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Spontaneous Epidural Air Entrapment

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ABSTRACT

Background: Epidural pneumorrhachis (EPR), an extension of pneumomediastinum, results from air that leaks from the mediastinum and accumulates in the epidural space of the spine. It is an uncommon, benign condition; most cases are asymptomatic, are recognized only on computed tomography scans, and require no treatment.

Case Report: We present a case of EPR, pneumomediastinum, pneumothorax, and subcutaneous emphysema in a young male who was managed conservatively with supportive care.

Conclusions: EPR is a rare yet benign condition that can be found incidentally while working up lung or spine pathology. Although radiography can define the presence of a pneumomediastinum and subcutaneous emphysema, the diagnosis of EPR can only be made using computed tomography. The management of EPR is usually conservative, and the focus should be on underlying disease.

INTRODUCTION

Epidural pneumorrhachis (EPR), an extension of pneumomediastinum, results from air that leaks from the mediastinum and accumulates in the epidural space of the spine. It is an uncommon, benign condition; most cases are asymptomatic, are recognized only on computed tomography (CT) scans, and require no treatment.

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CASE REPORT

An 18-year-old man presented with severe neck pain. He had no medical complaints until 3 days before presentation when he experienced upper respiratory symptoms including a runny nose, sinus congestion, and severe cough paroxysms. A few hours before presentation, he started having severe, sharp neck pain after violent coughing attacks. He denied tobacco, alcohol, or illicit drug use. Physical examination was significant for tachypnea, tachycardia, oxygen saturation of 90% at room air, and crepitus over the neck and the chest. The rest of his examination was unremarkable. Chest radiography revealed subcutaneous emphysema of the neck and upper chest with pneumomediastinum (Figure 1). A subsequent CT scan of the chest confirmed pneumomediastinum and subcutaneous emphysema with small bilateral pneumothorax, as well as EPR (Figure 2). The patient denied any recent trauma, travel, or aggressive sports, and he was admitted to the hospital with pulmonary and thoracic surgery consult. An esophagogram did not reveal extravasation of contrast into the hypopharynx, cervical, or thoracic esophagus. The patient was managed conservatively with oxygen and never required chest tube insertion. Serial chest images showed resolution of the pneumothorax, pneumomediastinum, and EPR. Control of cough paroxysms was key to controlling the progression of pneumomediastinum and EPR.

DISCUSSION

EPR is an accumulation of air in the epidural space of the spine.[1] It was first described by Gordon and Hardman in 1977 and named pneumorrhachis by Newbold et al in 1987.[2,3] EPR is a rare condition; most cases are discovered incidentally on images ordered for other reasons. EPR is divided according to

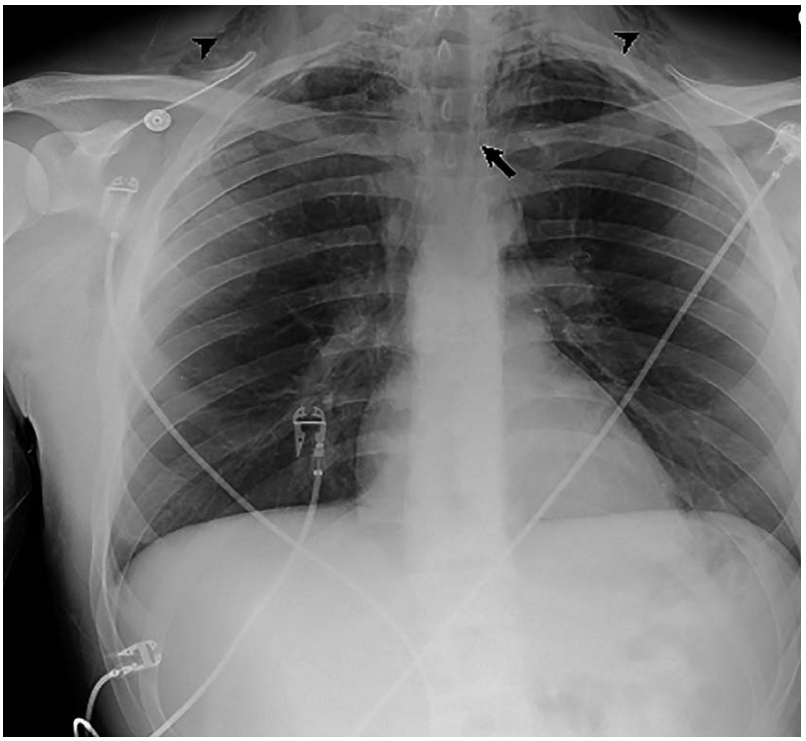

Figure 1. Chest radiography showing pneumomediastinum (long arrow) and subcutaneous emphysema of the neck and upper area of the chest (short arrows).

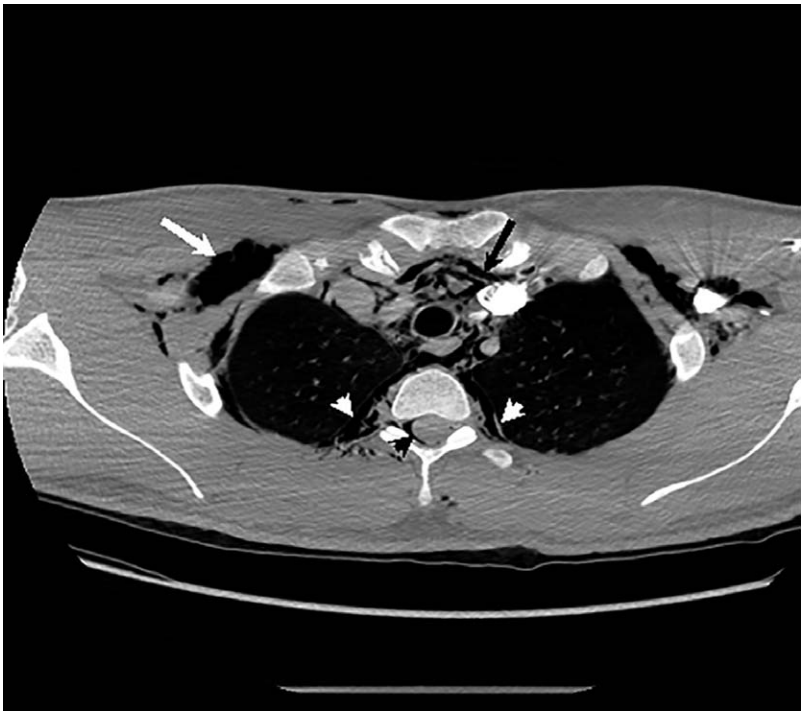

Figure 2. Computed tomography showing pneumomediastinum (black long arrow), small bilateral pneumothorax (white arrowhead), pneumorrhachis (black arrowhead), and subcutaneous emphysema (white long arrow).

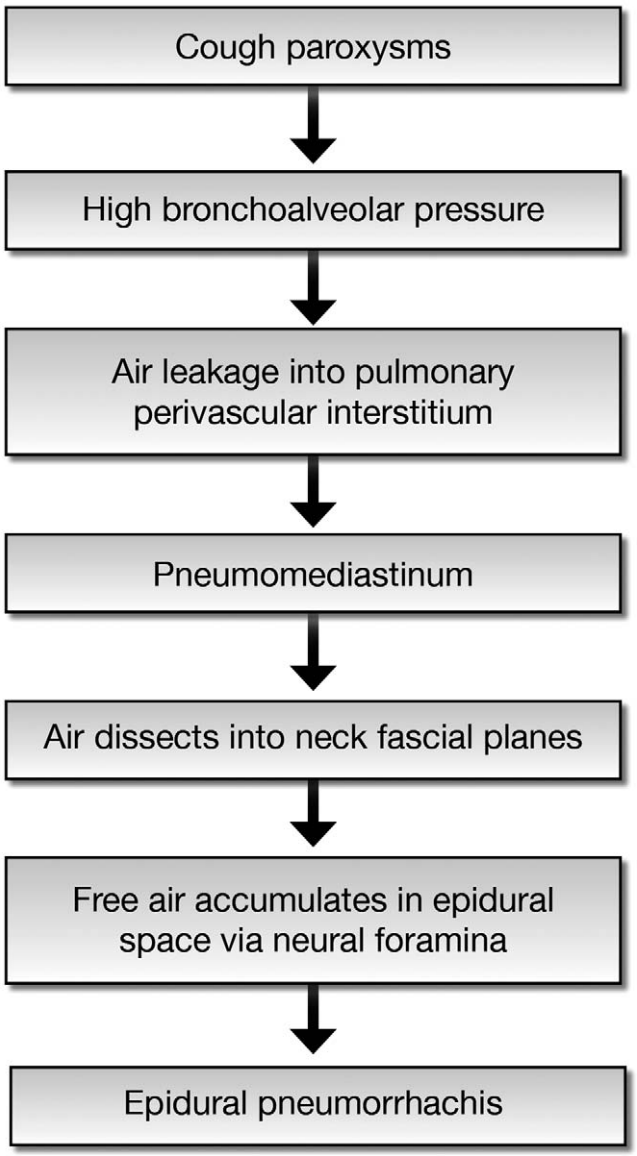

Figure 3. Pathophysiology of epidural pneumorrhachis.

etiology into traumatic, iatrogenic, and spontaneous.[4] Traumatic EPR is caused by direct air entry into the epidural space after spine injury, while iatrogenic EPR is caused by air entry into the epidural space during the administration of epidural anesthesia. Spontaneous EPR has been described following pneumothorax or pneumomediastinum.[5]

The pathophysiologic process of pneumomediastinum was first described by Macklin in 1939 and is also known as the Macklin effect.[6] The increase in the pressure gradient between the alveoli and interstitial space during coughing can cause alveolar rupture, followed by air dissection along the bronchoalveolar sheaths and into the mediastinum.[5,7] Afterwards, air dissects the path of least resistance into the mediastinum to the fascial planes of the neck. The lack of fascial barriers between the posterior mediastinum and the epidural space permits air to escape through the neural foramina into the epidural space, causing EPR.[8] Figure 3 illustrates the process leading to EPR. The majority of the leaked air collects in the posterior epidural space because of its lower resistance compared to the well-vascularized anterior space.[9] Patients with EPR usually are asymptomatic, but in rare cases, the accumulated air may cause symptoms ranging from mild radicular pain to neurological compression and consequent deficit such as paraplegia.[10] Although plain x-ray is able to detect pneumothorax and pneumomediastinum, which can cause EPR, most cases of EPR require CT for diagnosis.

EPR is considered a benign disease; mortality and morbidity are caused by air accumulation in other body cavities.[11] Most cases of EPR are self-limiting and managed conservatively. Spontaneous resorption of air accumulation within 2 to 3 weeks is expected in most cases. Surgical intervention is rarely indicated and considered only when injected air acts as a space-occupying lesion, causing pressure on nervous structures and resulting in neurological deficit.[12] Treatment should target the underlying pathology on a case-by-case basis.

CONCLUSION

EPR is a rare yet benign condition that can be found incidentally while working up lung or spine pathology. Although radiography is able to define the presence of a pneumomediastinum and subcutaneous emphysema, the diagnosis of EPR can only be made using CT. The management is mainly conservative, and the focus should be on underlying disease.

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