

## Perivalvular Abscess in Prosthetic Aortic Valve Endocarditis: Case Report and Short View

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### ABSTRACT

The perivalvular cardiac abscess is a severe condition associated with infective endocarditis, leading to significant morbidity and mortality if not diagnosed and managed adequately. The incidence of perivalvular abscess among patients with infective endocarditis is between 30% to 40%, with the aortic valve having a higher predisposition than the mitral valve and annulus. It appears to occur more often in prosthetic valve endocarditis than in native valve endocarditis, and the most common pathogen isolated is *Staphylococcus aureus*. Surgical treatment is usually the final treatment but the time of intervention is of high importance to get the best results. Perivalvular abscess often necessitates complex surgical techniques that remain always a challenge related to anatomical surprises that can be found in situ.

We describe a case with prosthetic valve endocarditis (PVE) of mechanical aortic valve with non coronary sinus perivalvular abscess and vegetations around 1.2cm, complicated with severe regurgitation, due to paravalvular leakage in a patient who underwent aortic valve replacement 25 years ago. The bacterial strain isolated is *S.Aureus* non MRSA. A small subaortic ventricular septal defect was found during examination of the outflow tract of left ventricle. Furthermore, we are also taking a short view of literature related to the choice of surgical strategy and management of this entity of patients.

**Conclusion:** Aortic valve endocarditis with perivalvular abscess formation remains a therapeutic challenge and surgical treatment is a gold corner. The surgical technique chosen is always challenging because of the tissue destruction and the necessity of anatomic aortic root reconstruction. The time of intervention should be evaluated carefully according to every patient.

**Keywords:** Infective endocarditis (IE); Prosthetic valve endocarditis (PVE); Perivalvular abscess

### Introduction

Infective endocarditis involving the left side valves of the heart remains a serious medical problem, with substantial

morbidity and mortality. Its incidence has been reported from 1.7 cases<sup>1</sup> to 6.2 cases<sup>2</sup> per 100 000 person-years, the risk increasing significantly with advancing age.

Prosthetic Valve Endocarditis (PVE) is a microbial infection that occurs on parts of a prosthetic valve and accounts for 20% of infective endocarditis. It occurs in up to 6% of patients who have valve prosthesis. The incidence of perivalvular abscess among patients with infective endocarditis is between 30% to 40%. It is the most severe form of infective endocarditis and is associated with high morbidity and mortality. The early diagnosis and initiation of treatment improves outcome and decreases complications and mortality.

The perivalvular cardiac abscess is a severe complication of infective endocarditis, with a significant morbidity and mortality.

We present a case with perivalvular abscess and vegetations around 1.2cm in PVE of mechanical aortic valve complicated also with central regurgitation and important paravalvular leak, in a patient who underwent aortic valve replacement 25 years ago. The management of this patient was a challenge due to comorbidities and severe clinical presentation that precluded urgent surgical intervention.

**Case Presentation**

A 50-year-old man B.M presented to emergency department, because of more than 10 days history of recurrent fever, chest pain, productive cough, headache, myalgias, arthralgias.

The patient reported aortic valve replacement 25 years ago and significant medical history of Chronic Kidney Disease (CKD), history of Mellitus Diabetes type II, Arterial Hypertension st II , Heart Failure NYHA II, Secondary Anemia.

On presentation to the emergency department, he went through a physical examination and were detected Osler nodes, Janeway lesions and subungual hemorrhages, characteristic findings in infective endocarditis.

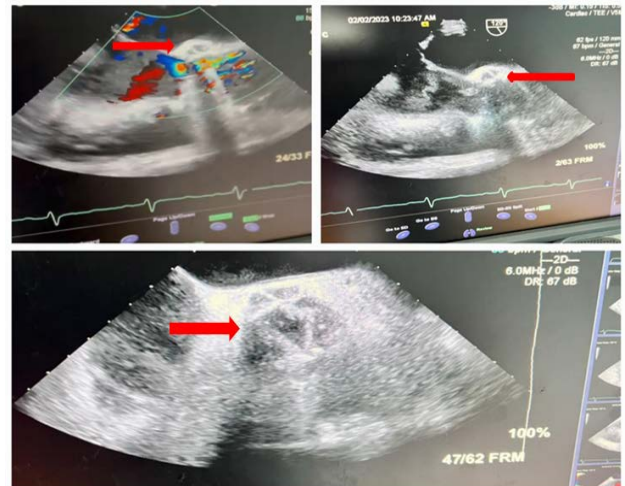


**Figure 1:** Red arrows-Osler Nodes; Yellow arrows-Janeway lesions; Green arrows-subungual hemorrhages.

His vital signs on admission were as follows: Heart rate (HR): 100-115 beats/min blood pressure (BP): 160-60 mmHg; pulse oximetry (SPO2): 90% in 5L O2; temperature:39,5°C, bilateral bronchial rales; peripheral edema.

Laboratory investigations show elevated blood cell count with leukocytosis (26700/mm3) and deviation to the left; neutrophils 77%; Hemoglobin 9.8 g/L; high C reactive protein (27.2 mg/L-<0.5mg/dl. The COVID-19 throat swabs PCR result was negative.

Computed tomography scan of thorax, abdomen, and pelvis did not show any source of infection. A trans-thoracic echocardiogram showed mild aortic regurgitation and mitral regurgitation with no clear vegetation, however, trans-esophageal echocardiogram (TEE) showed reduced left ventricular function with moderate central aortic regurgitation. Hypoechoic mass along the aortic side of the mechanical aortic valve was noted. Important paravalvular leak and non-coronary sinus abscess was suspected (**Figure 2**).

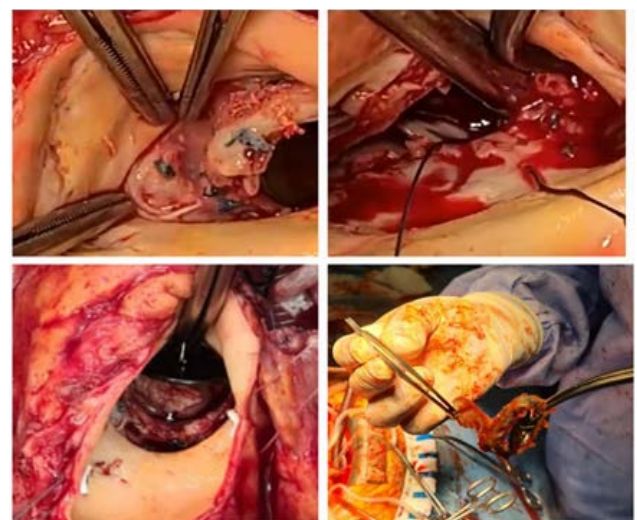


**Figure 2:** Transesophageal echocardiography findings Red arrows-abscess.

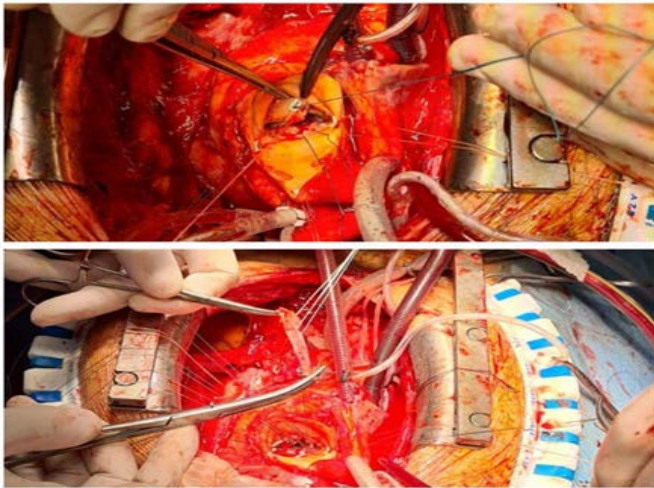
Blood cultures on admission grew Staphylococcus aureus non-MRSA (VITEK –MS and VITEK-2 Compact. Therefore, the patient was started intravenous antibiotics: Ceftriaxone 2.0g 12hourly, Levofloxacin 500mg 24 hourly , Vancomycin 1.0g 12 hourly, Flagyl 500mg 12 hourly according the antibiogram.

The patient was transferred to Cardiac Surgery Department after 5 days of and underwent the intervention: Mechanical aortic valve replacement with SJM Regent valve nr.21.

The intervention was performed under general anesthesia, through the median sternotomy, under cardiopulmonary by-pass through aorto-bicaval cannulation. Locally we found aortic annular abscess that involved more than half of annulus circumference starting from middle of noncoronary annulus ,involving all left annulus and through the left-right commissure ended near the middle of right coronary annulus. Demonstrated in the following picture (**Figure 3**).



**Figure 3:** Periannular abscess, prosthetic dehiscence and vegetations.



**Figure 4:** Surgical Technique.

Reconstruction of aortic annulus with pericardial and synthetic patch was necessary together with aorto-mitral continuity. We found casually a small subaortic VSD which was closed with two ticon 2/0 sutures with pledged (**Figure 4**). Postoperative trans-thoracic echocardiogram showed normo-functional mechanical aortic valve with mean gradient of 9mmHg.

The patient did good post operative course and followed the protocol under antibiotic regimen.

## Discussion

Perivalvular abscess is the second most common finding in IE, and along with its complications such as pseudoaneurysm and fistula formation, is urgent indication of surgical intervention because of increased mortality rate<sup>3</sup>.

Murdoch et al. looked at the presentation, etiology and estimated the patient incidence of infective endocarditis at about 15%. In regards to prosthetic tissue or prosthetic valves, the infection tends to be entirely peri-annular, extends to the myocardium, and results in paravalvular abscesses from dehiscence of the valve. The incidence of perivalvular abscess among patients with infective endocarditis is between 30% to 40%, with the aortic valve having a higher predisposition than the mitral valve and annulus. Native aortic valve endocarditis, usually located in a weak part of the annulus near the atrioventricular node (AV), clearly demonstrates the anatomic predisposition and exemplifies why abscesses and heart block presents as frequent sequelae. Additionally, the severe extension of perivalvular infection can also result in extrinsic coronary compression, or disruption, leading to an acute coronary syndrome<sup>4</sup>.

Echocardiography is pivotal in diagnosing cardiac abscess or IE by enabling vegetation detection, assessment of valvular damage, evaluation of resulting hemodynamic abnormalities, and observation of associated complications. Statistical analyses indicate that transthoracic echocardiography has a sensitivity of 60% to 75% for vegetation detection, whereas transesophageal echocardiography has a sensitivity exceeding 95%<sup>5</sup>. In echocardiography, abscess typically presents as hypoechoic area in perivalvular zone without detectable blood flow inside<sup>6</sup>. CT finding of a markedly thickened area around the aortic root is indicative of an aortic root abscess, and may show good relation to TEE and pathologic findings<sup>7</sup>.

The most common cardiac complication of PVE is heart failure. This can result from prosthetic valve dehiscence, which leads to valvular insufficiency, or myocardial infarction from emboli. Other cardiac complications are perivalvular abscess formation, intracardiac fistula, and pericarditis. Non-cardiac complications are usually a result of an embolic event, metastatic abscess formation, or a mycotic aneurysm. The incidence of embolic events ranges from approximately 15% to 35% and can occur one to two years after the abscess resolution<sup>8</sup>.

Although the biggest discussion in management of perivalvular abscess stays in when and what to do to reach the best outcomes?!

## What?

In treating intracardiac abscesses, it is vital to provide appropriate antibiotic therapy as soon as possible. Blood cultures should be acquired to identify the pathogenic bacteria and assist antibiotic selection. Until culture results are available, empirical antibiotic medication should be started to address a wide range of potential infections. The surgical method chosen is determined by factors such as the size and location of the abscess. The high inpatient mortality rates (12% to 24%) for peri-annular abscesses, irrespective of the surgical technique<sup>4</sup>.

It has been shown that endocarditis caused by *Staphylococcus aureus* and other virulent microorganisms on valves in the left side of the heart are best treated with early surgery.

The surgical principle of radical resection of all infected or even suspiciously infected edematous tissues. The complexity of the operations ranged from resection of part of the valve annulus and surrounding tissues with reconstruction with a patch to radical removal of the base of the heart including the entire aortic root, the intervalvular fibrous body, the posterior mitral annulus and part of the interventricular septum and atrial walls.

Various surgical techniques are used to treat complicated aortic valve endocarditis: patch, prosthesis, homograft. It is difficult to compare clinical outcomes of such complex operations such as surgical treatment of endocarditis with paravalvular abscess from different institutions. However, based on the reports by<sup>9,10</sup> is likely that the risk of recurrent endocarditis is reduced by the use of aortic valve homograft in these patients, but the long-term survival is influenced by numerous factors and the type of valve is certainly not the most important one. Guidelines support the use of both homografts and stentless bioprostheses in aortic valve endocarditis with paravalvular abscess formation. The choice between these approaches is currently based on the extent of infection, surgeon or institutional preference and demographic factors.

## When?

The operative mortality rate for the surgical treatment of aortic root abscess varies from 3.9% to 25%<sup>11</sup>. Early intervention, not emergent, for IE is known to have better outcomes and this reason leads surgeons to early operation if life-threatening sequelae do not develop. Emergent surgery has a higher mortality rate than does early and elective surgery (14.3% vs 9.3%)<sup>11</sup>. Studies have shown that early (delayed-urgent) surgery has better outcomes than emergent surgery. Our strategy is to undertake aortic root surgery after stabilizing the patient's infection, hemodynamics and general status. However, some patients with periannular extension of infection or myocardial abscess could potentially

be treated without surgical intervention<sup>11</sup>. These patients include: Patients with small (less than 1 cm) abscesses, patients who do not have complications of heart block, an echocardiographic progression of abscess during antibiotic therapy, patients who do not have valvular dehiscence or insufficiency. We should also mention that the outcomes of prosthetic valve endocarditis are worse than that those of native valve endocarditis. The operative mortality is higher than in native valve endocarditis and the long-term survival is not as good. David and colleagues reported that the early and late outcomes of PVE were worse than those of NVE, because PVE's frequent association with paravalvular abscess made the surgical reconstruction more complex. It is important for cardiovascular surgeons to be aware that these complicated reconstructive procedures have higher mortality and morbidity rates than does simple valve replacement for active IE<sup>11</sup>.

## Conclusion

Perivalvular abscess can be manifested with severe complications and requires early complex reconstructive surgery. Surgical intervention should be tailored to the patient's specific situation.

**Conflicts of interest:** The authors declare that there is no conflict of interest regarding the publication of this article.

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