



Case report

Fulminant pseudomonas pneumonia following coronary artery bypass grafting - Case report

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ABSTRACT

Introduction and importance: Pneumonia has always been a source of complication after surgeries. *Pseudomonas aeruginosa* has emerged as one of the most problematic Gram-negative pathogens among nosocomial infections. Pneumonia caused by pseudomonas is usually slowly progressive allowing clinicians to detect and manage it on time.

Clinical presentation: A 55-year-old man was hospitalized for elective CABG, complicated by fulminant pneumonia. Vancomycin and meropenem were administered as soon as the symptoms appeared. However, the patient died from septic shock syndrome caused by pseudomonas pneumonia on the third postoperative day, just hours after the first symptom appeared. The chest X-ray showed an extreme opacity within less than 12 h.

Clinical discussion: This case is reported because of its rare clinical presentation of Fulminant pseudomonas pneumonia following cardiac surgery.

Conclusion: Consider *pseudomonas aeruginosa* as a certain cause of pneumonia after cardiac surgery, and an organized, modified guideline is needed to determine the best option and timeline for treating this complication.

1. Introduction

Hospital-acquired pneumonia (HAP) is pneumonia that develops at least 48 h after admission to the hospital. VAP (ventilator-associated pneumonia), which accounts for about 80 % of HAPs, develops within 48 h of intubation [1,2].

The primary infectious complication following cardiac surgery is postoperative pneumonia, which is linked to significant morbidity, mortality, and medical expense increases. *P. aeruginosa* has always been identified as one of the main causal pathogens of this condition [3,4]. Mechanically ventilated patients with nosocomial *P. aeruginosa* infection have days-long *P. aeruginosa* colonization and slowly developing pulmonary infiltrates [5,6]. As a result, pseudomonas VAP infections after cardiac surgery typically take days to develop and require lengthy ICU admission for management [7].

This report presents a case of a fulminant ventilator-associated pneumonia post CABG surgery, which *P. aeruginosa* was isolated after the lung autopsy of the patient. The work has been reported in line with

the SCARE 2020 criteria [8].

2. Case report

A 55-year-old man presented to the hospital for elective CABG (coronary artery bypass grafting) surgery due to his history of dyspnea on exertion from a few months before his admission. He was an opium addict and worked as a driver. Evaluating medical history showed diabetes mellitus, hypertension, diabetic neuropathy, and major depressive disorder. Family history presents ischemic heart disease in both parents. The LAD (left anterior descending artery), LCX (left circumflex artery), and RCA (right coronary artery) had significant stenosis at a range of 90–95 %, according to his first angiography. As a result, he was diagnosed with the three-vessel disease with an LVEF (Left ventricle ejection fraction) of 30 % and PAP (Pulmonary arterial pressure) of 28 mmHg. He had never had a respiratory problem before, simply a minor cough. There was no evidence of edema in the extremities. A CT scan of his first lung revealed minor opacities at the two ends of the horizontal fissure of

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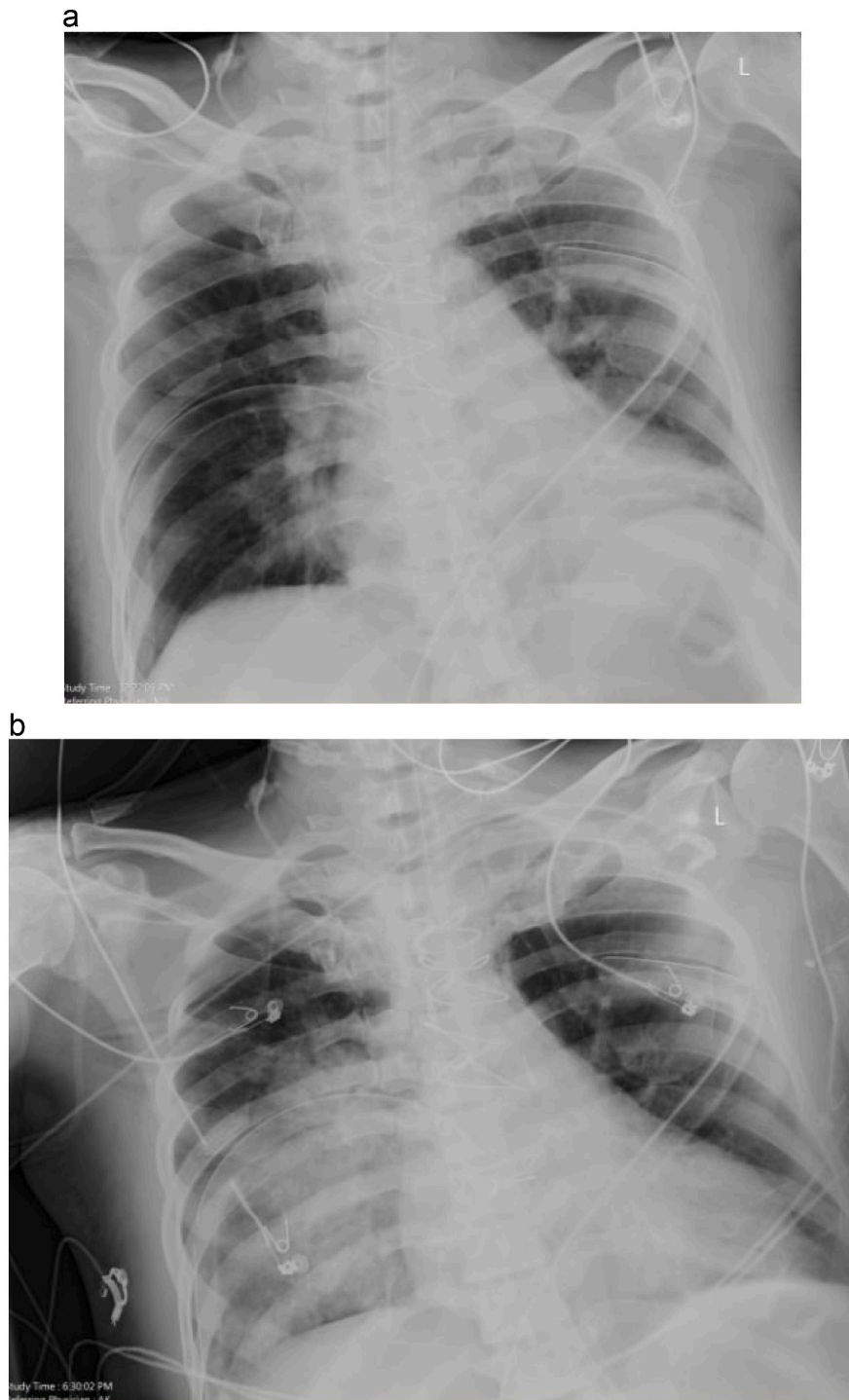


Fig. 1. A. The chest X ray of the patient taken at 8:00 AM day three post operation.
B. Chest X ray of the same patient taken 7 h after the first one on the same day.

the right lung, as well as a generalized vascular marking. There was no evident consolidation found. He had a WBC count of 5800, with 57.9 % neutrophils and 34.9 % lymphocytes, according to the results of his blood tests. The Troponin range was normal, with an HbA1c of 7.8 %. The results of the other lab tests were all within normal limits.

CABG surgery was performed on the patient by an expert cardiac surgery team; After prep and drape under general anesthesia, a mid-sternotomy was performed before harvesting LIMA and SVG for the anastomosis. This surgery took place at SHAHID RAJAEI hospital by an expert cardiac surgery team. A pacing wire and a chest tube were also

inserted. He was admitted to CCU with a good general condition and an o_2 sat of 97 %, although he was still intubated shortly after recovering from surgery.

On the 3rd day after surgery, around 8 a.m., his blood pressure decreased unexpectedly, and due to this and a continuous low EF, an IABP (Intra Aortic Balloon Pump) was inserted before a control chest X-ray confirmed its correct position (Fig. 1-A). His blood pressure was not rising. Hence the procedure was not effective. He was rather stable after receiving epinephrine. His Echocardiogram demonstrated a dilated RV (Right ventricle) which brought up Pulmonary Embolism as a

Table 1

The fluctuations of the Arterial blood gas (ABG) of the patient post operation. Note that all of the ABGs were performed while the patient was intubated.

Time	Day one post operation			Day two post operation			Day three post operation (time of event)			
	8:00 AM	14:00 PM	5:00 PM	8:00 AM	12:00 PM	5:00 PM	8:00 AM	12:00 PM	4:00 PM	9:00 PM
PH	–	7.40	7.37	7.35	7.33	7.31	7.26	7.25	6.97	7.03
pO ₂	–	97	143	127	101	58	58	79	55	59
pCo ₂	–	33	36	38	40	32	32	38	49	42
HCO ₃	–	20	21	21	21	19.16	15	17.2	12.7	11.1

differential diagnosis. His BP dropped again around 7oclock in the afternoon, along with a low-grade fever, tachycardia, tachypnea, loss of consciousness, and a decline in o₂ saturation, and his blood ABG revealed acidosis (Table 1). Meropenem 500 mg and Vancomycin 500 mg were injected as empirical antimicrobial therapy. His second chest X-ray of the day, taken just hours after the first, revealed a large haziness in the right lung's middle and inferior lobes (Fig. 1-B).

Computed tomography confirmed the findings (video 1, supplementary appendix 1). His suctioned lung secretion was not foamy nor bloody, it did not contain pus, and the texture was rather thin. He had a homogenous opacity at the base of his right lung and a severe consolidation in his middle lobe with an air bronchogram pattern on his lung CT scan. His last lab results comprised a WBC of 3140 with 86.9 % neutrophils and 11.8 % lymphocytes. Unfortunately, he was declared dead after a 40-minute Cardiopulmonary resuscitation (CPR). The blood and throat culture was performed after the first initial manifestation of instability. However, the results did not come back before the time of death. The actual cause of death was not discovered until an autopsy of the lung had been done. During the autopsy, a huge amount of foamy pus was secreted from the right main bronchi (video 2, supplementary appendix 2). *Pseudomonas Aeruginosa* fulminant pneumonia was confirmed to be the cause of death after an autopsy of the lung tissues.

3. Discussion

We presented a fulminant VAP post CABG of pseudomonas Aerogenosa, which the cause was isolated after autopsy of the lung.

P. aeruginosa-related pneumonia is mostly a nosocomial infection [3], which is exceedingly rare and does not frequently occur in the absence of underlying disease and risk factors(s) [9]. We want to bring attention to a fulminant form of this illness that hasn't been previously identified after CABG surgery. The diagnosis was not recognized throughout the life of the patient since the case did not have easily recognisable environmental risk factors for *Pseudomonas* pneumonia (such as exposure to humidifiers or whirlpools) [10,11]. However, diabetes was present in the mentioned patient, which is a risk factor for opportunistic microorganisms like pseudomonas Aerogenosa [12].

According to Hachette et al. [13], who examined 11 case reports of *P. aeruginosa* CAP in individuals who had previously been healthy, the right upper lobe was involved in two-thirds of these patients. But in this case, the inferior and middle lobes of the right lung began to show signs of consolidation. This was yet another factor contributing to the misleading cause.

Although uncommon, *P. aeruginosa* CAP frequently progresses quickly and can affect people who were previously healthy. It also has a significant fatality rate. Even if there is no obvious risk factor, such as workplace exposure to a *P. aeruginosa* carrier or exposure to aerosols of polluted water.

Specific, efficient anti-pseudomonas therapy must be started right away upon presentation to have any effect on the dreadful prognosis of fulminant *Pseudomonas* pneumonia.

Any patient presenting with a severe case of quickly progressing pneumonia requires *Aeruginosa* to be taken into account in the differential diagnosis. Specific, efficient anti-pseudomonas therapy must be started right away upon presentation to have any effect on the dreadful prognosis of fulminant *Pseudomonas* pneumonia.

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Ethical approval

Ethic committee of Tehran University approved the paper.

Consent

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

Author contribution

Delaram Sakhaei, Saba Ilkhani, Ehsan Parvas, Mana Jameie, Seyed Hossein Ahmadi Tafti were involved in study concept or design.

DS, SI, EP, MJ, SHT were involved in the study concept or design.

DS, SI, EP were involved in data collection.

DS, SI, and EP were involved in data interpretation.

DS, SI, EP, MJ were involved in writing the paper under the supervision of SHT.

Research registration

N/A.

Guarantor

Saba Ilkhani is the guarantor of this study.

Declaration of competing interest

The authors declare that there is no conflict of interests.

References

- [1] N.P. O'Grady, P.R. Murray, N. Ames, Preventing ventilator-associated pneumonia: does the evidence support the practice? *JAMA* 307 (23) (2012) 2534–2539.
- [2] A.T. Society, America IDSo, Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia, *American journal of respiratory and critical care medicine* 171 (4) (2005) 388.
- [3] D. Wang, X. Huang, H. Wang, S. Le, H. Yang, F. Wang, et al., Risk factors for postoperative pneumonia after cardiac surgery: a prediction model, *J. Thorac. Dis.* 13 (4) (2021) 2351–2362.
- [4] N. Allou, N. Kermarrec, C. Muller, G. Thabut, I. Philip, J.-C. Lucet, et al., Risk factors and prognosis of post-operative pneumonia due to *Pseudomonas aeruginosa* following cardiac surgery, *J. Antimicrob. Chemother.* 65 (4) (2010) 806–807.
- [5] Pier G.B. RR, *Pseudomonas aeruginosa*, in: *Principles and Practice of Infectious Diseases*, 7th edition, 2010.
- [6] C. Ding, Z. Yang, J. Wang, X. Liu, Y. Cao, Y. Pan, et al., Prevalence of *Pseudomonas aeruginosa* and antimicrobial-resistant *Pseudomonas aeruginosa* in patients with

- pneumonia in mainland China: a systematic review and meta-analysis, *Int. J. Infect. Dis.* 49 (2016) 119–128.
- [7] S. He, F. Wu, X. Wu, M. Xin, S. Ding, J. Wang, et al., Ventilator-associated events after cardiac surgery: evidence from 1,709 patients, *J. Thorac. Dis.* 10 (2) (2018) 776–783.
- [8] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [9] J. Rello, R. Rodriguez, P. Jubert, B. Alvarez, Pneumonia SGISC-A, Severe community-acquired pneumonia in the elderly: epidemiology and prognosis, *Clinical infectious diseases* 23 (4) (1996) 723–728.
- [10] J.C. Christopher, B. Gordon, D. Andes, Hot tub-associated necrotizing pneumonia due to *Pseudomonas aeruginosa*, *Clin. Infect. Dis.* 36 (3) (2003) e55–e57.
- [11] S. Huhulescu, M. Simon, M. Lubnow, M. Kaase, G. Wewalka, A. Pietzka, et al., Fatal *Pseudomonas aeruginosa* pneumonia in a previously healthy woman was most likely associated with a contaminated hot tub, *Infection* 39 (3) (2011) 265–269.
- [12] M.I. Restrepo, B.L. Babu, L.F. Reyes, J.D. Chalmers, N.J. Soni, O. Sibila, et al., Burden and risk factors for *Pseudomonas aeruginosa* community-acquired pneumonia: a multinational point prevalence study of hospitalised patients, *Eur. Respir. J.* 52 (2) (2018).
- [13] T.F. Hatchette, R. Gupta, T.J. Marrie, *Pseudomonas aeruginosa* community-acquired pneumonia in previously healthy adults: case report and review of the literature, *Clin. Infect. Dis.* 31 (6) (2000) 1349–1356.