access and understand that we will have to pay an Open Access fee upon acceptance of our article.

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