Pneumopericarditis: A Case of Acute Chest Pain with ST Segment Elevation

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1. Introduction

Pneumopericarditis involves a pericarditis clinical presentation, where fluid and air are found within the pericardial space. There are many reported cases of patients with a pneumopericardium, with only a few developing a classical pericarditis syndrome. This last condition has been described most frequently secondary to cardiovascular surgery, trauma, and gastrointestinal (GI) cancer. It may also result from abdominal surgery related complications, where the GI tract forms a fistula to the pericardial space. The latter is also known as a gastropericardial or esophagopericardial fistula depending on the organ involved. The pneumopericarditis clinical presentation varies from acute chest pain and hemodynamic compromise to a subacute and even chronic pericarditis picture. We present a patient with acute pneumopericarditis that had history of a Nissen fundoplication 14 years before with multiple postoperative complications requiring several interventions.

2. Case Presentation

A 42-year-old man, active smoker, presented to the emergency room complaining of anterior left side chest pain that started approximately three hours before arrival. He woke up around 3:00 am with sudden onset severe crushing chest pain that was constant. It was associated with shortness of breath and diaphoresis. His medical history was significant for gastroesophageal reflux, hypertension, major depression, and chronic left shoulder pain diagnosed as impingement syndrome. Family history was noncontributory. He had an extensive past surgical history, which included a laparoscopic Nissen fundoplication at age 25 due to severe gastroesophageal reflux disease and associated esophagitis. Several months after this procedure, he required two open revisions of the Nissen procedure. The first was due to a hiatal hernia, and the second was due to a diaphragmatic rupture requiring diaphragm repair with prosthetic material. The patient developed a subdiaphragmatic abscess at age 30 that required antibiotics and diaphragmatic surgery where the prosthetic
The common symptoms described by patients with pneumopericardium are chest pain and dyspnea. Left shoulder pain, or referred pain, may also be present and arises from diaphragmatic and/or pericardial irritation [10–12]. Of note, in some cases shoulder pain is chronic and persistent. On physical examination a classic mill wheel murmur, or “bruit de moulin,” can be present, which is a metallic tinkling rub found in patients with pneumopericardium [1]. Diagnosis is based on imaging studies which include upright chest X-rays, echocardiography, and chest computed tomography. GI imaging studies, like contrast esophagography, may show a fistula to the pericardium. Electrocardiographic findings can vary from those consistent with pericarditis to those with localized ST segment elevations. For example, much like in the case presented, these electrocardiographic findings have led to angiography and thrombolysis (Table 1) [2, 8, 9, 13, 14]. Treatment includes conservative management, described in few cases, and surgical intervention with fistula correction. Cases with conservative management have a worse prognosis, with the mortality being as high as 85% [8, 15]. A case has been described where the fistula was un repaired and the patient had recurrent disease five years later [16].

In our case, the patient may have had chronic diaphragmatic irritation leading to his chronic left shoulder pain. It is difficult to say over what period of time he started to have pericardial irritation with a fistula formation. A possible explanation for the absence of clinical signs of tamponade is that the fistula could have a bidirectional flow thereby impeding higher pressure buildup in the pericardial space over time. In this sense, a possible acute decompensation with increase in symptoms may have been due to changes in the fistula flow or gastric content/pressure leading to his acute symptoms and hospital visit. This would also be
Table 1: Pneumopericardium case reports where EKG ST segment elevations were found during initial presentation.

| Author                     | Gender | Age | Risk factor                  | Chest X-ray* | ST elevation† | Intervention       |
|----------------------------|--------|-----|------------------------------|---------------|---------------|-------------------|
| Kato et al. [8]            | M      | 65  | Esophagectomy                | Yes           | V5-V6         | None              |
| Bruhl et al. [2]           | M      | 63  | Spontaneous                  | No            | I, II, aVL, V3–V6 | Angiogram        |
| Ruano Poblador et al. [15] | M      | 56  | Billroth I gastrectomy       | Yes           | Lower, lateral | None              |
| Gagné et al. [13]          | F      | 43  | Roux-y-gastric bypass        | Yes           | I, II, aVL    | Angiogram         |
| Sihvo et al. [9]           | M      | 54  | Nissen Fundoplication        | No            | Inferior      | Thrombolysis      |
| Grandhi et al. [14]        | M      | 29  | Diaphragmatic hernia repair  | Yes           | V1, V2        | None              |

* Chest X-rays usually obtained when there were other exam findings such as fever.
† Per case report description.

Figure 2: Left ventriculogram. Air around the cardiac borders noted in systole (a) and diastole (b).

Figure 3: PA chest X-ray. A halo is visible around the left cardiac border.

Supported by his clinical course while in the hospital. We present electrocardiographic changes that were present after admission in Figure 5. Other cases where EKG changes were not suggestive of pericarditis are shown in Table 1. In patients with risk factors for developing gastropericardial fistulas, chest pain, and ST segment elevations we consider that a chest X-ray performed during the initial assessment should be considered.

Figure 4: Chest computed tomography. There is an air fluid level in the pericardial space.

Figure 5: EKG 24 hrs after admission. Diffuse ST segment elevation and slight PR segment depression.
In conclusion, pneumopericarditis should be considered as a differential diagnosis for acute chest pain in the patient with extensive gastroesophageal surgery. A key clinical finding such as chronic left shoulder pain and history of multiple GI interventions should heighten the suspicion for a possible gastropericardial fistula. In addition, associated EKG findings should be evaluated with caution in this clinical setting. In cases such as this one, a portable chest X-ray on admission may change a patient’s management and avoid unnecessary interventions.

**Conflict of Interests**

All authors have no conflict of interests to disclose.

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