

# A multifaceted prosthetic valve infective endocarditis

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## SOUHRN

Infekční endokarditida představuje významný problém veřejného zdraví s vysokou mortalitou a morbiditou. Do nemocnice byl s bolestí na hrudi dopraven 79letý muž po implantaci umělé aortální chlopně. Elektrokar-diogram prokázal **přední infarkt myokardu s elevací úseku ST**. Urgentní koronarografie odhalila kritickou stenózu přední sestupné větve levé koronární tepny, která byla řešena angioplastikou a implantací lékového stentu. Transtorakální a transezofageální echokardiografie prokázala nozokomiální endokarditidu na bio-logické aortální chlopni a významný periprotetický absces. Kultivací krevních vzorků byla zjištěna přítom-nost multirezistentní bakterie *Staphylococcus haemolyticus*. Po opakovaném transezofageálním vyšetření se pacient rozhodl – přes doporučení chirurgů – pro zahájení léčby antibiotiky během pobytu v nemocnici a v domácí péči. Tato kazuistika popisuje vzácný případ úspěšné konzervativní léčby řešící paravalvulární absces jako situaci obvykle vyžadující chirurgickou intervenci. Tento vynikající výsledek dokládá možnost ne-chirurgického řešení ve vybraných případech. Během sledování zůstává pacient v dobrém zdravotním stavu, což podtrhuje význam multidisciplinární péče a důsledného monitorování.

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## ABSTRACT

Infective endocarditis is a significant public health challenge, with high mortality and morbidity. A 79-year-old man, post-aortic bioprosthetic implantation, presented with chest pain. An electrocardiogram indicated anterior ST-elevation myocardial infarction. Urgent coronary angiography showed critical left anterior descending artery stenosis, treated with angioplasty and a drug-eluting stent. Transthoracic and transesophageal echocardiograms revealed nosocomial endocarditis on the aortic bioprosthetic and a significant peri-prosthetic abscess. Blood cultures identified multidrug-resistant *Staphylococcus haemolyticus*. Despite surgical recommendations, the patient opted for intra-hospital antibiotic therapy and home care after repeated transesophageal echocardiograms. Remarkably, this case underscores the rare and significant success of conservative therapy in resolving a paravalvular abscess, a condition typically necessitating surgical intervention. This extraordinary outcome highlights the potential for non-surgical management in selected cases. The patient remains in good health upon follow-up, emphasizing the importance of multidisciplinary care and vigilant monitoring.

### Keywords:

Acute myocardial infarction

Infectious endocarditis

Inflammatory state

Outpatient parental antimicrobial therapy

Transesophageal echocardiography

## Introduction

The pervasiveness of infective endocarditis (IE) underscores its substantial impact on public health, marked by considerable mortality and morbidity.<sup>1</sup> These trends find explanation in the overarching demographic shift towards an aging population, augmented utilization of valvular prostheses – encompassing percutaneous interventions – and the widespread deployment of implantable devices and central venous catheters.<sup>2</sup> Furthermore, the escalating challenge

of antibiotic resistance contributes significantly to the complexity of managing this condition. Currently, a global incidence of IE is approximately 13.8 cases per 100,000 individuals, with more 66 000 fatalities.<sup>3</sup> The complications of endocarditis can be local, such as abscess formation or fistula, often necessitating cardiac surgery, or they can include arrhythmic complications. Endocarditis can lead to systemic embolization, particularly affecting the brain and spleen. Notably, aortic valve endocarditis can embolize into the coronary vessels, resulting in ischemia.

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## Case presentation

A 79-year-old male presented to the Emergency Department (ED) with nocturnal-onset chest pain, complicated by hemodynamic compromise: non-invasive blood pressure was 80/50 mmHg, heart rate was 150 bpm, and oxygen saturation was 85% in room air. Three months prior, he underwent aortic bioprosthesis (Intuity 23) implantation for severe aortic stenosis. Pre-intervention coronary angiography revealed diffuse atheromatous plaques without significant stenosis. His medical history included paroxysmal atrial fibrillation, hypertension, and chronic obstructive pulmonary disease. The electrocardiogram depicted high ventricular response atrial fibrillation with ST segment elevation from  $V_1$  to  $V_5$  and reciprocal ST depression in inferior leads (Fig. 1). Arterial blood gas analysis revealed pH 7.25 and lactate 6 mmol/L. Prompt initiation of inotropic therapy and ventilatory support occurred, activating the catheterization lab. Coronary angiography unveiled a 90% stenosis of the mid-left anterior descending artery (Fig. 2), treated with angio-

plasty and coronary stent placement. Transthoracic echocardiography showed global left ventricular hypokinesia (ejection fraction [EF] 50%) linked to apical akinesia and aortic bioprosthesis with thickened leaflets suggestive of multiple vegetations. Transesophageal echocardiography (TOE) confirmed nosocomial IE, complicated by mild-to-moderate stenosis and a large abscess peri-prosthetic (Fig. 3A and 3B). The abscess was confirmed on contrast-enhanced computed tomography (Fig. 4). Extensive patient interrogation revealed the onset of evening fever, weight loss, and general malaise over the past two weeks. The suspicion of nosocomial endocarditis on the aortic bioprosthesis was confirmed. The atherosclerotic plaque on the anterior interventricular branch increased in size, leading to a reduction in downstream flow. Together with the elevated heart rate and septic state, this resulted in the onset of a mixed cardiogenic and septic shock. A possible hypothesis is that the local and systemic inflammatory state induced by endocarditis may have contributed to the plaque rupture/erosion and shock state with low blood pressure, atrial fibrillation with high

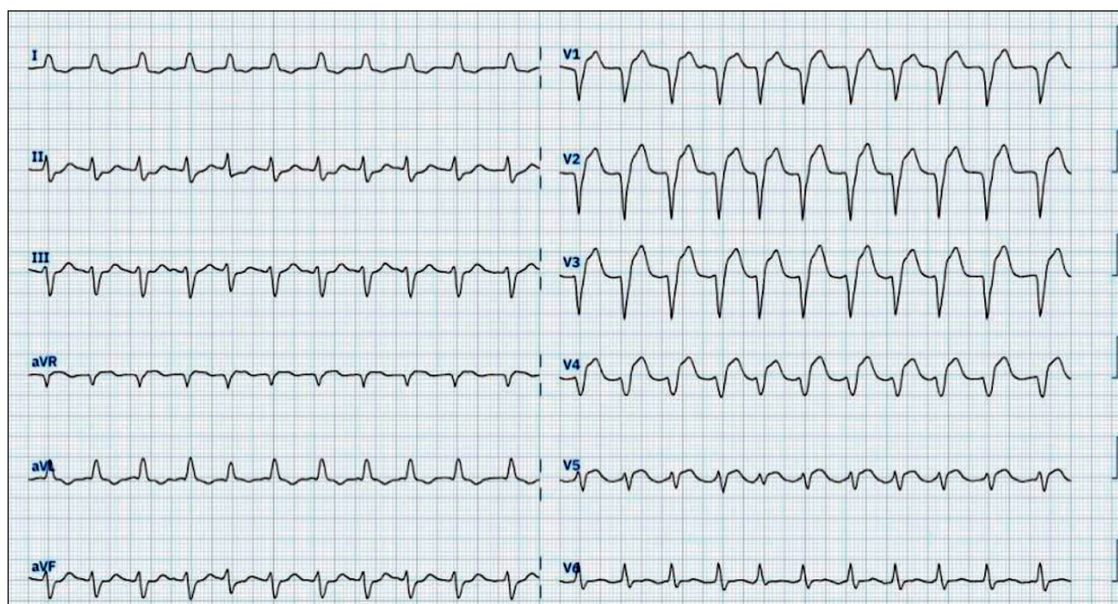


Fig. 1 – Electrocardiogram showing evidence of acute coronary syndrome with elevation of the anterior ST segment.

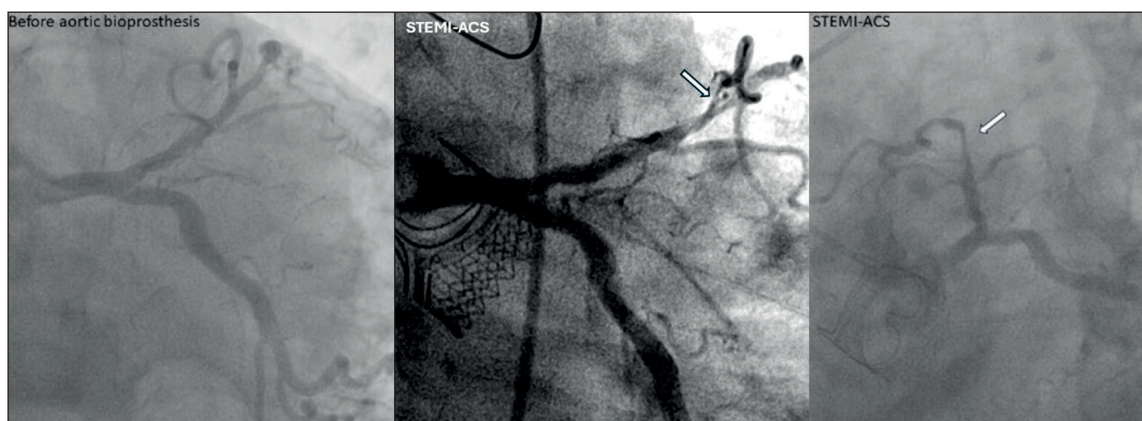


Fig. 2 – The two coronary angiographies compared.



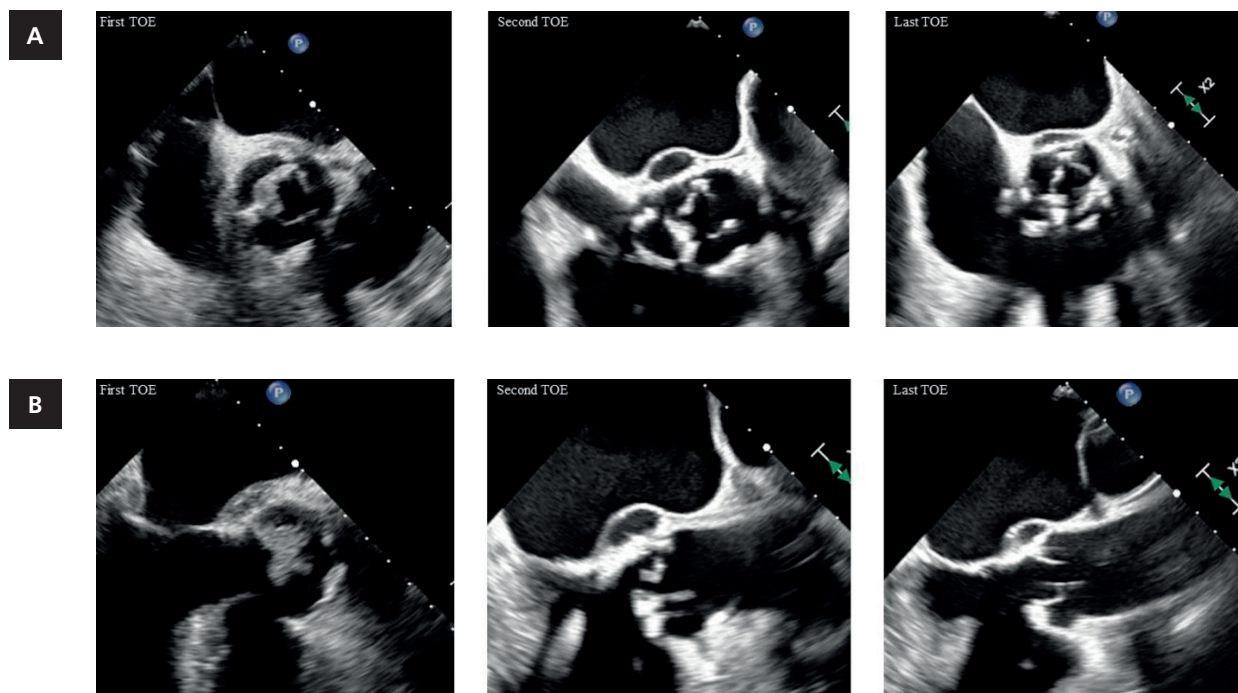


Fig. 3 – (A) Comparative transesophageal images: 45° aortic valve short-axis. (B) Comparative transesophageal images: 120° aortic valve long-axis.

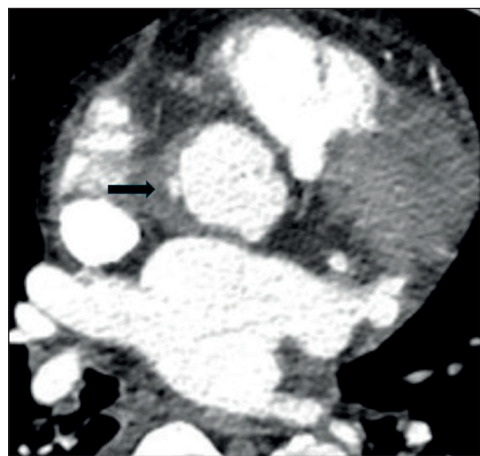


Fig. 4 – Abscess formation (arrow) on cardiac computed tomography in axial projection.

ventricular response could contribute to acute coronary syndrome. Blood cultures identified multidrug-resistant *Staphylococcus haemolyticus*, and meropenem was initiated as antibiotic therapy. Despite the recommendation for cardiac surgery, the patient and his family opted against it due to the high operative risk. Follow-up TOE, after approximately six weeks of intravenous antibiotic therapy, showed reduced vegetations on the bioprosthetic valve leaflets and partial resolution of abscess (Fig. 3A and 3B). With hemodynamic stability achieved, the patient was discharged home while continuing intravenous antibiotic therapy with Dalbavancina, under the outpatient parenteral antimicrobial therapy (OPAT) protocol. At the one-month post-discharge follow-up, the patient re-

mained asymptomatic and hemodynamically stable, and a new TOE demonstrated normally mobile bioprosthetic valve leaflets without vegetations and a reduced abscess without paravalvular regurgitation (Fig. 3A and 3B).

## Discussion

In synthesizing these clinical and epidemiological insights, our case report underscores the multifaceted nature of IE, accentuating the need for a holistic and individualized approach to its prevention, diagnosis, and management. IE poses a dual threat to coronary health, with embolic events and inflammatory processes contributing to the intricate relationship between inflammation and myocardial infarction. The embolization of endocardial vegetations into the coronary lumen, albeit rare, is the most recognized cause of myocardial infarction in infective endocarditis.<sup>4</sup> However, the systemic and local inflammatory state due to IE can play a significant pro-atherosclerotic role.<sup>5</sup> Chronic inflammation, characterized by dysfunctional immune responses, destabilize atherosclerotic plaques to their rupture and subsequent myocardial infarction. The inflammation contributes to the formation of coronary thrombi, thereby increasing the risk of acute coronary syndromes. Conditions characterized by pro-inflammatory states have consistently been linked to a higher risk of atherosclerosis. The intricate interplay between inflammation, atherosclerosis, and their impact on coronary health is emphasized by the recognition that inflammatory immune-mediated disorders, such as rheumatic diseases, inflammatory bowel diseases, rheumatoid arthritis, and systemic lupus erythematosus are closely associated with acute cardiovascular events indepen-

dently of traditional cardiovascular risk factors.<sup>6,7</sup> Indeed, patients affected by rheumatoid arthritis undergoing treatment with anti-inflammatory medications exhibit a lower incidence of acute coronary syndrome compared to those not utilizing such medications.<sup>8</sup> The dangerousness of untreated inflammation has recently been confirmed in patients with ischemic heart disease under optimized medical therapy.<sup>9,10</sup> The recent guidelines from the European Society of Cardiology have recommended an anti-inflammatory treatment in these patients.<sup>11</sup> In our case, pre-implantation coronary angiography revealed extensive atheromatosis. In our case, extensive atheromatosis was observed during pre-implantation coronary angiography. Given the patient's ongoing and highly effective statin therapy, it's improbable that this atheromatous condition would have deteriorated significantly within a mere three months without additional external factors. Therefore, the inflammatory state accelerated the atherosclerotic process, ultimately culminating in plaque rupture. Another challenging aspect of the patient's condition was the extent of perivalvular disease, marked by the formation of extensive abscess cavities, which warranted consideration for cardiothoracic surgical intervention. Nosocomial endocarditis is often highly destructive, exhibiting a diverse course depending on the pathogenicity of the involved microorganism. In this case, the course was subacute, as evidenced by positive blood cultures for coagulase-negative staphylococci (CoNS). Given the patient's refusal of surgery, a two-phase antibiotic therapy, proved successful in eradicating the infection. Notably, the infection resolved without causing dysfunction of the aortic bioprosthesis. While the OPAT protocol is typically reserved for stable patients without extensive disease,<sup>2</sup> the decision to continue antibiotic therapy at home was made after weeks of antibiotic treatment and improvement seen on a follow-up TOE. This choice proved judicious, impacting both hospitalization costs and the patient's overall well-being positively. The conservative antibiotic strategy resulted in the resolution of the paravalvular abscess, representing one of the few cases documented in the literature with a long-term follow-up demonstrating the patient's clinical well-being.

## Conclusion

In conclusion, IE not only causes coronary embolic events but also profoundly influences coronary atherosclerosis through its inflammatory state. These mechanisms should be better understood to provide new therapeutic options. The conservative antibiotic therapy resolved the paravalvular complication, an exceedingly rare event in clinical practice. Furthermore, the management of endocarditis

and its complications always requires a multidisciplinary effort.

## Conflict of interest

The authors declare they have no competing interests.

## Funding

None to declare.

## Ethical statement

Due to the nature of this report, ethical approval was not applicable.

## Informed consent

The patient has given his consent for the use of his medical data.

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