

Pneumopericardium: A Case Report

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Abstract: *Pneumopericardium is a rare cardiac disorder characterized by the presence of air in the pericardium. The following case report is of the patient presenting with complaints of breathlessness, fever and cough. He was a known case of B cell acute lymphoblastic leukemia. X ray was done which was suggestive of pneumopericardium. HRCT guided pericardiocentesis was done. Post procedure patient felt relieved of symptoms and discharged. The probable etiology was infective.*

Keywords: Pneumopericardium, cardiac disorder, cardiac tamponade, pericardiocentesis

1. Introduction

Bricheteau in 1844 first described pneumopericardium and named the sign of bruit de Moulin referring to a water wheel sound that remains associated with Pneumopericardium [1]. The phenomenon of pneumopericardium can be defined as the presence of air in the pericardial cavity. Although a rare event to be encountered in clinical practice, the occurrence leads to a potentially severe disease called cardiac tamponade [2]. Patients of pneumopericardium often reports breathlessness, chest pain, and chest discomfort as the most common symptoms. Given the severity of the disease, early diagnosis and prompt management is highly solicited.

2. Clinical Case

Shubham Jawale, a 16-year-old boy, studying in the 12th standard, and a resident of Washim, came with the complaints of continued breathlessness for 3 days.

Reviewing the history, it was observed that the onset of breathlessness was sudden and the patient was fine three days back. The breathlessness was exertional in nature, present at rest, and associated with mild chest discomfort and pain. No aggravating or relieving factors were reported. Since the inception of breathlessness 3 days back, the patient also suffered from continuous fever and cough with expectoration. Administration of antipyretics reduced the fever. No history of trauma was reported. The patient also had no history of using inhaled bronchodilators. The patient initially went to a local practitioner who referred him to the MGM hospital, Aurangabad, for further management.

Patient is a known case of B cell acute lymphoblastic leukemia (B-ALL), recently diagnosed (15 days back), for which he took the first round of chemotherapy. Apart from the chemotherapy, the patient had not undergone any medical surgery in his life. Patient is a non-addict with normal bowel and bladder habits. The patients' family had no history of similar complaints.

General examination revealed the patient to be of thin built. Additional defining characteristics of the patient involve high consciousness, co-operative attitude, and a well-oriented outlook towards time, place, and person.

Health status measurements revealed pulse to be 110 beats per minute. The nature of the pulse was regular with a normal amplitude and character, bilaterally equal with no

radio-radial or radio-femoral delay. All peripheral pulses were accurately felt.

Blood pressure was 120/80 mm of Hg, in the right arm at supine position.

Respiratory rate was 36/min, abdomino-thoracic.

The jugular venous pressure/ pulse (JVP), was normal. Patient had mild pallor, with no cyanosis, clubbing, and/or lymphadenopathy.

In the systemic examination of the cardiovascular system, apex impulse was not visualized. The precordium was slightly bulged with hyperresonance. Heart sounds were audible. The first heart sound (S1) and the second heart sound (S2) were normal. There was no murmur or pericardial rub.

Respiratory system revealed no abnormality.

Other relevant findings include moderate splenomegaly due to B-ALL.

3. Investigations

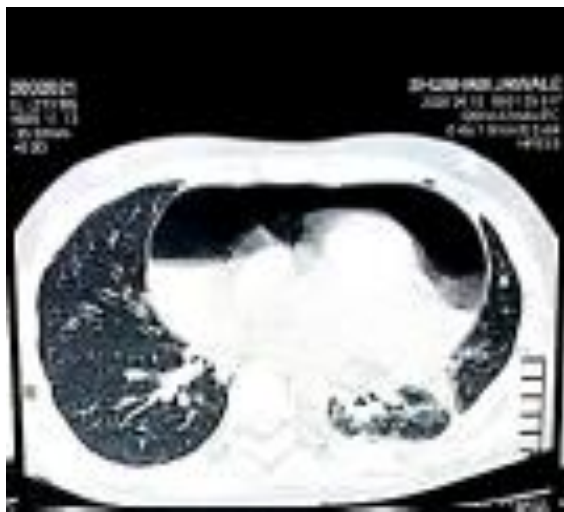
Haematological investigations revealed-

- Hemoglobin level: 9.5 gm/dl
- Total leucocyte count: 25,000 per cumm
- Platelet count: 1,24,00 per cumm.
- Serum electrolyte levels and kidney and liver function tests were within normal limits.

Chest x-ray revealed pneumopericardium.



High-resolution computed tomography (HRCT) revealed moderate pneumopericardium with mild pericardial effusion.



Two-dimensional echocardiogram (2DEcho) was within the normal limits.

4. Management

The patient was admitted in the intensive care unit (ICU). Oxygen support was given and a broad-spectrum antibiotics course was started. The patient responded well to the conservative management of the disease and exhibited improvement in the symptoms. However, breathlessness persisted, and hence it was decided to conduct a HRCT guided pericardiocentesis. Post procedure, the patient was immediately relieved of dyspnea. Laboratory investigations revealed the pericardial fluid to be within the normal limits and the culture report was sterile. After 2 days of treatment, the patient was discharged.

Post pericardiocentesis

CHEST x-ray



5. Conclusion

This was a case of pneumopericardium in a known case of B-ALL, diagnosed by chest x-ray and HRCT. The disease was effectively managed using antibiotic therapy and HRCT guided pericardiocentesis. The cause of pneumopericardium in this case is most likely to be infectious.

6. Discussion

Pneumopericardium typically involves traumatic or non-traumatic causes that affect the pericardium. In adults, 60% of pneumopericardium results from trauma, either sharp or blunt. Other causes attributed to pneumopericardium can be non-iatrogenic or iatrogenic [3].

Pneumopericardium is usually caused by blunt trauma to the chest. The chest injury can come from:

- A car crash
- A gunshot
- A football tackle
- An asthma attack
- A coughing fit
- Receiving the heimlich maneuver

Other causes include-

1. An individual receiving cardiopulmonary resuscitation (CPR) with deep chest compressions.
2. A woman delivering a baby. However, this is a very rare instance.
3. An infant can also be born with pneumopericardium. This is usually because of the air that could enter the pericardium through the pulmonary vein.
3. Pneumopericardium can also be the result of barotrauma. This is an injury to the heart, ear, or other area of the body caused by an air pressure imbalance. Airplane travel or scuba diving can cause barotrauma.
4. Positive airway pressure devices, like those used to treat obstructive sleep apnea. Use of these devices to inhale illicit drugs also poses as a potential cause of pneumopericardium.
5. An infection of the pericardium by gas producing organisms.

Depending upon the quantity of air in the pericardium, pneumopericardium can either be symptomatic or asymptomatic. The patient with mild pneumopericardium may be asymptomatic and exhibit normal cardiac functions. In case of acute pneumopericardium, the patient may be symptomatic and the percussion tone is tympanic. The heart sounds may be metallic.

Symptoms of pneumopericardium include:

- Chest pain
- Tachycardia
- Pain in the right upper abdomen

- Pain that extends from the chest to the shoulders and back
- Nausea
- Shortness of breath
- Fainting
- Hypotension
- Signs of shock, such as limbs that are cool to the touch
- Pale skin.
- The clinical signs of pneumopericardium classically include attenuation of the heart sounds (usually described as distant, muffled or absent) as observed in pericardial effusions [5, 8].

However, auscultation may also reveal other characteristic sounds. Bricheteau compared the sound in pneumopericardium to the sound made by the floats of the millwheel as they strike the water [7]. He termed this sloshing murmur in his patient with pyopneumopericardium as a “Bruit de Moulin” [5, 7]. Occasionally either a friction rub or Hamman’s sign (a pericardial crunching sound) may be audible. Percussion may reveal “shifting precordial tympany” in which the precordial hyperresonance shift as the patient changes position [7].

The clinical presentation of tension pneumopericardium is with the classic signs of cardiac tamponade. These include elevated central venous pressure, hypotension, tachycardia, pulsus paradoxus, and diminished heart sounds on auscultation [4, 5, 7, 9, 10]. In spite of tamponade typically causing a tachycardia, bradycardia has been observed with pneumopericardium. Electrocardiograph may reveal tachycardia or bradycardia, a global low voltage or changes similar to those observed in pericarditis. Chest radiography typically shows a small heart, partially or completely surrounded by air, which is contained within a sharply defined halo of pericardium (the halo sign) [4, 11, 12]. Furthermore, a sudden decrease of more than 2 centimetres in the cardiac shadow compared to the initial chest radiograph or a 33% reduction in cardiac size [12] serves as the signal for potential tension pneumomediastinum and hence the clinician should main a keen eye on such symptoms. Mirvis and colleagues referred to these symptoms as a “small heart sign” [4].

The radiographic signs of pneumopericardium and pneumomediastinum can be similar [13]. In pneumomediastinum, air is visible as radiographical streaks that are not limited by the pericardial boundaries. The streaks stretch into the superior mediastinum. In the presence of a pneumopericardium, the spread of the air within the pericardium is confined to aortic notch [8, 11]. Signs that are pathognomonic of pneumopericardium are “transverse band of air” on the frontal radiograph indicating air in the transverse sinus of the pericardium and the “triangle of air” visible on the lateral chest radiograph [14]. The diagnosis has also been facilitated by CT scan [15] and transthoracic or transoesophageal echocardiography, providing an insight to the signs of pericardial tamponade or presence of pericardial air.

Unlike pneumothorax, pneumopericardium often does not require any specific treatment and is usually self-limiting

as observed in the present case. Treatments such as needle aspiration or tube decompression are only required for patients with acute and symptomatic pneumopericardium or tension pneumopericardium. Absorption of the air in the pericardium can be aided by oxygen therapy in high concentrations as applicable in the management of pneumothorax.

The immediate treatment of tension pneumopericardium is decompression of the pericardial air facilitated by the insertion of a large-bore needle or intravenous catheter. The treatment occasionally results in a dramatic return of spontaneous circulation, a observation made in the present case [6, 16]. A small tube (e.g. 24 French gauge chest tube or pigtail cardiac catheter) [17] may be subsequently inserted into the pericardium using a subxiphoid approach. Surgical inventions involve a sternotomy. This procedure is associated with “cracking” and separating of the sternum, or breastbone.

For patients with mild pneumopericardium, a small incision in the upper abdomen making a pericardial window and thereby removing a part of the pericardium may be executed. Treatment for pneumopericardium does not involve any after effects or long-term complications. Getting a prompt treatment is the best way to increase the chances of positive outcomes.

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