

Pneumopericardium after Minimally Invasive Atrial Septal Defect Closure

Abstract

Minimally invasive atrial septal defect (ASD) closure is a commonly performed cardiac surgical procedure and has good outcome. We report an interesting chest X-ray showing pneumopericardium in a patient who underwent ASD closure using a minimally invasive approach.

Keywords: *Atrial septal defect closure, pneumopericardium, tamponade*

Pneumopericardium is defined as collection of air within the pericardial cavity though relatively rare can be spontaneous or a consequence of penetrating, blunt, or iatrogenic injury. We report a case of atrial septal defect (ASD) closure by minimally invasive approach with incidental finding of pneumopericardium postoperatively. Pneumopericardium is usually self-limiting and often requires no specific therapy, but life-threatening complications such as tamponade can occur.

A 28-year-old female with ostium secundum ASD underwent minimally invasive pericardial patch closure through right anterolateral thoracotomy approach. The patient had an uneventful intraoperative course.

In Intensive Care Unit, her first postoperative chest X-ray (CXR) revealed a continuous narrow radiolucent rim around the cardiac silhouette outlined by a fine line representing the pericardial sac [Figure 1]. The patient was positioned right side up in order for air evacuation through right pleural drain as pericardium was open and continuous to right pleural cavity. Early weaning from positive pressure ventilation (PPV) was done, and a repeat CXR was done which revealed no air within the pericardial cavity. There was no subcutaneous emphysema or obvious lesion around her chest and neck. The patient remained stable throughout her postoperative period and was discharged from the hospital.

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Discussion

Bricheteau first described pneumopericardium as collection of air within the pericardial cavity, a rare entity as compared to pneumothorax and pneumomediastinum. Common causes of pneumopericardium include chest trauma, cardiothoracic surgery, mechanical ventilation (particularly in children), infection, and pericardiocentesis.^[1] Clinical presentation of pneumopericardium depends on the rate and amount of air collected within the pericardial cavity. Symptoms of pneumopericardium include nonspecific radiating pain toward shoulder, back, or epigastrium. The patient may also complain of dyspnea and substernal chest pain. On physical examination, she may show tachycardia with weakened peripheral pulses, tachypnea, hypotension, and signs of raised jugular venous pressure. On auscultation, muffled heart sounds and a classically described Mill Wheel murmur (Bruit de Moulin), which is caused by turbulent flow of air and fluid in the pericardial sac, may be present. Radiologically, cardiac silhouette is partially or completely surrounded by a translucent rim along with parietal pericardium being visible as a thin line (the halo sign).^[2,3] Characteristically, air in the pericardium remains below the levels of great vessels unlike air in the mediastinum. Any sudden decrease of >2 cm in the cardiac shadow compared to the initial CXR or a 33% reduction in cardiac size, known as “small heart sign,” predicts impending tension pneumomediastinum.^[4] Electrocardiogram may show diffuse low voltage pattern in the presence of tamponade. Echocardiography,

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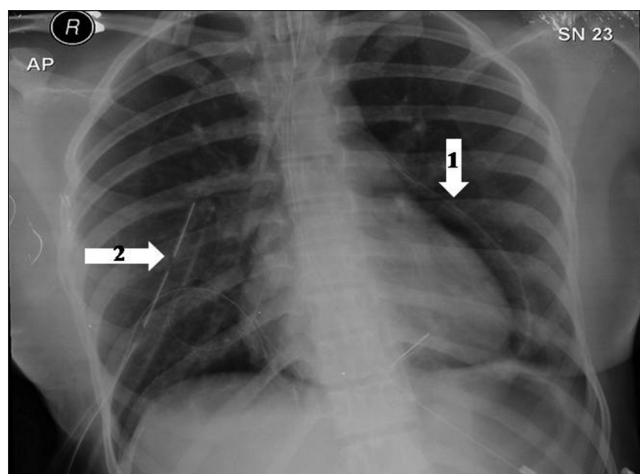


Figure 1: Postoperative chest X-ray showing pneumopericardium - air within the pericardial cavity (1) following minimally invasive atrial septal defect closure with intercostal drain tube (2) *in situ*

though has limited role, shows an “air gap sign” due to echo dropout.^[5]

The main mechanism leading to pneumopericardium involves either a pleuropericardial connection in the presence of pneumothorax or pulmonary volutrauma with alveolar air going into the pericardium.^[6-8] PPV/noninvasive ventilation may rapidly produce a life-threatening tamponade if one-way communication exists between lung and pericardium.

Pneumopericardium unlike pneumothorax often does not require any specific treatment and is usually self-limiting as in the present case. The treatment of small or asymptomatic pneumopericardium is usually conservative and directed toward the underlying cause. Oxygen therapy in high concentrations can be useful in the absorption of air. In cases of large and symptomatic pneumopericardium, the definitive treatment is drainage of air surrounding the pericardium. In our case, the patient had a right-sided intercostal drainage tube, pericardium was open, and the patient was extubated within 6 h of surgery. Chest tube remained *in situ* till CXR had no evidence of pneumopericardium [Figure 2].

Small air collection not causing tamponade can easily go unnoticed in anesthetized patients that too on PPV which can be a potential source of pneumopericardium.

High index of suspicion is required in immediate postoperative period in cardiac surgery patients more so in

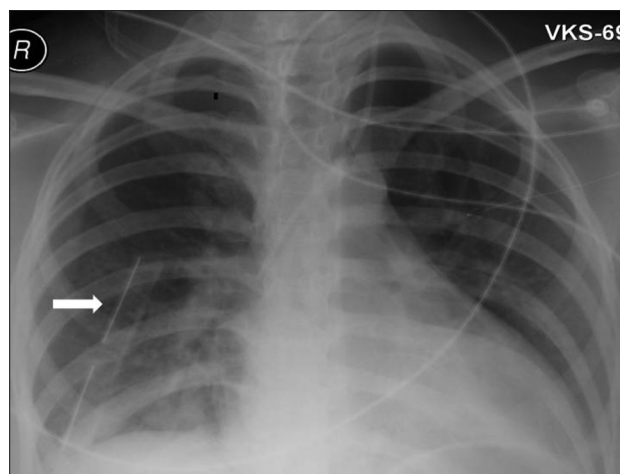


Figure 2: Chest X-ray taken after 12 h with right intercostal drain *in situ* showed no evidence of pneumopericardium

patient who has undergone minimally invasive surgery so as to prevent any pneumopericardium to cause tamponade.

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Conflicts of interest

There are no conflicts of interest.

References

1. Lee YJ, Jin SW, Jang SH, Jang YS, Lee EK, Kim YJ, *et al.* A case of spontaneous pneumomediastinum and pneumopericardium in a young adult. *Korean J Intern Med* 2001;16:205-9.
2. Higgins CB, Broderick TW, Edwards DK, Shumaker A. The hemodynamic significance of massive pneumopericardium in preterm infants with respiratory distress syndrome. Clinical and experimental observations. *Radiology* 1979;133:363-8.
3. Westermann GW, Suwelack B. Spontaneous pneumopericardium due to exertion. *South Med J* 2003;96:50-2.
4. Mirvis SE, Indeck M, Schorr RM, Diaconis JN. Posttraumatic tension pneumopericardium: The “small heart” sign. *Radiology* 1986;158:663-9.
5. Reid CL, Chandraratna AN, Kawanishi D, Bezdek WD, Schatz R, Nanna M, *et al.* Echocardiographic detection of pneumomediastinum and pneumopericardium: The air gap sign. *J Am Coll Cardiol* 1983;1:916-21.
6. Capizzi PJ, Martin M, Bannon MP. Tension pneumopericardium following blunt injury. *J Trauma* 1995;39:775-80.
7. Hymes WA, Itani KM, Wall MJ Jr, Granchi TS, Mattox KL. Delayed tension pneumopericardium after thoracotomy for penetrating chest trauma. *Ann Thorac Surg* 1994;57:1658-60.
8. Westaby S. Pneumopericardium and tension pneumopericardium after closed-chest injury. *Thorax* 1977;32:91-7.