Case report

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Posttraumatic intradural pneumorrhachis: A rare entity

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Abstract : Pneumorrhachis, denoting intra-spinal air, is an uncommon epiphenomenon of coincident underlying injuries and diseases, accompanied by different aetiologies and possible pathways of air entry into the spinal canal. Air within the spinal canal can be divided into primary and secondary pneumorrhachis, extra- or intradural pneumorrhachis and aetiologically subsumed into iatrogenic, traumatic and nontraumatic The pathogenesis and aetiologies of pneumorrhachis are multifold and can be a diagnostic challenge. CT is the imaging tool of choice. Pneumorrhachis has to be differentiated from free intraspinal gas collections and the coexistence of air and gas within the spinal canal has to be considered differential diagnostically. Pneumorrhachis usually is asymptomatic but can also be symptomatic by itself as well as by its underlying pathology. The latter, although often severe, might be concealed and has to be examined carefully to enable adequate patient treatment. The management of pneumorrhachis has to be individualized.

Keywords: pneumorrhachis, intradural, spinal canal

INTRODUCTION

Pneumorrhachis (PR), the phenomenon of intraspinal air, is a singular imaging finding of varying etiology. PR usually is asymptomatic but can also be symptomatic by itself as well as by its underlying pathology. We review the literature and attempt to elucidate theories of the development of PR and current management strategies.

CASE REPORT

Case 1: A 25 year-old-male was admitted after a severe head injury with a Glasgow coma score (GCS) E2M3V2. Computed tomography (CT)-head (Fig. 1a,b) revealed multiple intracranial injuries. Internal pneumocephalus with diffuse air distribution in the basal, prepontine and perimesencephal cisterns could be detected. Spinal CT (Fig.1c) demonstrated intra-dural air lucency in the cervical vertebral column. Air was located both anterior and posterior to the spinal cord along with pneumocephalous suggestive of intradural air. The patient remained decorticated, was managed conservatively but succumbed to his injuries.

Case 2: A 38-year-old lady was admitted with history of assault with a sickle. On examination she had multiple cut lacerated wounds over her suboccipital, frontal, parietooccipital regions. She had a GCS of 15. Computed tomography (CT)-head (Fig. 2a) was normal. Spinal CT (Fig.2b) demonstrated intra-dural air lucency in the cervical vertebral column. This was mainly situated posterior to spinal cord with a track of air extending into the muscular and subcutaneous plane. The patient was managed conservatively and discharged after 2 days.

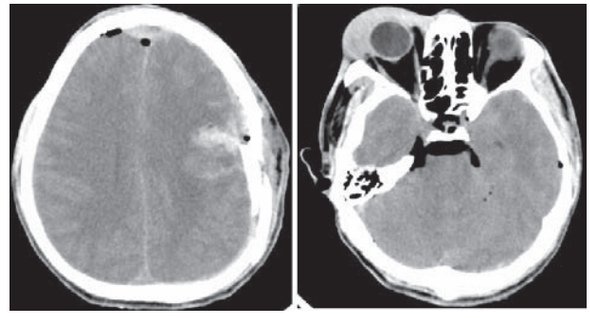

Fig 1a, b : Axial cranial CT scans (soft-tissue setting) revealing severe head injury accompanied by traumatic internal pneumocephalus with air distributed prepontine, perimesencephally.

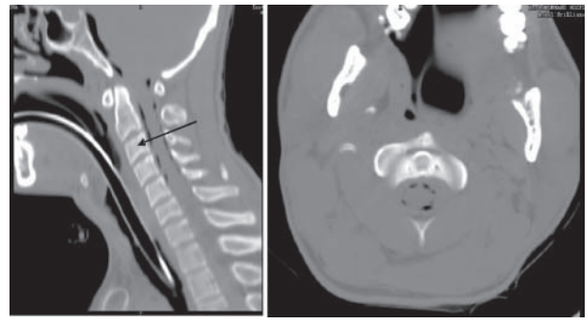

Fig 1c : Multiplanar reformatted spinal CT images demonstrating traumatic cervical intra-dural air (Arrow).

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Fig 2a : CT Head – There is no significant intradural injury

Fig 2b : CT Spine with 3-dimensional reconstruction Showing air located posteriorly (Black arrow) and tracking into the extraspinal region (White arrow)

DISCUSSION

The term 'pneumorrhachis'(PR) was first coined in 1987[1]. PR can be classified descriptively into internal, intradural and external, extradural. External PR by itself is usually innocuous, whereas internal traumatic PR, is frequently is associated with major trauma and believed to be a marker of severe injury[2]. PR can be classified into iatrogenic, traumatic and nontraumatic[2.] Location and distribution of air within the spinal canal depends on the site of air dissection, rate and volume of intraspinal air, capacity of intraspinal space and positioning of the patient. In external PR, because of the lower resistance from the loose connective tissue, as compared with the rich vascular network that is present anteriorly, the epidural air usually collects in the posterior epidural space[3.]

PR is primarily a radiographic diagnosis. X-ray may be helpful as an initial examination and to detect larger amounts of intraspinal air[2.] A linear lucency along the spinal canal on a lateral chest radiograph is a useful sign[3]. The diagnostic tool of choice is CT[4]. However, intra- and extradural PR may be difficult to differentiate[2]. Intraspinal air has to be clearly differentiated from free intraspinal gas collections due to degenerative, malignant, inflammatory and infectious diseases by gas-forming organisms[4]. Intraspinal gas, which has the same density as air collections cannot be clearly differentiated by CT. Intradural air is usually associated with a more severe head injury, pneumocephalous and is sited both anterior and posterior to the spinal cord. Extradural air is usually associated with a penetrating injury, the patient is usually clinically better preserved and is usually not associated with pneumocephalous. It is sited mainly posterior to the spinal cord (Figs 1 & 2).

The treatment of patients with PR involves the management of the associated injures. PR in itself usually is asymptomatic, reabsorbs spontaneously[3] and usually managed conservatively. When symptomatic, it is usually associated with spinal anaesthesia procedures[5]. Post traumatic PR is thought to be associated with an increased morbidity and mortality. PR associated with decreased intraspinal pressure secondary to cerebrospinal fluid leakage usually has a more benign character, whereas entrapped intraspinal air under pressure entering the cranio-spinal compartment usually in combination with a one-way air valve mechanism might cause tension PR and pneumocephalus with nervous tissue compression requiring intervention. Prophylactic management with antibiotics is usually not recommended in cases of extradural PR and in patients with intradural PR without signs and symptoms of meningitis.

In case general anaesthesia is required, the use inhalational nitrous oxide is avoided because it causes expansion of intracavitary air and results in an increase in CSF pressure, as nitrous oxide diffuses into the air-filled space. Also, pressurisation of the oronasopharynx should be avoided, and alternative anaesthetic techniques such as intermitted positive pressure ventilation with transient high-concentration oxygen should be used, thus preventing an increase in the volume of any intraspinal and intracranial air while promoting its early.

CONCLUSION

PR especially intradural, is a rare entity and can be caused by a multitude of sources. It is usually self-limiting and management is directed to the associated pathologies to enable adequate therapy. Intradural cervical pneumorrachis comes up as a predictor of severity of head-injury.

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