Received: 1 April 2024 | Revised: 26 May 2024 | Accepted: 30 May 2024

DOI: 10.1002/ccr3.9078

CASE REPORT

Clinical Case Reports Open Access WILEY

Left-sided infective endocarditis presenting with pulmonary involvement and liver abscess: A case report

Reza Basiri[1] | **Safieh Shazdehahmadi**[1] | **Amir Reza Boskabadi**[2]

[1]Lung Disease Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

[2]Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Correspondence
Safieh Shazdeh Ahmadi, Lung Disease Research Center, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.
Email: shazdehahmadis4011@mums.ac.ir

Key Clinical Message

Infective endocarditis is an important differential diagnosis in patients with persistent fever and chills not responding to antibiotics and involvement of multiple organs. It can present without any specific signs such as valvular murmurs and no growth on blood cultures. Therefore, considering an echocardiography can be crucial and helpful in establishing the diagnosis.

Abstract

Infective endocarditis (IE), a rare disease with high mortality, arises from microbial infection affecting the heart valves and endocardium. It exhibits diverse symptoms and can involve various organs, including the brain, lungs, spleen, and liver. Diagnosis is often intricate due to its polymorphic nature, and negative blood cultures can add complexity to the diagnostic process. In this report, we present an unusual case of IE in a 53-year-old male farmer with multi-organ involvement, including liver abscesses and pulmonary infiltration with cavities. Echocardiography showed a nodular mass attached to his bicuspid aortic valve, thus, playing a crucial role in confirming the diagnosis. This atypical manifestation highlights the necessity for increased clinical vigilance and further research to improve diagnostic approaches for uncommon IE cases.

KEYWORDS

case report, infective endocarditis, left-sided endocarditis, pulmonary infiltration

1 | INTRODUCTION

Infective endocarditis (IE) is a rare but fatal disease caused by infection of the endocardium and heart valves due to microorganisms' invasion.[1] It can involve different organs such as the brain, lungs, spleen, and liver, causing various symptoms.[2] The presentation is usually polymorphic, from signs of systemic infection (fever, chills, and weight loss) to peripheral signs (Osler nodes, and Janeway lesions), hemodynamic complications (such as valve regurgitation and heart failure), neurological complications (such as stroke), renal failure, septic emboli, and septic shock; thus making the diagnosis a challenge.[3] Risk factors for IE include rheumatic and congenital heart diseases (CHD), prosthetic valves, cardiac implantable electronic devices, intravenous (IV) access, IV drug abuse, and immunosuppression.[4] The fundamental tools for diagnosing IE are echocardiography and blood cultures.[5] However, in some cases,

the blood culture may be negative (blood culture-negative endocarditis or BCNE), posing a bigger challenge in diagnosis and treatment.[6] The most common causative bacteria for IE are staphylococci (about 40%–45%, mostly *S. aureus*), streptococci (about 35%–40%, mainly viridans streptococci), and enterococci (about 10%). Other less frequent pathogens include gram negative bacteria such as the HACEK group (*Hemophilus*, *Aggregatibacter*, *Cardiobacterium*, *Eikenella corrodens*, and *Kingella* species) and fungal infections, notably candida and aspergillus.[2]

Here, we present a case of IE with an unusual presentation and negative blood cultures.

2 | CASE EXAMINATION

A 53-year-old male farmer, with a previous history of smoking, diabetes, and chemical warfare exposure, presented to a local hospital with persistent fever, shaking chills, dyspnea, malaise, dry coughs, and abdominal pain. On physical examination, he had a fever of 38.5°C, crackles at the lung bases, and abdominal tenderness in the right upper quadrant. He had no valvular murmurs and no mucocutaneous lesions of infectious endocarditis such as Osler nodes, Janeway lesions, or splinter hemorrhages under the fingernails.

3 | CASE METHODS

After doing a computed tomography (CT) scan with contrast of the abdomen, a hypodense area with peripheral enhancement with a double target sign was in the liver suggesting a liver abscess. A biopsy showed necrotic material with numerous neutrophils that was consistent with abscess and the patient underwent drainage and antibiotics treatment. A chest CT scan indicated a cavitary lesion in the upper lobe of the right lung, along with a cystic area in the left lower lobe, patchy consolidations, and nodular lesions in the lung field (Figures 1 and 2). After another lung CT scan, some peripheral lesions had become smaller or changed their density. This finding was suggestive of consolidation or fluid collection and absence of mass. Empirical antibiotic treatment with ceftriaxone 1 g IV BID and clindamycin 600 mg IV TDS was started, but the lesions were not resolved, hence he was referred to our center for further evaluation.

In our hospital, his lab tests showed a borderline leukocyte count of 10,000 cells/mm^3 (normal range 4000–10,000) with neutrophil percentage of 68.3%, a C-reactive protein (CRP) of 63.9 mg/dL (normal range <6), and an erythrocyte sedimentation rate (ESR) of 44 mm/h (normal range <15). His hemoglobin, platelet count, liver enzymes, venous blood gases, serum electrolytes, creatinine, and electrocardiogram were unremarkable. A polymerase

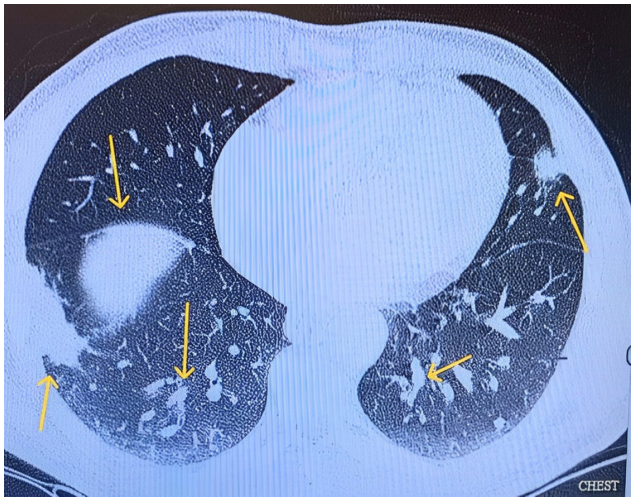

FIGURE 1 The figure shows various consolidations and nodular lesions in the lung field.

chain reaction test was performed for Covid-19 and influenza, which was negative for both. A flexible bronchoscopy was done to rule out tuberculosis and infection, and no endobronchial lesion was found. An acid-fast stain of bronchial fluid was performed, and no acid-fast bacteria was seen. Two blood cultures were performed, but neither showed any sign of bacterial or fungal infection after 48 h.

A transthoracic echocardiography (TTE) was performed on the patient to evaluate the possibility of endocarditis, which showed a bicuspid aortic valve (BAV) and a sclerotic nodular mass in the right coronary cusp (RCC) with compression effect on the left coronary cusp (LCC). No other lesion was seen on other valves. His antibiotic regimen was changed to linezolid 600 mg IV BID to cover methicillin-resistant *Staphylococcus aureus*. After 5 days, the patient's symptoms improved and his ESR and CRP levels decreased significantly. He was discharged with oral linezolid 600 mg BID and levofloxacin 500 mg QD for 6 weeks and was referred to another cardiologist for transesophageal echocardiography (TEE) and further evaluation.

The TEE showed a BAV with partial fusion and raphe between bases of RCC and LCC, along with a small thickening of raphe between fused cusps and an overlying mobile mass with the size of 5×4 mL attached on the aortic aspect of the cusp (Figures 3 and 4). Moderate aortic regurgitation with a mildly dilated aortic root was also seen. The size and systolic function of ventricles were normal and no other valve abnormalities were found.

4 | RESULTS

Based on the TEE and clinical findings, endocarditis diagnosis was confirmed. Surgery was recommended to the patient, but he did not accept it due to financial constraints.

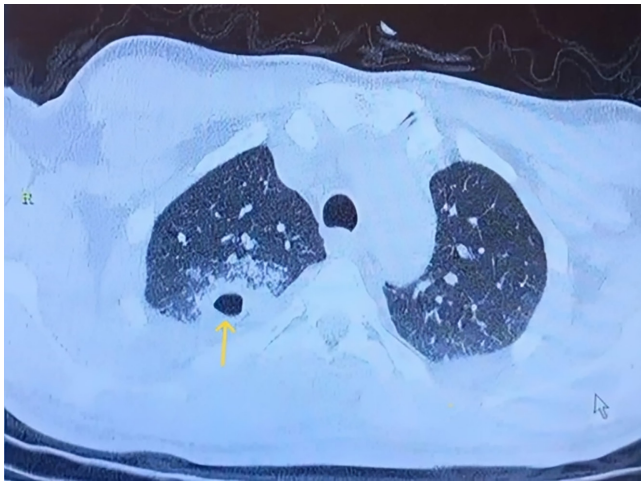

FIGURE 2 The figure shows a cavitary lesion in the right upper lobe of the lung.

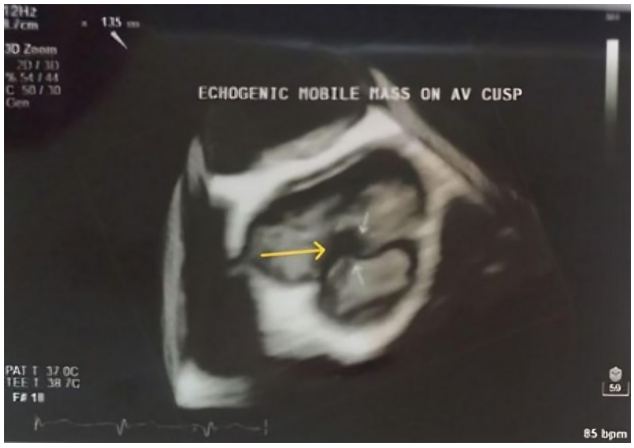

FIGURE 3 The figure shows an echogenic mobile mass on the AV cusp; which (along with the patient presentation) is consistent with endocarditis.

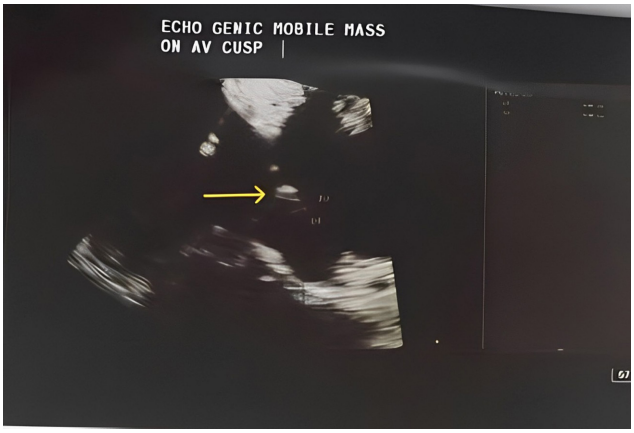

FIGURE 4 The figure shows an echogenic mobile mass on the AV cusp; which (along with the patient presentation) is consistent with endocarditis.

5 | DISCUSSION

Pulmonary complications after IE include pneumonia, pleural effusion, pulmonary embolism, lung abscess, and pulmonary edema.[7] Pulmonary complications are seen in 70%–98% of the patients with right-sided endocarditis[7] and they can increase inpatient mortality, hospital transfer fees, and long-term care needs.[8] Common radiologic findings include pleural effusion, multiple round densities, and cavitary lesions.[9] Although pulmonary involvement mostly happens in patients with right-sided endocarditis,[10] it can be seen also in left-sided endocarditis. In a study by Allan Clarelin et al.[11] pulmonary emboli were seen in 11 (5.4%) out of 204 patients with a history of IV drug use and left-sided endocarditis. In a case report, Rana Al-Zakhari et al.[12] reported a patient with aortic valve endocarditis and severe aortic regurgitation that presented with unilateral pulmonary edema. In another article, Francesca Gavvaruzi et al.[13] reported a patient with aortic valve endocarditis and lung abscess. In our case, the patient had multiple lung lesions while having aortic valve endocarditis. Nevertheless, further research needs to be done on lung involvement in left-sided IE.

Compared to other abscesses in IE, the data regarding the association between liver abscess and IE is limited. In a study by Boukobza et al.[14] the prevalence of brain abscess in IE was 5.7%. Also, about 14.4% cases of IE are associated with intracardiac abscesses.[15] To our knowledge, there are currently no studies determining the prevalence of liver abscess in IE. We found 14 case reports with different bacteria in both immunocompromised and immunocompetent patients. Kaho Sato et al.[16] reported a case of a 51-year-old previously healthy woman presenting with a liver abscess and mitral valve endocarditis. Both of her blood cultures grew *Fusobacterium necrophorum*, and she was treated with ceftriaxone and metronidazole. Another case of endocarditis caused by *F. necrophorum* presented with hepatic abscess and cavitary lesions in the lung was reported by Volpe et al.[17] in 2019. There have been three articles reporting cases of IE with a liver abscess caused by *Klebsiella pneumonie*.[18–20] *Streptococcus anginosus* is another bacteria reported by Finn et al. which causes multiple liver abscesses with endocarditis in a previously splenectomized patient.[21] Wong et al.[22] reported a case of bacteriemia with *Streptococcus constellatus* which caused endocarditis and hepatic abscess in a patient with gastric adenocarcinoma, which expired shortly after diagnosis. In a case report by Wahib Lahlou et al.[23] a 56-year-old previously healthy male presented with liver abscess, pneumonia, and pleural effusion. The pus culture grew with *Lactococcus lactis*, a bacteria that is considered nonpathogenic for humans.[24] TTE revealed

aortic valve endocarditis and he was treated with metronidazole, imipenem, and amikacin. Lim et al.[25] report a case of aortic valve endocarditis with multiple liver abscesses caused by *Chromobacterium violaceum*, which was successfully treated with meropenem and ciprofloxacin. Other bacteria that have been reported to cause both endocarditis and liver abscess are *Eikenella corrodens*,[26] *Streptococcus milleri*,[27] and *Ruminococcus*.[28] There is also a case report by Dahya et al.,[29] which reported a case of endocarditis by *Fusobacterium nucleatum* in a previously healthy patient who presented with both liver and brain abscesses.

BAV is the most common congenital heart disease (with 2% prevalence)[30] that is usually asymptomatic in childhood but can result in multiple complications in adulthood, such as aortic stenosis, regurgitation, dissection, aneurysm, and heart failure.[31] Patients with BAV have a significantly higher risk of IE,[32] and BAV is the second most common CHD associated with endocarditis. This contrasts with the current guidelines for excluding it from antibiotics prophylaxis.[33]

Blood culture-negative endocarditis can sometimes become a dilemma, as Duke criteria usually do not perform well in such patients; but still, in many cases, the pathogen can be detected via other methods, such as serology.[34] BCNE is mostly found in patients with prior antibiotic treatment.[35] Patients with BCNE undergo surgery more often, but the mortality rate is not significantly different from the blood culture-positive group.[36]

6 | CONCLUSION

This case report presents an unusual manifestation of IE with the involvement of various organs, including liver abscesses and pulmonary complications. The diagnosis of IE was confirmed through echocardiography. Such atypical presentations of IE pose significant challenges in diagnosis and management, necessitating heightened clinical awareness. Further research is required to better understand these uncommon manifestations and improve future diagnostic approaches for similar cases.

AUTHOR CONTRIBUTIONS

Reza Basiri: Methodology; project administration. **Safieh Shazdeh Ahmadi:** Methodology; writing – original draft. **Amir Reza Boskabadi:** Writing – original draft; writing – review and editing.

FUNDING INFORMATION

The research and writing of this article were conducted without any funding or financial support.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest in relation to the publication of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

CONSENT

Written informed consent was obtained from the patient to publish this case report and any accompanying images.

ORCID

Safieh Shazdehahmadi https://orcid.org/0009-0004-0426-8343
Amir Reza Boskabadi https://orcid.org/0009-0006-4900-6464

REFERENCES

1. Wu Z, Chen Y, Xiao T, Niu T, Shi Q, Xiao Y. Epidemiology and risk factors of infective endocarditis in a tertiary hospital in China from 2007 to 2016. *BMC Infect Dis*. 2020;20(1):1-10.
2. Cimmino G, Bottino R, Formisano T, et al. Current views on infective endocarditis: changing epidemiology, improving diagnostic tools and centering the patient for up-to-date management. *Life (Basel)*. 2023;13(2):377.
3. Iung B, Duval X. Infective endocarditis: innovations in the management of an old disease. *Nat Rev Cardiol*. 2019;16(10):623-635.
4. Cahill TJ, Baddour LM, Habib G, et al. Challenges in infective endocarditis. *J Am Coll Cardiol*. 2017;69(3):325-344.
5. Yuan X-c, Liu M, Hu J, Zeng X, Zhou A-y, Chen L. Diagnosis of infective endocarditis using echocardiography. *Medicine*. 2019;98(38):e17141.
6. El-Ashry AH, Saad K, Obiedallah AA, Elhoufey A, Dailah HG, Hussein MSA. Molecular and serological diagnostic approach to define the microbiological origin of blood culture-negative infective endocarditis. *Pathogens*. 2022;11(11):1220.
7. Bajura C, Proca I, Roitburt A, Fărîmă C. Pulmonary complications in infective endocarditis. 2020.
8. Bui JT, Schranz AJ, Strassle PD, et al. Pulmonary complications observed in patients with infective endocarditis with and without injection drug use: an analysis of the National Inpatient Sample. *PLoS One*. 2021;16(9):e0256757.
9. Cunha BA, Gill MV, Lazar JM. Acute infective endocarditis: diagnostic and therapeutic approach. *Infect Dis Clin N Am*. 1996;10(4):811-834.
10. Chahoud J, Sharif Yakan A, Saad H, Kanj SS. Right-sided infective endocarditis and pulmonary infiltrates. *Cardiol Rev*. 2016;24(5):230-237.
11. Clarelin A, Rasmussen M, Olaison L, Ragnarsson S. Comparing right-and left sided injection-drug related infective endocarditis. *Sci Rep*. 2021;11(1):1177.
12. Al-Zakhari R, Suhail M, Yousif M, Gala B, Diaz K. Unilateral pulmonary edema in acute aortic regurgitation:

a complication of infective endocarditis. *J Cardiol Cases*. 2021;24(1):41-44.
13. Gavaruzzi F, Chinello P, Cucinotta G, et al. *Streptococcus intermedius* brain abscess with lung abscess and aortic valve endocarditis: a case report and literature review. *Infect Dis Rep*. 2023;15:445.
14. Boukobza M, Ilic-Habensus E, Mourvillier B, Duval X, Laissy J-P. Brain abscesses in infective endocarditis: contemporary profile and neuroradiological findings. *Infection*. 2023;51(5):1431-1444.
15. Blomjous MS, Budde RP. Infective endocarditis related abscess is an important complication and requires awareness on all imaging modalities. *J Nucl Cardiol*. 2023;30(6):2415-2417.
16. Sato K, Matsubara T, Imai S, et al. *Fusobacterium necrophorum* endocarditis with liver abscesses: a case report and review of the literature. *Intern Med*. 2021;60(15):2445-2449.
17. Volpe N, Connolly S, Cheema B, Angarone M. A curious case of endocarditis and liver abscess in a previously healthy man. *Am J Med*. 2020;133(2):186-190.
18. Babouee Flury B, Donà V, Buetti N, Furrer H, Endimiani A. First two cases of severe multifocal infections caused by *Klebsiella pneumoniae* in Switzerland: characterization of an atypical non-K1/K2-serotype strain causing liver abscess and endocarditis. *J Glob Antimicrob Resist*. 2017;10:165-170.
19. Hamide A, Mahapatra R, Noronha AK, Kandan B, Shankar C, Veeraraghavan B. Hypervirulent *Klebsiella pneumoniae* infection presenting as endocarditis and liver abscess. *Trop Dr*. 2022;52(4):583-585.
20. Rivero A, Gomez E, Alland D, Huang DB, Chiang T. K2 serotype *Klebsiella pneumoniae* causing a liver abscess associated with infective endocarditis. *J Clin Microbiol*. 2010;48(2):639-641.
21. Finn T, Schattner A, Dubin I, Cohen R. *Streptococcus anginosus* endocarditis and multiple liver abscesses in a splenectomised patient. *BMJ Case Rep*. 2018;2018:224266.
22. Wong Y-H, Huang P-J, Chen F-L, Lee W-S. *Streptococcus constellatus* septicemia complicating endocarditis and liver abscess associated with gastric adenocarcinoma. *J Microbiol Immunol Infect*. 2019;52(6):1002-1003.
23. Lahlou W, Bourial A, Maaouni T, et al. *Lactococcus lactis* endocarditis and liver abscess in an immunocompetent patient: a case report and review of the literature. *J Med Case Rep*. 2023;17(1):115.
24. Antolin J, Cigüenza R, Saluena I, Vazquez E, Hernandez J, Espinos D. Liver abscess caused by *Lactococcus lactis* cremoris: a new pathogen. *Scand J Infect Dis*. 2004;36(6–7):490-491.
25. Lim IW, Stride PJ, Horvath RL, Hamilton-Craig CR, Chau PP. *Chromobacterium violaceum* endocarditis and hepatic abscesses treated successfully with meropenem and ciprofloxacin. *Med J Aust*. 2009;190(7):386-387.
26. Nordholm AC, Vøgg ROB, Permin H, Katzenstein T. *Eikenella corrodens* endocarditis and liver abscess in a previously healthy male, a case report. *BMC Infect Dis*. 2018;18(1):35.
27. Rashid RM, Salah W, Parada JP. '*Streptococcus milleri*' aortic valve endocarditis and hepatic abscess. *J Med Microbiol*. 2007;56(Pt 2):280-282.
28. Sucu N, Köksal I, Yilmaz G, Aydin K, Caylan R, Aktoz BG. Liver abscess and infective endocarditis cases caused by *Ruminococcus productus*. *Mikrobiyol Bul*. 2006;40(4):389-395.
29. Dahya V, Patel J, Wheeler M, Ketsela G. *Fusobacterium nucleatum* endocarditis presenting as liver and brain abscesses in an immunocompetent patient. *Am J Med Sci*. 2015;349(3):284-285.
30. Bravo-Jaimes K, Prakash SK. Genetics in bicuspid aortic valve disease: where are we? *Prog Cardiovasc Dis*. 2020;63(4):398-406.
31. Liu T, Xie M, Lv Q, et al. Bicuspid aortic valve: an update in morphology, genetics, biomarker, complications, imaging diagnosis and treatment. *Front Physiol*. 2019;9:1921.
32. Michelena HI, Katan O, Suri RM, Baddour LM, Enriquez-Sarano M. Incidence of infective endocarditis in patients with bicuspid aortic valves in the community. 2016.
33. Mano TB, Cardoso I, Costa PO, et al. Infective endocarditis in a cohort of adult CHD patients. *Cardiol Young*. 2023;33(2):190-195.
34. Lamas C, Eykyn S. Blood culture negative endocarditis: analysis of 63 cases presenting over 25 years. *Heart*. 2003;89(3):258-262.
35. Buburuz A-M, Petris A, Costache II, Jelihovschi I, Arsenescu-Georgescu C, Iancu LS. Evaluation of laboratory predictors for in-hospital mortality in infective endocarditis and negative blood culture pattern characteristics. *Pathogens*. 2021;10(5):551.
36. Suardi LR, de Alarcon A, Garcia MV, et al. Blood culture-negative infective endocarditis: a worse outcome? Results from a large multicentre retrospective Spanish cohort study. *Infect Dis*. 2021;53(10):755-763.

How to cite this article: Basiri R, Shazdehahmadi S, Boskabadi AR. Left-sided infective endocarditis presenting with pulmonary involvement and liver abscess: A case report. *Clin Case Rep*. 2024;12:e9078. doi:10.1002/ccr3.9078