

Case Report

Application of Perioperative Transesophageal Echocardiography in Resection of Pulmonary Artery Sarcoma: A Case Report

Yang Chen , Jing Yang* 

Country Department of Anesthesiology, West China Hospital Sichuan University, Chengdu, China

Abstract

Pulmonary artery sarcoma (PAS) is an extremely rare and aggressive malignancy, often misdiagnosed as pulmonary thromboembolism due to overlapping clinical presentations. This case report describes a 35-year-old female with progressive dyspnea and syncope, initially managed as pulmonary embolism. Despite anticoagulation therapy, persistent intracardiac masses were identified, prompting urgent surgical intervention. Transesophageal echocardiography (TEE) played a pivotal role intraoperatively, revealing a large mobile mass obstructing the pulmonary artery and causing hemodynamic instability. Following cardiac arrest, emergency surgery with extracorporeal circulation support was performed. Postoperative TEE demonstrated reduced mass size and improved pulmonary blood flow, although histopathological examination confirmed malignant carcinosarcoma. Unfortunately, the patient experienced recurrent syncopal episodes post-discharge and succumbed to the illness despite resuscitation efforts. This case highlights the diagnostic challenges of PAS and the indispensable role of TEE throughout the perioperative period. TEE provides real-time hemodynamic monitoring, precise tumor localization, and assessment of right ventricular function, facilitating timely surgical decisions. Intraoperatively, TEE continuously monitors for sudden hemodynamic changes, such as right ventricular outflow tract obstruction, and guides therapeutic interventions. Postoperatively, TEE aids in evaluating surgical outcomes, detecting residual masses or complications, and informing postoperative management strategies. Multi-planar TEE assessment, especially the ME gastric view, is crucial for comprehensive evaluation. This case underscores the importance of integrating TEE into the management of PAS to optimize patient outcomes.

Keywords

Pulmonary Artery Sarcoma, Pulmonary Embolism, Transesophageal Echocardiography, Misdiagnosis, Multidisciplinary Management

1. Introduction

Pulmonary artery sarcoma (PAS) is an exceedingly rare and aggressive malignancy originating from the mesenchymal cells within the intimal or subintimal layers of the pulmonary

artery. With fewer than half of thousand documented cases worldwide and an estimated incidence of 0.001% to 0.03%, PAS poses significant diagnostic and therapeutic challenges

*Corresponding author: yangjing@wchscu.cn (Jing Yang)

Received: 31 July 2025; **Accepted:** 11 August 2025; **Published:** 18 August 2025



Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

[1, 2]. Clinically and radiologically, PAS often mimics thromboembolic disorders and inflammatory conditions, leading to frequent misdiagnosis and delayed treatment [3-6]. This diagnostic ambiguity can result in suboptimal management and poor prognostic outcomes. The article reports a patient with severe symptoms of pulmonary artery sarcoma who underwent surgical resection with extracorporeal circulation under the guidance of transesophageal echocardiography (TEE). This case report aims to focus on the importance of TEE in PAS surgical resection.

2. Case Report

A 35-year-old female was admitted with a 13-day history of worsening dyspnea on exertion and an 8-day history of syncope. Physical examination revealed loud pulmonary component of the second heart sound and a systolic murmur at the pulmonary valve area. Her transthoracic echocardiography (TTE) demonstrated a dilated pulmonary artery containing a large, mobile, irregular mass (45 × 23 mm) located within the main pulmonary artery and its branches, adjacent to the pulmonary valve. A small amount of blood flow signal was detected in the pulmonary artery, $V_{max}=2.8$ m/s. Severe pulmonary hypertension and right heart enlargement were also observed (Figures 1, 2). Her computed tomography pulmonary angiography (CTPA) revealed filling defects in the pulmonary trunk and bilateral pulmonary arteries, suggestive of pulmonary embolism (PE), thickened pulmonary artery wall, and minimal pericardial effusion. Her laboratory tests indicated thrombocytopenia, hypoalbuminemia and elevated inflammatory markers. Initial management of the patient was diagnosed with intermediate-to-high-risk PE and initiated on fondaparinux. Despite 9 days of anticoagulation therapy, follow-up echocardiography showed persistent masses. During the treatment process, the patient experienced a fainting episode and lost consciousness. After active rescue measures, the patient regained normal heart rhythm. It is considered that the pulmonary embolism has recurred, and urgent removal of the pulmonary vascular mass is required.

After anesthesia induction, intraoperative transesophageal echocardiography (TEE) identified a mobile mass occupying the entire lumen of the pulmonary artery, with accelerated blood flow and tricuspid regurgitation (Figure 3). Before the surgery, the patient suddenly experienced cardiac arrest. The surgeon immediately performed emergency cardiac compression, and carried out emergency heparinization treatment, open-chest surgery, and established extracorporeal circulation to maintain systemic perfusion. During the surgical procedure, a mass lesion was identified within the main pulmonary artery, extending into the left and right pulmonary arteries. The surgeon removed the tumor and performed a pulmonary artery reconstruction surgery for the patient using a donor pericardium. With the assistance of a large number of vasoactive drugs, the patient successfully broke free from extracorporeal circulation. TEE revealed the mass was smaller and pulmo-

nary arterial blood flow had increased compared to before the operation (Figure 4). Meticulous hemostasis was achieved, and heparin anticoagulation was reversed with protamine sulfate. Given the presence of severe myocardial edema and significant right heart compression secondary to attempted sternal closure, definitive sternal closure was deferred until resolution of myocardial edema. The patient was subsequently transferred to the intensive care unit (ICU) for post-operative management.

The patient underwent re-exploration thoracotomy with hemostasis and wound debridement on postoperative day (POD) 3. Vasoactive agents were successfully weaned and endotracheal extubation was performed on POD 5. Postoperative TTE indicated hypoechoic irregular masses (annular level) in the main pulmonary artery post-tumor resection, right ventricular dilation with pulmonary artery enlargement, Mild-to-moderate pulmonary valve regurgitation, Moderate-to-severe tricuspid regurgitation, Preserved biventricular systolic function. Histopathological examination confirmed malignant sarcoma, with immunohistochemical profiling and molecular studies establishing the final diagnosis as carcinosarcoma. The patient was discharged on POD 9 in stable condition.

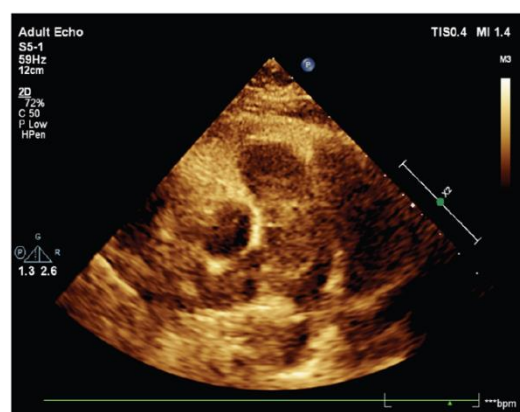


Figure 1. Preoperative TTE (a giant mass in the main pulmonary artery trunk).

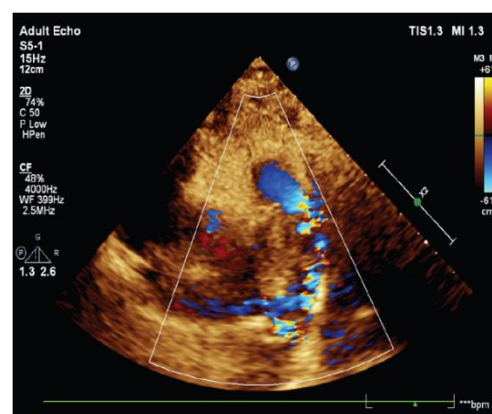


Figure 2. TTE (blood flow through the main pulmonary artery was difficult).

Two months post-discharge, the patient presented with recurrent syncopal episodes persisting for 10 hours, accompanied by bradycardia and undetectable peripheral oxygen saturation. Despite emergent cardiopulmonary resuscitation, the patient succumbed to the condition.

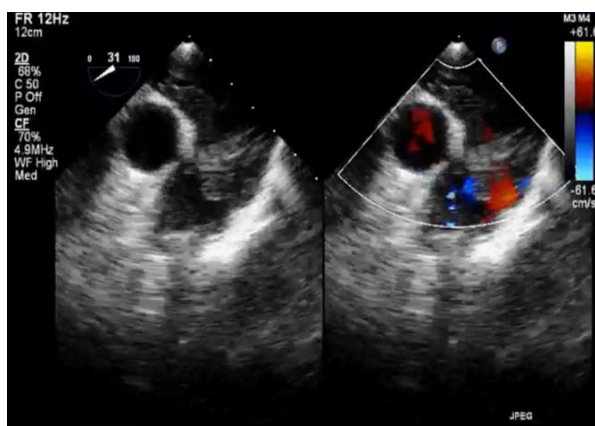


Figure 3. Preoperative TEE (a giant mass in the main pulmonary artery trunk. And blood flow through the main pulmonary artery was difficult.).

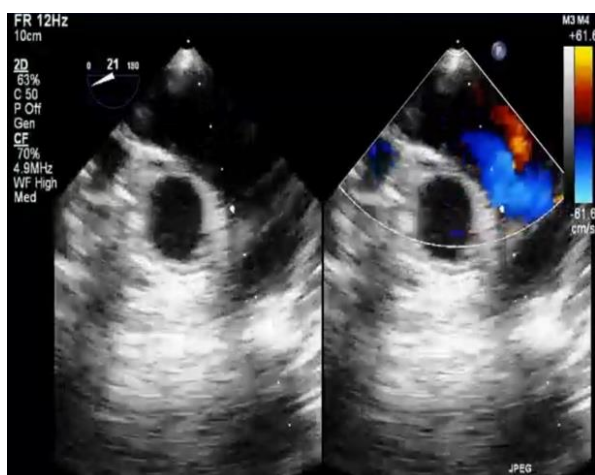


Figure 4. Postoperative TEE (The mass was smaller and pulmonary arterial blood flow had increased compared to before the operation).

3. Discussion

Pulmonary artery sarcoma (PAS) is extremely rare in cardiovascular diseases. PAS often affects the main pulmonary artery or left pulmonary artery [7-10]. Clinically and radiologically, PAS poses a significant diagnostic challenge, closely mimicking both thromboembolic disease and inflammatory pulmonary processes [11]. Multimodal imaging integration remains crucial: cardiac magnetic resonance (CMR) provides superior soft-tissue characterization for differential diagnosis [12], while computed tomography (CT) delineates anatomical extent. TEE emerges as the modality of choice for real-time hemodynamic monitoring, offering distinct advantages over

CT in procedural guidance and avoiding ionizing radiation [13].

Our case illustrates diagnostic complexities of pulmonary artery orifice sarcoma. Position-dependent tumor mobility precipitated recurrent thromboembolic events with hemodynamic collapse, manifesting as positional syncope and cardiac arrest. Anatomical obstruction at the pulmonary arterial bifurcation created a "ball-valve" effect, generating dynamic right ventricular outflow tract (RVOT) obstruction exacerbated by positional changes. Emergent surgical intervention proved mandatory given the imminent risk of sudden death from recurrent hemodynamic collapse.

Based on the provided information, here's a summary of the perioperative TEE scanning process for patients with pulmonary artery sarcoma.

Preoperative TEE we should do detailed baseline assessment and risk stratification. Such as Accurately determine tumor location and extent, severity of RVOT obstruction, tricuspid valve (TV) function, pulmonary artery (PA) pressures, identify high-risk features such as extensive PA invasion, severe right ventricular (RV) dysfunction, and baseline PE.

Intraoperative we should continuously TEE monitoring to evaluation for sudden hemodynamic failure (RVOT/cardiac arrest). TEE monitors RVOT obstruction changes during positioning/surgery, visualize tumor resection margins, detects iatrogenic TV damage or tumor fragment embolization, and asses acute hemodynamic changes (obstructive shock, PE). TEE can minimize but not completely eliminate the risk of pulmonary embolism. Meanwhile, based on cardiac output, vascular resistance index, pulmonary vascular resistance, and right heart function, TEE is beneficial for intervention guidance in direct infusion, and the use of positive inotropic drugs/vasopressor drugs for treatment.

Postoperative we can immediately evaluation to confirm RVOT decompression, TV integrity, complete tumor resection, and absence of acute PE/RV failure. TEE is conducive to early detection, such as ruling out residual obstruction, TV damage, or embolism CTPA, Ventilation/Perfusion (V/Q) Scintigraphy if TEE inconclusive. Also, TEE can also assess cardiac function and guide postoperative management including fluid supplementation, the use of diuretics, and the administration of positive inotropic drugs.

We have reflected on certain measures that seemingly have the potential to improve patient outcomes [14]. Conducting multi-planar TEE assessment during the perioperative period, especially the mid-esophageal gastric view, is crucial for the evaluation below the valve. The team can detect early warning signs such as a sudden increase in the right ventricular outflow tract pressure gradient, right ventricular dilation/dysfunction, new TEE - detected regurgitation, or acute hemodynamic collapse. The echocardiographer must proactively communicate the examination results to the surgeons and anesthesiologists. If the patient has the following conditions after surgery, timely imaging examinations should be completed:

persistent right ventricular dysfunction, hypoxia or electrocardiogram changes require urgent CTPA, V/Q scanning. It may even be necessary to perform multiple TTE/CTPA examinations [15].

4. Conclusions

This case illustrates the critical need for PAS awareness in refractory PE. TEE is indispensable for diagnosis and perioperative management. Early multidisciplinary intervention may improve outcomes in this rare malignancy.

Abbreviations

PAS	Pulmonary Artery Sarcoma
TTE	Transthoracic Echocardiography
CTPA	Computed Tomography Pulmonary Angiography
PE	Pulmonary Embolism
TEE	Transesophageal Echocardiography
ICU	Intensive Care Unit
POD	Postoperative Day
RVOT	Right Ventricular Outflow Tract
CMR	Cardiac Magnetic Resonance
CT	Computed Tomography
TV	Tricuspid Valve
PA	Pulmonary Artery
RV	Right Ventricular

Author Contributions

Yang Chen: Conceptualization, Data curation, Resources, Investigation, Methodology, Project administration, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - original draft

Jing Yang: Writing - review & editing

Funding

This work is not supported by any external funding.

Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article.

Ethical Statement

Written consent for the publication of this case report was obtained from the patient.

Informed Consent Statement

Approval for a case report by the institutional ethics committee is not required.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Bai, X., & Ruan, L. A case report of primary pulmonary artery intimal sarcoma. *European journal of medical research*. 2021, 26(1), 89. <https://doi.org/10.1186/s40001-021-00568-w>
- [2] Kronzer, E., Robinson, S. I., Collins, D. A., & McBane, R. D., 2nd. Primary pulmonary artery sarcoma versus pulmonary thromboembolism: a multimodal imaging comparison. *Journal of thrombosis and thrombolysis*, 2021, 52(4), 1129-1132. <https://doi.org/10.1007/s11239-021-02464-w>
- [3] Rali, P. M., & Criner, G. J. Submassive Pulmonary Embolism. *American journal of respiratory and critical care medicine*. 2018, 198(5), 588-598. <https://doi.org/10.1164/rccm.201711-2302CI>
- [4] Nguyen, P. C., Stevens, H., Peter, K., & McFadyen, J. D. (2021). Submassive Pulmonary Embolism: Current Perspectives and Future Directions. *Journal of clinical medicine*. 2021, 10(15), 3383. <https://doi.org/10.3390/jcm10153383>
- [5] Kahn, S. R., & de Wit, K. Pulmonary Embolism. *The New England journal of medicine*. 2022, 387(1), 45-57. <https://doi.org/10.1056/NEJMc2116489>
- [6] N Mercken, K., Sneyers, V., & Di Dedda, E. (2024). Pulmonary Artery Intimal Sarcoma. *Journal of the Belgian Society of Radiology*. 2024, 108(1), 105. <https://doi.org/10.5334/jbsr.3688>
- [7] Xiao, Q., Li, X., Li, Y., Wu, Z., Xu, C., Chen, Z., & He, W.. Biological drug and drug delivery-mediated immunotherapy. *Acta pharmaceutica Sinica*. 2021, B, 11(4), 941-960. <https://doi.org/10.1016/j.apsb.2020.12.018>
- [8] Zhao, M., Nie, P., Guo, Y., & Chen, H. Pulmonary artery intimal sarcoma: A rare cause of filling defects in pulmonary arteries. *The American journal of the medical sciences*. 2022, 364(5), 655-660. <https://doi.org/10.1016/j.amjms.2022.05.009>
- [9] de Groot, M. R., van Marwijk Kooy, M., Pouwels, J. G., Engelage, A. H., Kuipers, B. F., & Büller, H. R. The use of a rapid D-dimer blood test in the diagnostic work-up for pulmonary embolism: a management study. *Thrombosis and haemostasis*. 1999, 82(6), 1588-1592.
- [10] Assi, T., Kattan, J., Rassy, E., Moussa, T., Nassereldine, H., Honore, C., Adam, J., Terrier, P., Dumont, S., Mir, O., & Le Cesne, A. A comprehensive review on the diagnosis and management of intimal sarcoma of the pulmonary artery. *Critical reviews in oncology/hematology*. 2020, 147, 102889. <https://doi.org/10.1016/j.critrevonc.2020.102889>

- [11] Wyler von Ballmoos, M. C., Chan, E. Y., & Reardon, M. J. Imaging and Surgical Treatment of Primary Pulmonary Artery Sarcoma. *The international journal of cardiovascular imaging*. 2019, 35(8), 1429-1433. <https://doi.org/10.1007/s10554-018-1489-8J>
- [12] Nicoara, A., Skubas, N., Ad, N., Finley, A., Hahn, R. T., Mahmood, F., Mankad, S., Nyman, C. B., Pagani, F., Porter, T. R., Rehfeldt, K., Stone, M., Taylor, B., Vegas, A., Zimmerman, K. G., Zoghbi, W. A., & Swaminathan, M. Guidelines for the Use of Transesophageal Echocardiography to Assist with Surgical Decision-Making in the Operating Room: A Surgery-Based Approach: From the American Society of Echocardiography in Collaboration with the Society of Cardiovascular Anesthesiologists and the Society of Thoracic Surgeons. *Journal of the American Society of Echocardiography: official publication of the American Society of Echocardiography*. 2020, 33(6), 692-734. <https://doi.org/10.1016/j.echo.2020.03.002>
- [13] Assaf, Yazan., Nasser, Maher., Nasser, Maher., Nasser, Maher., & Nasser, Maher. Pulmonary Embolism Following Incomplete Surgical Resection of a Right Ventricular Myxoma: A Case Report and Review of the Literature. *Cardiology and therapy*. 2018, 7(1), 107-117.
- [14] Chan, E. Y., Ravi, V., Ali, A., Nguyen, D. T., Graviss, E. A., MacGillivray, T. E., & Reardon, M. J. Surgical Management of Primary Pulmonary Artery Sarcoma. *Seminars in thoracic and cardiovascular surgery*. 2023, 35(1), 53-64. <https://doi.org/10.1053/j.semtcvs.2021.10.013>
- [15] Alizadehasl, A., Najdaghi, S., Mohseni Salehi, M., Meshgi, S., Hosseini Jebelli, S. F., Yalameh Aliabadi, A., Hakimian, H., Forati, S., Safavirad, A., & Narimani Davani, D. A Comprehensive Insight Into Primary Intimal Sarcoma of the Pulmonary Artery; From Diagnosis to Management: A Case Report and Review of the Literature. *Clinical case reports*. 2024, 12(11), e9580. <https://doi.org/10.1002/ccr3.9580>

Biography



Yang Chen is an anesthesiologist working at West China Hospital of Sichuan University. In 2024, she obtained a master's degree in anesthesiology from West China Hospital of Sichuan University. The main research direction is perioperative analgesia.

Research Field

Yang Chen: perioperative analgesia, regional anesthesia, nerve block anesthesia, pain, anesthesia management, orthopedic surgery management.

Jing Yang: perioperative analgesia, regional anesthesia, nerve block anesthesia, pain, anesthesia management, orthopedic surgery management.