International Surgery Journal
Guidi G et al. Int Surg J. 2022 Apr;9(4):889-891
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20220952

Case Report

Isolated pneumopericardium after blunt chest trauma

Gonçalo Guidi*, Silvia Silva, João Pinto-de-Sousa, Fernando Próspero-Luis, Ricardo Vaz Pereira, Urânia Fernandes, Daniela Martins, Clara Leal, Bruno Vieira, Francisca Freitas, Carolina Marques

Department of General Surgery, Centro Hospitalar de Trás-os-Montes e Alto Douro EPE, Vila Real, Portugal

Received: 14 February 2022
Revised: 11 March 2022
Accepted: 14 March 2022

***Correspondence:**
Dr. Goncalo Guidi,
E-mail: gjlima@chtmad.min-saude.pt

ABSTRACT

Pneumopericardium after blunt chest trauma it's a very rare entity in adults, usually seen in association with pneumothorax or pneumomediastinum. When isolated, it's believed to be caused by the Macklin effect. Generally, it's a benign, self-limiting condition requiring no additional therapy. However, it must be recognized because an increase in intrapulmonary pressure (example- intubation) can lead to a tension pneumopericardium or cardiac tamponade.

Keywords: Pneumopericardium, Blunt chest trauma

INTRODUCTION

Motor vehicle accidents and falls are the most common causes of blunt chest trauma (BCT) worldwide. However, only 17% of occult injuries after BCT are clinically relevant.[1]

Pneumopericardium, i.e., the presence of air in the pericardial space, it's very rare in adults, usually seen after blunt chest trauma in association with pneumothorax or pneumomediastinum. Other causes of pneumopericardium may include congenital defects, thoracic surgery and positive pressure ventilation, particularly in neonates.[2]

Most commonly, pneumopericardium is due to a fistula between the pericardium and a gas-containing cavity, such as the pleural space, trachea, bronchial tree, or GI tract.[2] However, isolated pneumopericardium may occur even without pneumothorax or pneumomediastinum.

When asymptomatic, it`s usually self-limited. However, an increase in intrapulmonary pressure (example-intubation) can lead to a tension pneumopericardium or cardiac tamponade if not recognized.[3,4]

Evaluation of the tracheobronchial tree and esophagus is essential to rule out potential sources of the air although it can be postponed in asymptomatic patients with stable functions.

Herein, a case is presented.

CASE REPORT

A 46-year-old man presented at our hospital following a high kinetic car crash with rollover. Glasgow coma scale (GCS) score was 15 points, Blood pressure 137/87 mmHg, heart rate 70 beats/min and the spontaneous breathing was 14/min.

At physical evaluation he complained of chest pain at the sternum level, without instability. He had normal breath sounds bilaterally and a normal cardiac auscultation.

X-ray of the sternum revealed a fracture of the anterior and posterior board of the upper third of the sternum.

Subsequent computed tomography (CT) of the thorax confirmed the fracture of upper third of the sternum and revealed a low volume pneumopericardium (Figure 1, 2) without pneumothorax or pneumomediastinum.

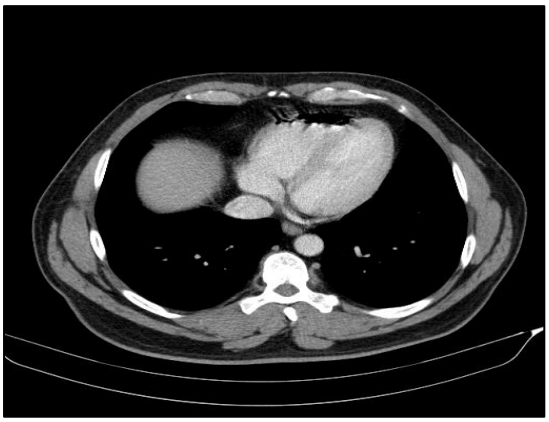

Figure 1: Low volume pneumopericardium on CT.

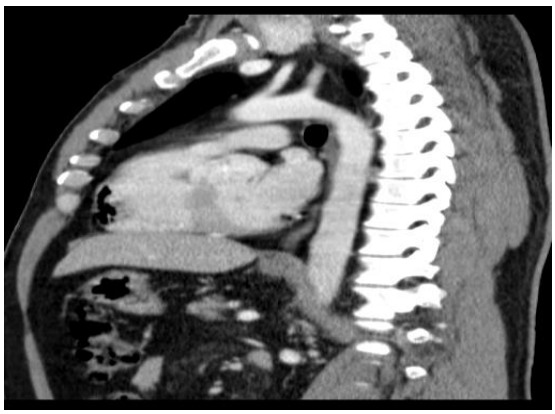

Figure 2: Low volume pneumopericardium on CT.

Electrocardiography (ECG) and cardiac ultrasound were normal without signs of cardiac ischemia and left ventricular ejection fraction preserved.

He had an uneventful recovery, being discharged 24 hours later. CT and cardiac ultrasound at discharge showed complete resolution of the pneumopericardium.

DISCUSSION

In 1884, Bricheteau reported the first instance of pnemopericardium.[5] Etiologies of pneumopericardium may include excessive positive pressure ventilation, thoracic surgery, trauma (penetrating/blunt) or congenital defects. Blunt trauma is an exceedingly rare cause of pneumopericardium.

The main pathophysiological mechanisms for the mentioned etiologies include fistulas between air-containing cavities (such as the lung, bronchial tree, and gut) and the pericardium, and the Macklin effect. Isolated pneumopericardium after blunt chest trauma is believed to be caused by an abrupt increase of the intrathoracic pressure with rupture of the alveoli. The air leaks from the ruptured alveoli and tracks trough the vascular sheath spreading into the pericardial space. This is known as the Macklin effect.[6,7]

Pneumopericardium is generally a benign, self-limiting condition requiring no additional therapy.

However, if sufficient amount of air reaches this space, a tension pneumopericardium may develop, with all the signs and dangers associated with an effusion-based tamponade.

Pericardiocentesis is reserved for cases where pneumopericardium progresses to hemodynamic instability, tension pneumopericardium or cardiac tamponade.[8,9]

CONCLUSION

Isolated pneumopericardium is an extremely rare disorder after a blunt chest trauma. In most cases, it is self-limiting requiring no additional therapy. However, it must be remembered to prevent a tension pneumopericardium due to an increase an increase in intrapulmonary pressure (example- intubation). Pericardiocentesis is reserved for cases where pneumopericardium progresses to hemodynamic instability, tension pneumopericardium or cardiac tamponade.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Capizzi PJ, Martin M, Bannon MP. Tension pneumopericardium following blunt injury. J Trauma. 1995;39(4):775-80.
2. Cummings RG, Wesly RL, Adams DH, Lowe JE. Pneumopericardium resulting in cardiac tamponade. Ann Thorac Surg. 1984;37(6):511-8.
3. Marques RAF, Lopes LH, Mdos MS, Carmona CV, Fraga GP, Hirano ES. Tension pneumopericardium in blunt thoracic trauma. Int J Surg Case Rep. 2016;24:188-90.
4. Gorecki PJ, Andrei VE, Schein M. Tension pneumopericardium in chest trauma. J Trauma. 1999;46(5):954-6.
5. Anand R, Brooks MD, Facs SE, Puckett Y, Richmond RE, Ronaghan CA. Pneumopericardium Resulting From Blunt Thoracic Trauma. Cureus. 2020;12(11):e11625.
6. Mansfield PB, Graham CB, Beckwith JB, Hall DG, Sauvage LR. Pneumopericardium and

pneumomediastinum in infants and children. J Pediatr Surg. 1973;8(5):691-9.
7. Wintermark M, Schnyder P. The Macklin effect: a frequent etiology for pneumomediastinum in severe blunt chest trauma. Chest. 2001;120(2):543-7.
8. Langdorf MI, Medak AJ, Hendey GW, Nishijima DK, Mower WR, Raja AS, et al. Prevalence and Clinical Import of Thoracic Injury Identified by Chest Computed Tomography but Not Chest Radiography in Blunt Trauma: Multicenter Prospective Cohort Study. Ann Emerg Med. 2015;66(6):589-600.
9. Hamp BD, Brnadić LR, Cavrić G, Daraboš N. Occult pneumopericardium after isolated blunt chest trauma. Postgrad Med J. 2019;95(1124):343.

Cite this article as: Guidi G, Silva S, Pinto-de-Sousa J, Próspero-Luis F, Pereira RV, Fernandes U et al. Isolated pneumopericardium after blunt chest trauma. Int Surg J 2022;9:889-91.