Triple-Valve Infective Endocarditis

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A 56-year-old man with no prior history of cardiac disease presented to the emergency department with a two-week history of progressively worsening dyspnea, accompanied by chills and nocturnal sweating. On physical examination, his vital signs were within normal limits, with a blood pressure of 110/70 mmHg, heart rate of 90 beats per minute, oxygen saturation of 98%, and body temperature of 36.7 °C. Electrocardiography revealed atrial fibrillation with a variable ventricular response ranging from 70 to 100 beats per minute. Laboratory investigations demonstrated mild normocytic anemia (hemoglobin, 10.3 g/dL), normal leukocyte and neutrophil counts, and a markedly elevated C-reactive protein level (96 mg/L). Based on these findings, infective endocarditis (IE) was suspected. Three sets of blood cultures were obtained on the day of admission, and empirical antimicrobial therapy with ampicillin and ceftriaxone was initiated the following day in accordance with current clinical guidelines.

Transthoracic echocardiography (TTE) performed at admission revealed a small, mobile vegetation measuring approximately 4–5 mm attached to the anterior leaflet of the mitral valve (MV). Subsequent transesophageal echocardiography (TOE) confirmed MV involvement and demonstrated severe mitral regurgitation (grades III–IV), without evidence of leaflet perforation or perivalvular abscess formation.

At the level of the tricuspid valve (TV), TTE identified a large, highly mobile mass measuring 24.3 × 13.4 mm. Further evaluation with TOE revealed multiple TV vegetations associated with severe tricuspid regurgitation (grade IV), in the absence of leaflet perforation or abscess formation.

TOE also demonstrated involvement of the aortic valve (AV), with a small vegetation measuring approximately 5 mm. No evidence of aortic leaflet perforation, abscess formation, or other structural complications was observed.

In addition to the valvular abnormalities, a patent foramen ovale (PFO) with intermittent right-to-left shunting was identified (Figure 1a).

After 5 days, all blood cultures yielded *Streptococcus gallolyticus*, which was fully susceptible to penicillin, prompting adjustment of the antibiotic regimen. Fulfillment of two major Duke criteria—positive blood cultures for *Streptococcus gallolyticus* and echocardiographic evidence of valvular vegetations—confirmed the diagnosis of IE.[1] Given the well-established association between *Streptococcus gallolyticus* bacteremia and colorectal malignancy, a colonoscopy was performed; however, no neoplastic lesions were identified.

Although *Streptococcus gallolyticus* most commonly involves left-sided cardiac valves, this patient had a PFO with predominantly left-to-right shunting and only intermittent, likely provoked, right-to-left flow. This mechanism may have contributed to transient right-sided valvular involvement. Nevertheless, this hypothesis remains speculative, and alternative mechanisms—such as embolization from left-sided vegetations or transient bacteremia—cannot be excluded.

Given the involvement of three cardiac valves, surgical intervention was indicated. The patient underwent MV replacement with a 33 mm St. Jude Medical Masters mechanical prosthesis, TV replacement with a 24 mm Medtronic Advanced Technology Surgery mechanical prosthesis, excision of vegetation from the non-coronary cusp of the AV, and closure of the PFO (Figures 1b, c). The AV was repaired rather than replaced to preserve native valve function and minimize prosthetic burden.

Postoperatively, the patient recovered without evidence of organ dysfunction and experienced marked symptomatic improvement. He was discharged on postoperative day 21 and remained in excellent clinical condition at the 2-month follow-up.

Triple-valve endocarditis is exceptionally rare, accounting for approximately 0.2–0.4% of cases of native valve IE.[2,3] Owing to its low prevalence, current treatment strategies are largely based on evidence derived from case reports and small case series. The most frequently reported causative pathogens include *Staphylococcus aureus* and *Streptococcus* species, reflecting the microbial profile observed in

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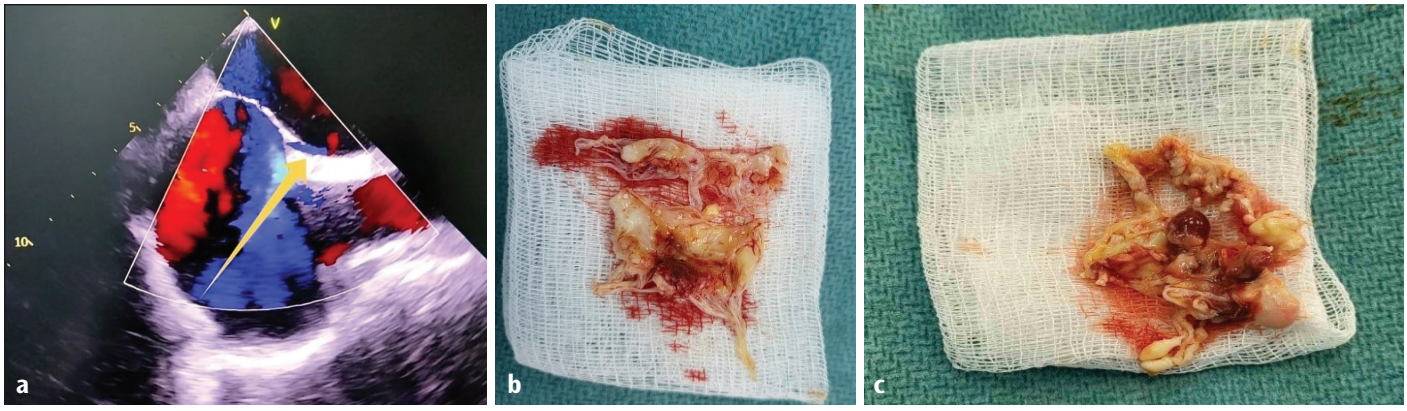

FIG. 1. (a) Transesophageal echocardiography demonstrating a patent foramen ovale with left-to-right shunting; (b) intraoperative view of mitral valve vegetation; (c) intraoperative view of tricuspid valve vegetation.

single-valve IE. Reported risk factors include intravenous drug use, repeated prosthetic valve interventions, chronic hemodialysis, immunosuppression, and congenital cardiac abnormalities, such as a PFO.

Mortality rates among patients with triple-valve involvement are higher than those observed in patients with one or two affected valves (21% vs. 18%), with congestive heart failure (64%) and acute renal failure (50%) being the most commonly reported complications.[4] In a review of 15 cases of triple-valve IE, Kadado et al.[5] reported that 90% of patients required surgical replacement of all affected valves.

Multivalvular IE is a rare condition associated with high morbidity and mortality and requires prompt diagnosis and coordinated multidisciplinary management. Early, individualized treatment combining appropriate antimicrobial therapy with timely surgical intervention reduces complications and improves survival.[6] This case underscores the importance of systematic evaluation to identify all involved valves, the central role of comprehensive echocardiographic assessment using TTE and TOE in guiding clinical management, and the need for gastrointestinal evaluation in patients with *Streptococcus gallolyticus* bacteremia, even when initial investigations are negative.

Informed Consent: Written informed consent for the publication of this case and the associated images was obtained from the patient.

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