CASE REPORT

Development of Massive Pneumopericardium After Intubation and Positive Pressure Ventilation

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ABSTRACT

Pneumopericardium is a rare complication of chest trauma, mechanical ventilation and cavitating pneumonia. We report a case of a 7-year-old patient with chronic myeloid leukemia who developed massive pneumopericardium immediately after being electively intubated for a diagnostic radiological procedure in the setting of ongoing *Enterococcal pneumonia*. As intensive care medicine becomes more prevalent in hospitals, we believe that clinicians need to be aware of this uncommon but potentially fatal condition.

Key words: *Pneumopericardium. Intubation. Positive pressure ventilation.*

INTRODUCTION

Pneumopericardium is a rare complication that has most often been described in the context of blunt or penetrating chest trauma or mechanical ventilation. In addition, there have been case reports of pneumopericardium in the setting of direct extension of infectious or neoplastic processes. We present the case of a young patient who developed pneumopericardium in the setting of pneumonia and intubation requiring mechanical ventilation.

CASE REPORT

A 7-year-old boy, with a history of chronic myeloid leukemia (CML) that had transformed to Pre-B acute lymphoblastic leukemia (ALL) was admitted to our hospital for blast crisis. During his hospital stay the patient developed left upper lobe opacity on chest X-ray prompting a bronchoscopy which was performed and revealed necrotic haemorrhagic tissue at the orifice of the left upper lobe. Cultures were positive for *Enterococcus* and the patient was treated with appropriate antibiotics. Subsequently, the patient had seizures in the absence of fever or electrolyte abnormalities. CT scan of the brain was planned under general anaesthesia with low tidal volume ventilation. The scan revealed bilateral occipital infarcts, post-procedure the patient was shifted to the intensive care unit and since he could not be immediately extubated secondary to bradycardia, a chest X-ray was performed revealing a massive pneumopericardium (Figure 1).

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Agitated saline instilled in the endotracheal (ET) tube showed under echocardiogram in the lateral pericardial space indicative of a possible tracheopericardial connection. Attempts at weaning the patient were unsuccessful secondary to tachypnea and desaturation whenever, the ventilator mode was changed from assist control to pressure support. In addition, bronchoscopy could not be safely performed to look for possible tear given high oxygen requirements. Cardiothoracic surgery was consulted to evaluate for surgical pericardiotomy but it was felt that given the patients overall tenuous state it would be better to attempt needle aspiration. This led to the echocardiographic guided placement of a triple lumen catheter in the pericardial space to attempt to drain the air from the pericardium with CT scan confirming adequate position (Figure 2). Despite active aspiration of air from the triple lumen catheter the pneumopericardium persisted and the patient became hypotensive requiring vasopressor support. He eventually went into cardiac arrest and passed away.

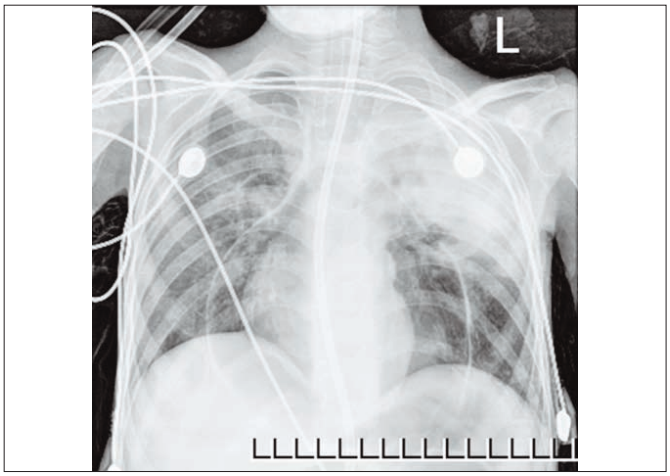

Figure 1: Chest radiography revealing massive pneumopericardium after intubation and positive pressure ventilation.

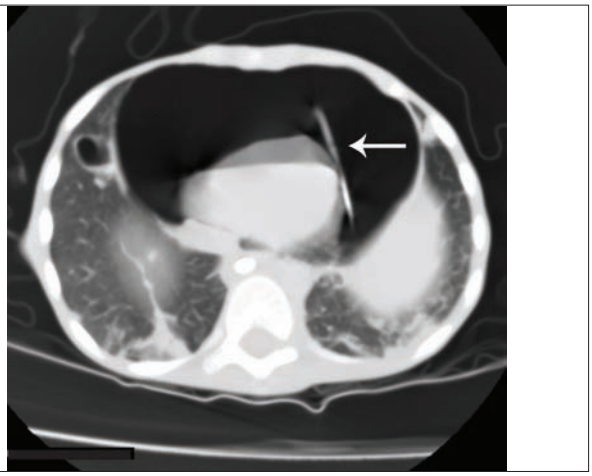

Figure 2: Persistent pneumopericardium on CT scan despite placement of a triple lumen catheter (arrow).

DISCUSSION

Pneumopericardium is a rare entity and is usually a complication of positive pressure ventilation, blunt chest trauma[1,2] or cardiac procedures.[3-5] Additionally, it has also been reported as a complication of *Staphylococcal pneumonia, Anaerobic pneumonia* and *empyema*.[6,7] Other less common causes of pneumopericardium that have been described include secondary to peptic ulcers[8] or in the setting of oesophageal cancer with development of an oesophageal-pericardial fistula.[9]

Tension pneumopericardium will clinically present with cardiac tamponade causing a decrease in cardiac output with associated hypotension, rise in central venous pressure, tachycardia and pulsus paradoxus. Pulsus paradoxus is said to be present if the inspiratory fall in systolic pressure is greater than 10 mmHg. Electrocardiogram in these patients will usually show low voltage or electrical alternans and may be a useful early clue to the diagnosis. However, it is important to remember that in an adult at least 80-100 ml of fluid can accumulate without causing tamponade[10] therefore, in cases where there is a high degree of suspicion of tension pneumopericardium or tamponade an echocardiogram may need to be urgently performed. Echocardiography has a diagnostic purpose as well as aids in therapeutic pericardiocentesis as in our case.

If the pneumopericardium is not causing tamponade it can be observed, otherwise immediate percutaneous or surgical pericardiocentesis is generally required and may be lifesaving. This case is unique in that despite having a massive pneumopericardium the patient did not become hypotensive in the initial 24 hours. Although it is possible that the patient developed the pneumopericardium secondary to the pre-existing pneumonia, we believe that the temporal relationship of the pneumopericardium developing immediately after intubation, as well as the fact that agitated saline injected in the ET tube was seen on echo in the pericardial space points to this being a case of pneumopericardium secondary to endotracheal intubation.

In summary, this case highlights a rare complication of intubation, presenting without the usual clinical signs and symptoms and reinforces the importance of routine chest X-rays in patients who undergo intubation.

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