Pneumomediastinum in COVID-19 patients: a case series of a rare complication

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Abstract

Pneumomediastinum is a rare clinical finding, but one which can be the source of significant concern for clinicians. By presenting 3 such cases, we highlight that pneumomediastinum can complicate the course of a severe coronavirus disease 2019 infection but emphasize that conservative management is the first-line method of treatment, with gradual resorption of the air from the tissues. It is important to be alert to the development of pneumothorax, which will require drainage.

Keywords: Pneumomediastinum • Mediastinal emphysema • Coronavirus disease 2019

INTRODUCTION

Pneumomediastinum is a rare occurrence and commonly referred to a thoracic surgeon [1]. During the coronavirus disease 2019 (COVID-19) pandemic, we have observed an increased in the number of patients referred to us for pneumomediastinum, suggesting that there is an association with either the viral infection, or the ventilation required to manage these patients. Here we present 3 cases highlighting the management of these patients (Fig. 1).

CASE REPORT

Patient 1

A 52-year-old male with a past medical history of diabetes and asthma, was admitted with dyspnoea, fever and cough. Blood gas levels on admission revealed type-1 respiratory failure and he was placed on non-invasive ventilation with continuous positive airway pressure (CPAP) (PEEP of 5 FiO 2 0.5). His chest radiograph (CXR) on admission demonstrated bilateral mid-zone and basal ground glass opacification typical of moderately severe COVID-19 pneumonia. He was admitted to a medical ward and antibiotics were administered (Co-amoxiclav and Doxycycline). The diagnosis of COVID-19 was confirmed by reverse transcription polymerase chain reaction (RT-PCR). His ventilation requirements gradually increased over 6 days, to a PEEP of 14 and a FiO2 of 0.8. Further deterioration resulted in him requiring intubation and mechanical ventilation. CXR following intubation revealed extensive bilateral consolidation and moderate pneumomediastinum. He was placed in a prone position and commenced on Epoprostenol nebulizers, therapeutic anticoagulation and Meropenem. The following day, a CXR demonstrated extensive pneumomediastinum, compressing the adjacent lung tissue, subcutaneous emphysema over the lower neck and upper chest but no pneumothorax. A subsequent computed tomography (CT) scan additionally demonstrated extensive pneumoretroperitoneum encasing the left kidney and pancreas. There was no indication of bowel or oesophageal perforation and the distribution of air was suggestive of extension from the chest. His extensive pneumomediastinum was managed conservatively with monitoring by daily CXRs where gradual improvement was observed. He continued to improve and was eventually discharged to the ward requiring no surgical intervention.

Patient 2

A 68-year-old male with a past medical history of hypertension and hypercholesterolaemia, was admitted with a history of dyspnoea, myalgia and cough. He was similarly found to have type-1 respiratory failure, CPAP was instituted (PEEP of 8 FiO2 0.4), and Co-Amoxiclav and Doxycycline administered. The diagnosis of COVID-19 was confirmed by RT-PCR. Over a period of 13 days, despite increased CPAP support, he continued to deteriorate and required intubation and mechanical ventilation. Post-intubation CXR demonstrated bilateral pulmonary infiltrates and subcutaneous emphysema into the neck. A subsequent CT scan demonstrated widespread pneumomediastinum with significant subcutaneous, retrocrural and retroperitoneal extensions, with no evidence of visceral perforation. His oxygen requirements increased the following day and CXR demonstrated a new right-
sided pneumothorax requiring drainage. The patient clinically improved and serial CXR confirmed resolution of the pneumomediastinum.

**Patient 3**

A 66-year-old male with a past medical history of hypertension, obesity and chronic kidney disease, was admitted with fever and acute confusion, secondary to type 1 respiratory failure. He was similarly managed initially with CPAP therapy and antibiotics. Admission CXR demonstrated pulmonary infiltrates and a pneumopericardium. He deteriorated rapidly and required intubation and mechanical ventilation on the same day. Subsequent CXR confirmed extensive pneumomediastinum. He suffered severe hyponatraemia and acute kidney injury requiring haemofiltration. The diagnosis of COVID-19 was confirmed by RT-PCR. He was extubated and transferred to the ward. Serial CXR confirmed the resolution of his pneumomediastinum.

**DISCUSSION**

Pneumomediastinum is a rare clinical finding, but one which can be the source of significant concern for clinicians managing such patients. By presenting these 3 cases, we emphasize that conservative management is usually all that is required, with gradual resorption of the air from the tissues [1]. There have been 2 other COVID-19 patients with pneumomediastinum described in the literature to date, who were also treated conservatively [2–4]. However, it is important to continue to monitor with serial imaging for the development of pneumothorax, which can lead to cardiorespiratory compromise, and also other signs of clinical deterioration. In patients with an accompanying pneumothorax, chest drainage is indicated and if there is ongoing air leakage, this is an indication for thoracic surgery.

In the context of the severe respiratory disease associated with COVID-19, it is highly likely that (unless there is a history of retching/vomiting) the pathogenesis of the pneumomediastinum is due to alveolar rupture secondary to barotrauma associated with mechanical ventilation, due to the high PEEP required to maintain adequate oxygenation in these severely compromised patients. Indeed, barotrauma is a recognized complication of mechanical ventilation [5]. Tracheobronchial injury secondary to intubation can also be a cause. In order to try and minimize the risk of barotrauma, patients should be ventilated with the least damaging settings possible to achieve adequate oxygenation. In patients requiring escalating PEEP, efforts should be focussed on identifying potentially reversible causes and strategies to reduce the PEEP should be sought, for example proning the patients early.

**Conflict of interest:** none declared.

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