Journal of Indonesia Vascular Access (*INAVA*) 2024, Volume 4, Number 2: 41-45
E-ISSN : 2798-6780 ; P - ISSN : 2807-7032

Published By : IVAA
the Indonesian Vascular Access Association

Infective endocarditis: a case series

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Received: 2024-07-29
Accepted: 2024-10-14
Published: 2024-11-07

ABSTRACT

Introduction: Infective endocarditis (IE) remains a critical cardiovascular condition with significant mortality rates, ranging from 20% during hospitalization to 25-30% within six months post-infection. Valve abnormalities have been strongly associated with IE and worsen patient symptoms and prognostic. This study presents a case series of IE in Dr. Mohammad Hoesin Palembang Hospital.

Case presentations: This case series reports on the management and outcomes of four pediatric patients treated for IE between January and May 2024 in RSUP Mohammad Hoesin Palembang. Each patient presents with moderate to severe mitral regurgitation and valve vegetation. Diagnoses were based on clinical symptoms and echocardiographic findings, adhering to the Duke criteria. The management involved systemic antibiotics and valve replacement surgery, with a focus on individualized treatment plans based on the severity of regurgitation and the presence of vegetation. Notably, all four patients survived and demonstrated substantial improvement in quality of life after surgical management.

Conclusions: Our findings emphasize the efficacy of a multidisciplinary approach combining antibiotic therapy with timely surgical intervention for successful treatment outcomes in IE. Early diagnosis and appropriate management, including valve replacement, when necessary, are crucial for improving patient survival and quality of life.

Keywords: infective endocarditis, valve replacement, valve vegetation.
Cite This Article: Yazid, K.N., Bermansyah., Satria, G., Umar, A., Nugraha, A., Tobing, A.H.L., Nasution, I.H. 2024. Infective endocarditis: a case series. *Journal of Indonesia Vascular Access* 4(2): 41-45. DOI : 10.51559/jinava.v4i2.56

INTRODUCTION

Infective endocarditis (IE) is defined as an infection of the endocardial surface of the heart, with a global incidence estimated at 3 to 10 cases per 100,000 people annually.[1-4] Despite advancements in diagnostic facilities, the development of new antibiotics, and the implementation of early surgical interventions, the incidence of IE continues to remain high.[5] In developing countries, IE is primarily predisposed by rheumatic heart disease (RHD), whereas in developed countries, congenital heart disease is more frequently identified as the underlying condition.[6-8]

Significant mortality has been associated with IE, with 20% of patients reported to die during hospitalization, and mortality rates have been shown to increase to 25–30% within six months post-infection.[9-13] Early mortality rates are documented as being similar for mitral and aortic valve endocarditis. IE has been classified based on its location, the presence or absence of intracardiac lesions, and the mode of acquisition, which includes infections acquired in the community, in healthcare settings, or through intravenous drug use.[11,14-17]

The causative organisms of IE are most commonly identified as *Staphylococcus* species, followed by *Streptococcus* species.[9] The diagnosis of IE is established using the modified Duke criteria, which require the presence of a combination of major and minor criteria.[18-20] Major criteria are defined by positive blood cultures containing typical microorganisms associated with IE and echocardiographic evidence of endocardial involvement, such as cardiac masses or abscesses.[20] Minor criteria include fever exceeding 38°C, vascular phenomena such as systemic embolism, immunologic phenomena such as glomerulonephritis or Osler nodes, predisposing factors including a history of cardiac lesions or intravenous drug use, and microbiologic evidence that does not meet the major criteria.[20]

In developed countries, blood cultures have been reported as positive in approximately 60–80% of IE cases, while in developing countries, the positivity rate is lower, at around 40–60%.[18,19] Echocardiography has been established as the standard diagnostic modality for the detection of valvular vegetations and cardiac abscesses.

Better outcomes and faster recovery have been demonstrated in patients with IE who undergo early surgical intervention after antibiotic administration for valvular abnormalities. In this report, four cases of IE treated at the Department of Cardiothoracic and Vascular Surgery, Dr. Mohammad Hoesin Palembang Hospital, are described, focusing on the management approaches and clinical progression following surgical treatment.

CASE REPORT

Case 1 (B)

A 17-year-old girl was referred by a pediatrician to the Department of Cardiothoracic and Vascular Surgery (CTVS) for evaluation of mitral valve vegetation. She presented with fever, shortness of breath, and bilateral leg swelling. Transthoracic echocardiography (TTE) revealed a 1.5 cm vegetation on the mitral valve, accompanied by prolapse of the anterior leaflet, severe mitral regurgitation, and moderate tricuspid regurgitation (**Figure 1**). At the time of referral, the patient had already been hospitalized for 30 days and was receiving treatment with diuretics and intravenous Benzathine Penicillin. A re-evaluation of TTE showed no reduction in the size of the vegetation or improvement in the degree of mitral regurgitation.

On physical examination, auscultation detected a pansystolic murmur at the fourth intercostal space (ICS). Laboratory findings were within normal limits, with a non-reactive antistreptolysin O (ASO) titer, and blood cultures were negative for any organisms.

A multidisciplinary team comprising pediatric cardiologists and CTVS specialists diagnosed the patient with congestive heart failure secondary to infective endocarditis. Treatment was initiated with systemic ampicillin and diuretics. Subsequently, the patient underwent mitral valve replacement with a bioprosthetic valve. Postoperative rehabilitation began promptly after the patient was weaned from mechanical ventilation. During her continued hospitalization, the patient received systemic antibiotics and heparin therapy.

At a three-month follow-up, the patient demonstrated significant improvement in her quality of life, with no recurrence of symptoms or complications.

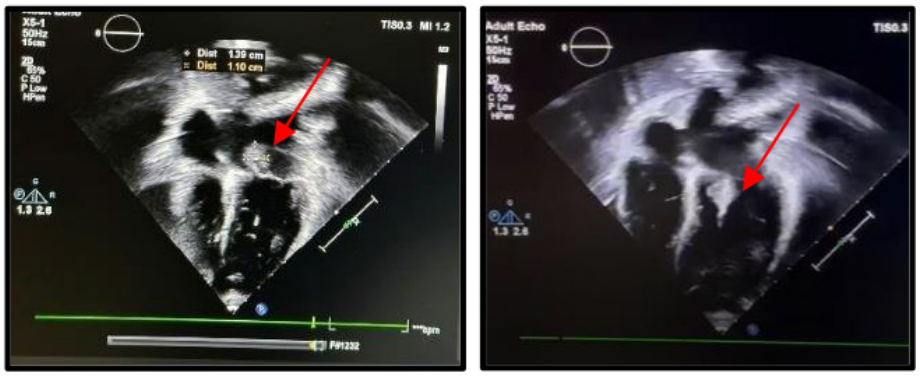

Figure 1. Echocardiography showed vegetation in the mitral valve (red arrow)

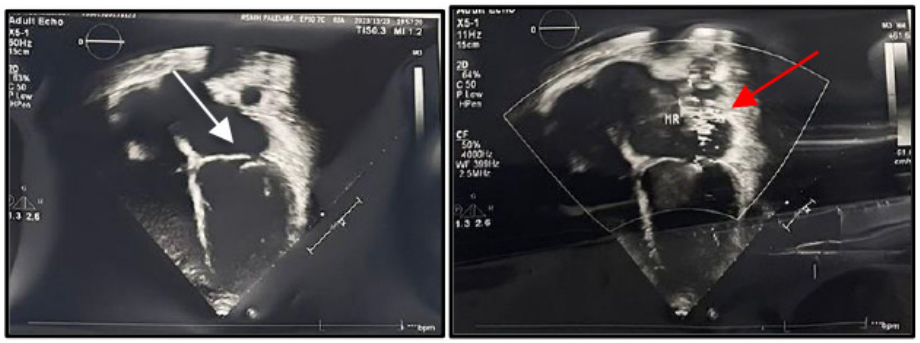

Figure 2. Echocardiography showed anterior mitral valve tear (white arrow) and mitral regurgitation (black arrow)

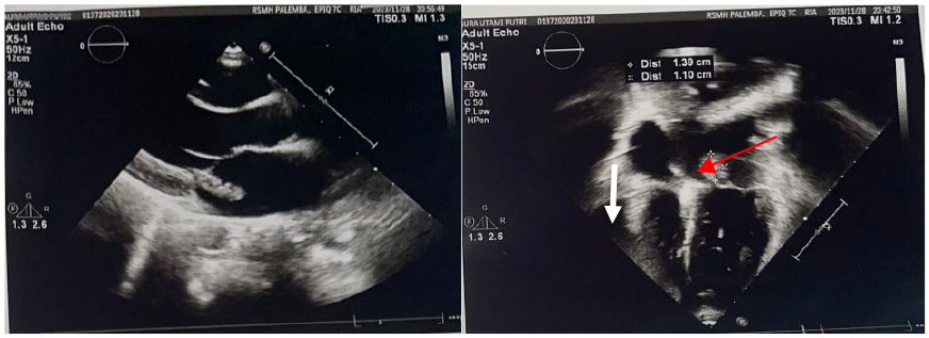

Figure 3. Echocardiography showed vegetation in the anterior mitral valve (red arrow), severe mitral regurgitation, moderate tricuspid regurgitation, and minimal pericardial effusion (white arrow)

Case 2 (L)

A 13-year-old girl was referred by a pediatrician to the Department of CTVS for valve replacement surgery. Her medical history was unremarkable, and she reported no current complaints. She had a past diagnosis of rheumatic heart disease, initially presenting with shortness of breath and palpitations. At that time, she was managed by her cardiologist and placed on prophylactic systemic benzathine penicillin, receiving 1.2 million IU every four weeks.

On physical examination, auscultation revealed a pan systolic murmur at the cardiac apex. Laboratory findings were within normal limits except for a microbiology blood culture, which was positive for *Micrococcus luteus*. TTE examination revealed severe mitral regurgitation with prolapse and a tear in the anterior mitral valve leaflet, along with moderate tricuspid regurgitation (**Figure 2**). No vegetations were observed.

The patient was treated with intravenous ampicillin and gentamicin prior to surgery. She subsequently underwent mitral valve replacement using a bioprosthetic valve. Following the procedure, the patient was discharged and managed as an outpatient with warfarin therapy for three months. At the three-month follow-up, she reported no complaints, and her recovery was uneventful.

Case 3 (A)

A 13-year-old girl presented with high-grade fever, joint pain, and palpitations. On physical examination, a pan systolic murmur was auscultated along the left midclavicular line, extending into the midaxillary line at the fifth to sixth intercostal space. Laboratory investigations revealed an elevated erythrocyte sedimentation rate (ESR), and microbiological blood culture identified *Staphylococcus aureus*. TTE examination demonstrated vegetation on the mitral valve, severe mitral stenosis and regurgitation, moderate tricuspid regurgitation, and minimal pericardial effusion (**Figure 3**).

The patient was initially treated with systemic ampicillin-sulbactam and gentamicin for four weeks. However, the size of the mitral valve vegetation did not reduce. Subsequently, the patient developed symptoms of heart failure, including shortness of breath and pulmonary rales. In response, mitral valve replacement with a bioprosthetic valve was performed. Intraoperative findings revealed a severely calcified mitral valve (**Figure 4**). The patient was extubated early postoperatively and showed marked improvement in daily living activities at the three-month follow-up, with no recurrence of symptoms.

Case 4 (S)

A 10-year-old boy was referred by a pediatrician to the Department of CTVS for evaluation of valve replacement surgery. Three weeks prior, he had experienced a high-grade fever, palpitations, and shortness of breath. At the presentation, the patient appeared lethargic and continued to exhibit shortness of breath. On physical examination, pulmonary rales were noted, along with a systolic murmur at the cardiac apex.

Laboratory findings revealed a hemoglobin level of 9.5 g/dL, while other parameters were within normal limits. Microbiological blood culture results were pending. TTE examination identified vegetation and a tear in the anterior leaflet of the mitral valve, as well as severe mitral regurgitation and severe tricuspid regurgitation (**Figure 5**).

The patient was diagnosed with heart failure. Treatment included systemic ampicillin and ceftriaxone, along with diuretic therapy. Subsequently, he underwent mitral valve replacement with a mechanical valve. Following surgery, the patient was managed as an outpatient with lifelong warfarin therapy. At the three-month follow-up, the patient reported no complaints and demonstrated significant clinical improvement.

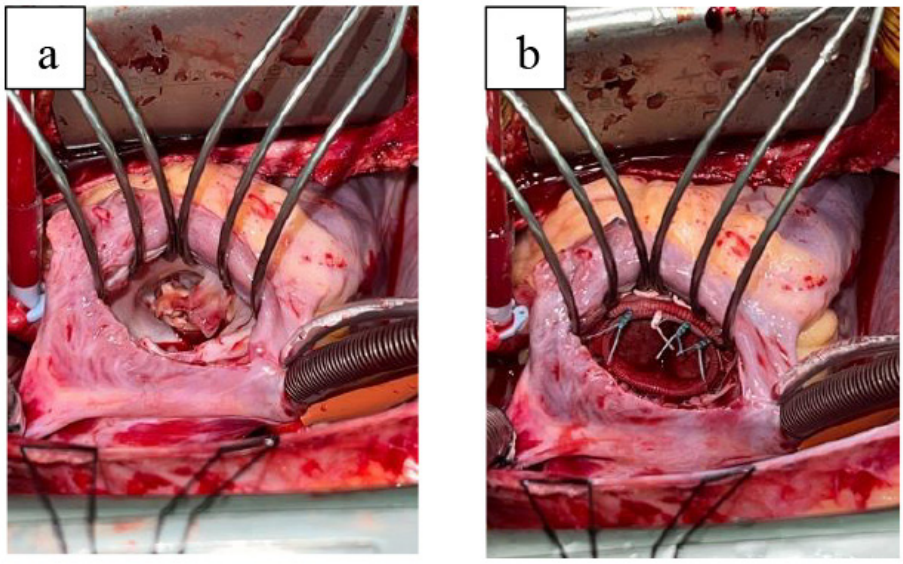

Figure 4. (a) Intraoperative finding of highly calcified and vegetation of mitral valve; (b) Mitral valve replacement with bioprosthetic valve

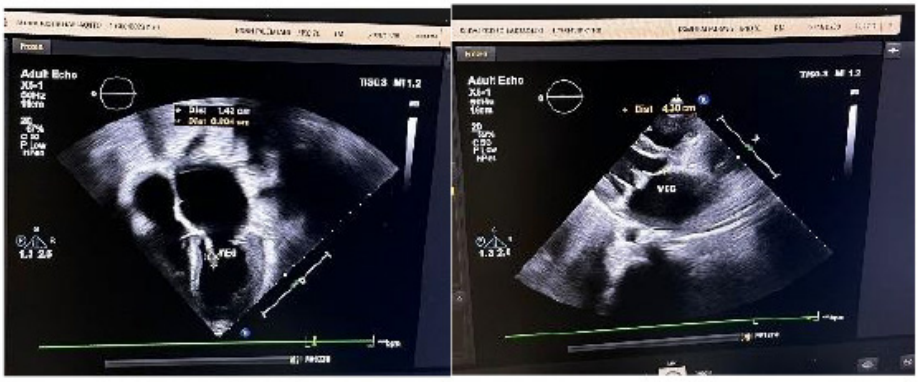

Figure 5. Echocardiography showed vegetation and tear in the mitral valve and severe mitral regurgitation

DISCUSSION

The management of infective endocarditis (IE) necessitates an interprofessional approach involving infectious disease specialists, cardiologists, and cardiac surgeons to optimize antimicrobial therapy and determine the need for surgical intervention. Early consultation with cardiothoracic surgery has been shown to improve mortality rates significantly and is considered essential for patients presenting with complications. Approximately 50% of IE patients require surgical intervention at some stage.[8] In our center, an established collaboration between pediatric cardiologists and cardiac surgeons ensures timely referrals and minimizes delays in patient management.

From our experience, echocardiography plays a pivotal role in diagnosing cardiac lesions, guiding the initiation of antibiotic therapy without waiting for blood culture results, and determining the timing of surgery. It provides critical data, including the presence of vegetations and abscesses, valve abnormalities, heart failure severity,

and the functional status of the heart over time.[24] All four patients in this series presented with vegetations and moderate to severe mitral regurgitation, necessitating prompt initiation of empiric antimicrobial therapy, which included combinations such as ampicillin, gentamicin, and ceftriaxone.[22,23]

While most IE patients respond favorably to antibiotic therapy, a subset of patients presents a dilemma regarding the timing and necessity of valve replacement. The decision to perform surgery is guided by specific clinical indications, which are summarized as follows:[24]

1. **Heart failure due to valve dysfunction**: Surgery is indicated irrespective of the duration or status of antibiotic therapy.
2. **Highly resistant or aggressive pathogens**: IE caused by *Staphylococcus aureus*, fungi, or other resistant organisms affecting left-sided valves mandates surgery.
3. **Structural complications**: Development of heart block, aortic root abscess, or other destructive lesions requires surgical intervention.
4. **Persistent infection**: Surgery is warranted in cases of persistent bacteremia or fever lasting more than 5–7 days despite appropriate antimicrobial therapy.
5. **Prosthetic valve endocarditis (PVE)**: Patients with PVE and relapsing infections, where bacteremia recurs after completing antibiotic therapy, may need surgical management.
6. **Recurrent emboli and persistent vegetations**: Surgery is necessary for patients with recurrent embolic events and unresolving vegetations despite adequate antibiotic treatment.
7. **Large vegetations and embolic risk**: Mobile vegetations larger than 10 mm with evidence of embolic phenomena in native valve endocarditis (NVE) or PVE often require urgent or emergency surgery.
8. **Right-sided IE complications**: Patients with large vegetations, persistent infection, or septic pulmonary embolism due to right-sided valve IE may require surgery.

In all four cases presented, the presence of vegetations and significant mitral valve abnormalities necessitated surgical intervention in the form of mitral valve replacement, using either bioprosthetic or mechanical valves. Postoperatively, all patients demonstrated substantial clinical improvement, with enhanced functional capacity and resolution of symptoms at follow-up. These outcomes underscore the critical role of timely surgical intervention in achieving successful treatment outcomes for IE.

CONCLUSION

Effective management of infective endocarditis (IE) requires a multidisciplinary approach, combining timely diagnosis, targeted antibiotic therapy, and early surgical intervention. Our findings highlight that prompt surgical management of valve abnormalities significantly improves recovery and outcomes, emphasizing the importance of coordinated care in treating IE.

ACKNOWLEDGMENT

The authors would like to express their gratitude to the Cardiothoracic and Vascular Surgery Department of the Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia.

CONFLICT OF INTEREST

The author reports no conflict of interest in this work.

FUNDINGS

No specific funding was received for this study.

PATIENTS' INFORMED CONSENT

All patients' guardians or parents have provided their consent and signed the informed consent form for the preparation of this case report manuscript.

AUTHOR CONTRIBUTION

All authors contributed to the manuscript writing and agreed to the final version of the manuscript for publication.

REFERENCES

1. Pant S, Patel NJ, Deshmukh A, et al. Trends in infective endocarditis incidence, microbiology, and valve replacement in the United States from 2000 to 2011. J Am Coll Cardiol. 2015;65(19):2070-6
2. Bor DH, Woolhandler S, Nardin R, Brusch J, Himmelstein DU. Infective endocarditis in the U.S 1998-2009: a nationwide study. PLoS One. 2013;8(3): e60033
3. Federspiel JJ, Stearns SC, Peppercorn AF, Chu VH, Fowler VG Jr. Increasing US rates of endocarditis with Staphylococcus aureus: 1999-2008. Arch Intern Med. 2012;172(4):363–5
4. Dayer MJ, Jones S, Prendergast B, Baddour LM, Lockhart PB, Thornhill MH. Incidence of infective endocarditis in England, 2000-13: a secular trend, interrupted time-series analysis. Lancet 2015;385(9974) :1219–28
5. Cabell CH, Jollis JG, Peterson GE, et al. Changing patient characteristics and the effect on mortality in endocarditis. Arch Intern Med. 2002;162(1):90–4
6. Math RS, Sharma G, Kothari SS, et al. Prospective study of infective endocarditis from a developing country. Am Heart J. 2011;162(4):633–638
7. Garg N, Kandpal B, Garg N, et al. Characteristics of infective endocarditis in a developing country-clinical profile and outcome in 192 Indian patients, 1992-2001. Int J Cardiol. 2005;98(2):253–60
8. Baddour LM, Wilson WR, et al. American Heart Association Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young, Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and Stroke Council. Infective Endocarditis in Adults: Diagnosis, Antimicrobial Therapy, and Management of Complications: A Scientific Statement for Healthcare Professionals From the American Heart Association. Circulation. 2015 Oct 13;132(15):1435-86. Selton-Suty
9. C, Célard M, Le Moing V, et al; AEPEI Study Group. Preeminence of Staphylococcus aureus in infective endocarditis: a 1-year population-based survey. Clin Infect Dis. 2012;54(9):1230–9
10. Leone S, Ravasio V, Durante-Mangoni E, et al. Epidemiology, characteristics, and outcome of infective endocarditis in Italy: the Italian Study on Endocarditis. Infection. 2012;40(5):527–35
11. Nadji G, Rusinaru D, Rémadi JP, Jeu A, Sorel C, Tribouilloy C. Heart failure in left-sided native valve infective endocarditis: characteristics, prognosis, and results of surgical treatment. Eur J Heart Fail. 2009;11(7):668–75
12. Olmos C, Vilacosta I, Fernández C, et al. Contemporary epidemiology and prognosis of septic shock in infective endocarditis. Eur Heart J. 2013;34(26):1999–2006
13. García-Cabrera E, Fernández-Hidalgo N, Almirante B, et al. Group for the Study of Cardiovascular Infections of the Andalusian Society of Infectious DiseasesSpanish Network for Research in Infectious Diseases. Neurological complications of infective endocarditis: risk factors, outcome, and impact of cardiac surgery: a multicenter observational study. Circulation. 2013;127(23):2272–84
14. Tattevin P, Revest M, Lefort A, Michelet C, Lortholary O. Fungal endocarditis: current challenges. Int J Antimicrob Agents. 2014;44(4):290-4

15. Smego RA Jr, Ahmad H. The role of fluconazole in the treatment of Candida endocarditis: a meta-analysis. Medicine (Baltimore). 2011;90(4):237–49
16. Thuny F, Beurtheret S, Mancini J, et al. The timing of surgery influences mortality and morbidity in adults with severe complicated infective endocarditis: a propensity analysis. Eur Heart J. 2011;32(16):2027–33
17. Hoen B, Alla F, Selton-Suty C, et al; Association pour l'Etude et la Prévention de l'Endocardite Infectieuse (AEPEI) Study Group. Changing profile of infective endocarditis: results of a 1-year survey in France. JAMA. 2002;288(1):75–81
18. Hoen B, Duval X. Clinical practice. Infective endocarditis. N Engl J Med. 2013;368(15):1425–33
19. Tornos P, Iung B, Permanyer-Miralda G, et al. Infective endocarditis in Europe: lessons from the Euro heart survey. Heart. 2005;91(5):571–75
20. Robert S. Baltimore, MD, Michael Gewitz, MD, et al. Infective endocarditis in Childhood: 2015 update: A scientific statement from American Heart Association. Circulation. 2015;132(15):1487-515
21. San Román JA, López J, Vilacosta I, et al. Prognostic stratification of patients with left-sided endocarditis determined at admission. Am J Med. 2007;120(4):369.e1-7
22. Habib G, Lancellotti P, Antunes MJ, et al; ESC Scientific Document Group. 2015 ESC Guidelines for the management of infective endocarditis: The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC). Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). Eur Heart J. 2015;36(44):3075–128
23. Baddour LM, Wilson WR, Bayer AS, et al; American Heart Association Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young, Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and Stroke Council. Infective endocarditis in adults: diagnosis, antimicrobial therapy, and management of complications a scientific statement for healthcare professionals from the American Heart Association. Circulation. 2015;132(15):1435–86
24. Pettersson GB, Hussain ST, Coselli JS, et al. Current AATS guidelines on surgical treatment of infective endocarditis. Ann Cardiothorac Surg. 2019;8(6):630–44