

Pneumopericardium-Complication of Pericardiocentesis: A Rare Case

Jingyu Deng¹, Chengzhu Wang², Yanjun Liu², Zheng Zhang^{2*}, Taohong Hu² and Chao Yang³

¹Jinzhou Medical University, Jinzhou, Liaoning, P.R. China

²Department of Cardiology, The Rocket Army Special Medical Center of the PLA, Beijing, P.R. China

³Department of Blood Transfusion, The Rocket Army Special Medical Center of the PLA, Beijing, P.R. China

*Corresponding author: Zhang Z, Department of Cardiology, The Rocket Army Special Medical Center of the PLA, Beijing 100088, P.R. China, Tel: +86215474 0000; E-mail: zhangzheng123456@Gmail.com

Rec date: February 02, 2019; Acc date: March 19, 2019; Pub date: March 25, 2019

Citation: Deng J, Wang C, Liu Y, Zhang Z, Hu T, et al. (2019) Pneumopericardium-Complication of Pericardiocentesis: A Rare Case. J Clin Radiol Case Rep Vol.3 No.1:1

Abstract

Background: Pneumopericardium is a rare complication of pericardiocentesis. In general, it is reported as a complication of blunt or penetrating thoracic trauma, but rare iatrogenic and spontaneous cases have been reported. The level of gas and liquid surrounding the heart shadow in pericardium on chest X-ray is an early observation in diagnosis. These clinical measurements and processes are variable, depending on the patient's hemodynamic state. Cardiac tamponade as a serious complication requiring prompt recognition and treatment.

Case presentation: We recently observed a case of pneumopericardium after a therapeutic pericardiocentesis in a 66-year-old woman with pericardial effusion.

Conclusion: Our case raises the awareness of this fatal condition and helps increase the use of preventive measures to prevent its development during emergency procedures.

Keywords: Pneumopericardium; Pericardiocentesis

Introduction

It has been reported that pneumopericardium, defined as the presence of free air or gas in the pericardial cavity occurs approximately 0.01% [1,2]. Pneumopericardium after pericardiocentesis is rare, which may be caused by direct pleuro-pericardial communication or leakage of pericardial drainage system [2-4]. Most of the time iatrogenic pneumopericardium requires no specific therapy, but in some patients, life-threatening complications, especially pericardial tamponade, require rapid recognition and appropriate managements [3,5]. Pneumopericardium is relatively easy to diagnose by chest X-ray, which shows lucent outline separating and the pericardium from the heart or by echocardiography reveals swirling bubbles sign in the pericardial cavity [3,6]. We

discuss a rare case of pneumopericardium in an aged woman who underwent pericardiocentesis due to pericardial effusion.

Case Presentation

A 66-year-old woman with paroxysmal chest tightness, palpitation for 2 weeks, was referred to the hospital. The patient had a history of primary pericardial effusion for 30 years. Physical examination on admission indicated that pulse rate was 138 bpm, respiratory rate was 22 per minute, and blood pressure was 140/90 mmHg. Moreover, physical examination also indicated that the patient had enlarged heart, filling jugular vein, negative hepatic jugular vein disease, unheard pathological murmur and mild edema of both lower limbs. Electrocardiogram demonstrated that sinus tachycardia (pulse rate, 138 bpm) (Figure 1). Ultrasound cardiogram (UCG) suggested that the patient presented medium to large amount of pericardial effusion (Figure 2). Then, we give patients diuretic treatment. Furthermore, drainage of pericardial fluid by percutaneous pericardiocentesis via the subxiphoid approach was performed. The intrapericardial catheter was secured to the skin and attached to a closed drainage system under negative pressure using a vacuum container. 300 mL faint yellow pericardial effusion was drained daily for 3 days. After 3 days, no drainage fluid was removed, and the pericardial puncture drainage tube was pulled out. However, the patient still had the symptom of palpitation. Therefore, chest radiographs (Figure 3) was performed and indicated that the patient has enlarged heart, pneumopericardium, pericardial effusion and right pleural effusion (small amount). Furthermore, chest computed tomography (CT) was performed immediately. CT results revealed that the patient's pericardial cavity was widened, showing gas and liquid density with gas-liquid plane, indicating pneumopericardium and pericardial effusion. Meanwhile, bilateral pleural effusion (more on the right) and calcification in the posterior basal segment of the lower left lung was also observed (Figure 4A). 3 days later, the chest CT was checked and showed that pericardial pneumopericardium and effusion did not change much. However, the volume of bilateral pleural effusion was decreased (Figure 4B). Review of UCG (Figure 2B) indicated pericardial effusion was less than before. However, as Figure 5

showed that several tiny sparkling echogenic spots swirling in the pericardial sac evoking micro air bubbles (open arrows). The patient had no obvious chest tightness, so the pneumopericardium was not treated, and the patient was informed to review chest CT 3 months later. After 3 months, subjective symptoms and radiological signs of pneumopericardium disappeared. Chest CT examination demonstrated that there was no pericardial pneumopericardium, bilateral pleural effusion (right side more), pericardial effusion (Figure 6). Re-examination of UCG revealed that there was a small and moderate amount of pericardial effusion (Figure 2C).

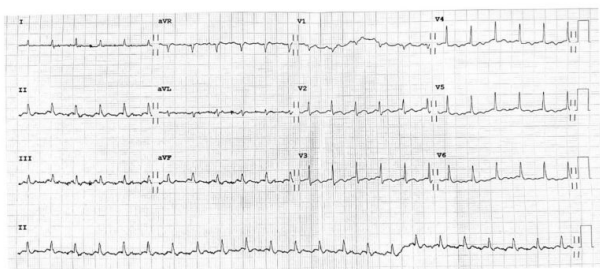


Figure 1 Electrocardiogram on admission showed sinus tachycardia with the changes of ST-T.

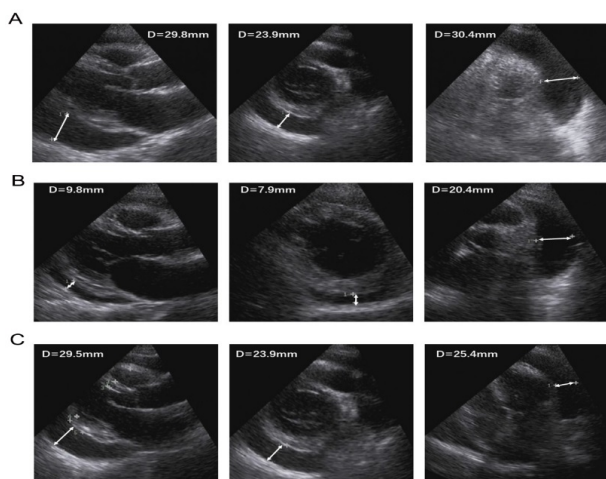


Figure 2 Ultrasound cardiogram (UCG) (A) Before paracentesis: Medium to large amount of pericardial effusion (white two-way arrow). (B) After paracentesis: Pericardial effusion was less than before (white two-way arrow). (C) Re-examination after 3 months: A medium to large of pericardial effusion (white two-way arrow).



Figure 3 Chest radiographs indicated that the patient has enlarged heart, pneumopericardium (Red arrows pointing at outline of the sac), pericardial effusion and right pleural effusion.

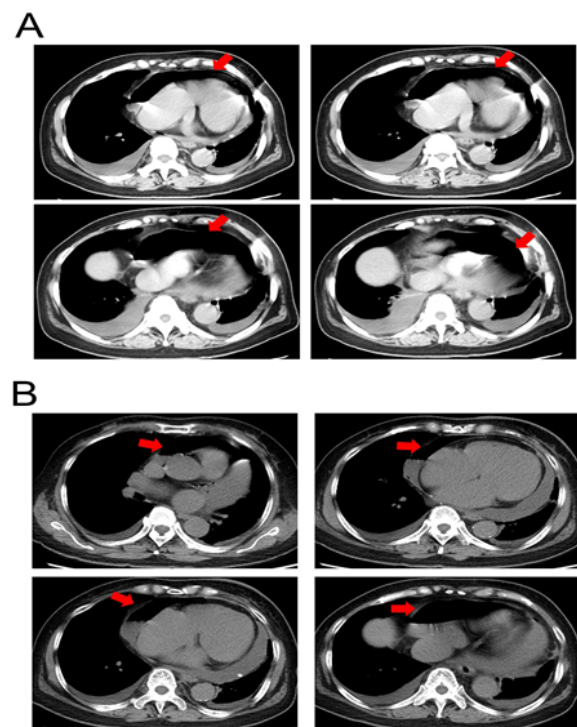


Figure 4 Chest computed tomography (CT). (A) Pericardial cavity is widened, showing gas and liquid density and gas-liquid plane (Red arrows) and pneumopericardium, pericardial effusion, bilateral pleural effusion, and calcification in the posterior basal segment of the lower left lung. (B) Chest CT after 3 days of drainage: Pneumopericardium and effusion did not change much, bilateral pleural effusion and the volume of effusion decreased.

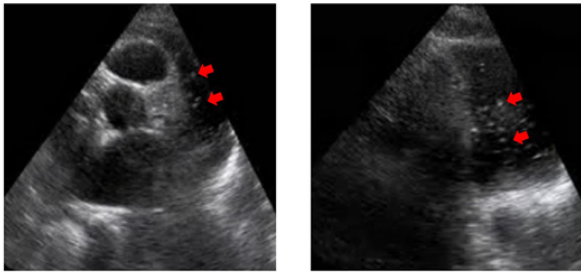


Figure 5 Echocardiography showing several tiny sparkling echogenic spots swirling in the pericardial sac evoking micro air bubbles (Red arrows).

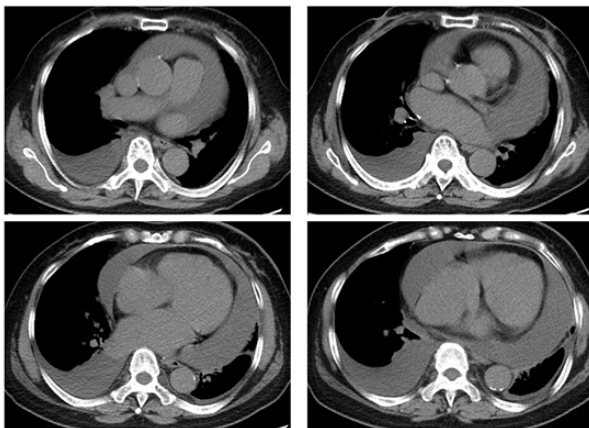


Figure 6 After 3 month follow-up, chest CT re-examination suggested that there was no pericardial pneumopericardium, bilateral pleural effusion, pericardial effusion.

Discussion

Pneumopericardium is a rare but potentially life-threatening disease, defined as an accumulation of air-fluid level in the pericardial cavity. It has been reported to result from a multitude of causes such as penetrating or blunt chest trauma, pericardium infections, iatrogenic and invasive procedures, abnormal communications such as fistula between the pericardium and hollow organs, or spontaneously without any underlying cause in healthy people [2,7,8]. It occurs after therapeutic pericardiocentesis, which is even rarer and has been reported in few cases of literature [3,6]. It can be attributed to direct pleural pericardial communication or leaks in the pericardial drainage system [3-5].

Pericardiocentesis with extended catheter drainage is a safe and effective treatment for clinically significant pericardial effusion and can be effectively performed under local anesthesia. The subxiphoid window should be the standard

initial procedure for most patients who need drainage to treat exudative pericardial disease [9-12].

The diagnosis of pneumopericardium, a complication of pericardiocentesis, can be made by conventional chest radiographs, echocardiography/UCG or CT [3]. In posteroanterior chest radiographs, a continuous thin radiolucent rim of air and air-fluid level follows the cardiac silhouette and is outlined by a fine line representing the pericardial sac [5]. Echocardiography can demonstrate two pathognomonic signs: "The air gap sign" and "The swirling bubbles sign" [13,14]. In the present case, the patient's UCG indicated a distinct "swirling bubbles sign" in the pericardium. It represents the gas-liquid interface with continuous agitation motion in the pericardial cavity due to cardiac activity. In echocardiography, it is shown by several tiny bright echogenic points in the pericardial sac, causing microbubbles. In addition, chest CT can also clearly confirm the diagnosis, which is the main basis for the diagnosis of pneumopericardium in obscure cases. It offers further information concerning mechanisms and associate lesions [2].

Conclusion

In current case, we observed a patient with pericardial effusion complicated by pneumopericardium after pericardial puncture. The characteristic manifestations of chest X-ray and echocardiography can make a definite diagnosis. The pneumopericardium can resolve spontaneously under close observation. Three-month follow-up also indicated that the patient's pneumopericardium disappeared.

Declarations

Consent to participate

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Consent for publication

All the authors declare that they consent for publication this article.

Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The data sets supporting the results of this article are included within the article and its additional files.

Author's contributions

JYD and ZZ drafted the manuscript and approved its final version. ZZ, JYD, CYYJL and CZW acquired data, revised the article's intellectual content, and approved the final version. ZZ

and THH are responsible for the integrity of this work. All authors read and approved the final manuscript.

Acknowledgements

Thanks for all the authors who participated in this article.

References

1. Lee YJ, Jin SW, Jang SH, Jang YS, Lee EK, et al. (2001) A case of spontaneous pneumomediastinum and pneumopericardium in a young adult. *Korean J Intern Med* 16: 205-209.
2. Iskander S, Amar H, Audrey B, Fabien D (2016) Pneumomediastinum: A rare complication of pericardiocentesis. *J Cardiovasc Ultrasound* 24: 55-59.
3. Choi WH, Hwang YM, Park MY, Lee SJ, Lee HY, et al. (2011) Pneumopericardium as a complication of pericardiocentesis. *Korean Circ J* 41: 280-282.
4. Mullens W, Dupont M, De-Raedt H (2007) Pneumopericardium after pericardiocentesis. *International Journal of Cardiology* 118: e57.
5. Brander L, Ramsay D, Dreier D, Peter M, Graeni R (2002) Continuous left hemidiaphragm sign revisited: A case of spontaneous pneumopericardium and literature review. *Heart* 88: e5.
6. Yuce M, Sari I, Davutoglu V, Ozer O, Usalan C (2010) Bubbles around the heart: Pneumopericardium 10 days after pericardiocentesis. *Echocardiography* 27: E115-116.
7. Lee SH, Kim WH, Lee SR, Rhee KS, Chae JK, et al. (2008) Cardiac tamponade by iatrogenic pneumopericardium. *J Cardiovasc Ultrasound* 16: 26-28.
8. Abraham IV, Lauro L, Obillos SM, Aherrera JA, Magno JD, et al. (2017) A rare case of pneumopericardium in the setting of tuberculous constrictive pericarditis. *Case reports in Cardiology* pp: 4257452.
9. Buchanan CL, Sullivan VV, Lampman R, Kulkarni MG (2003) Pericardiocentesis with extended catheter drainage: An effective therapy. *The Annals of Thoracic Surgery* 76: 817-820.
10. Naunheim KS, Kesler KA, Fiore AC, Turrentine M, Hammell LM, et al. (1991) Pericardial drainage: Subxiphoid vs. transthoracic approach. *Eur J Cardiothorac Surg* 5: 99-104.
11. Bejvan SM, Godwin JD (1996) Pneumomediastinum: Old signs and new signs. *AJR* 166: 1041-1048.
12. Reid CL, Chandraratna PA, Kawanishi D, Bezdek WD, Schatz R, et al. (1983) Echocardiographic detection of pneumomediastinum and pneumopericardium: The air gap sign. *JACC* 1: 916-921.
13. Kerut EK, Hannawalt C, Everson CT, Nanda NC (2014) The air gap sign. *Echocardiography* 31: 400-401.
14. Antonini-Canterin F, Nicolosi GL, Mascitelli L, Zanuttini D (1996) Direct demonstration of an air-fluid interface by two-dimensional echocardiography: A new diagnostic sign of hydropneumopericardium. *JASE* 9: 187-189.