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AORTO-RIGHT ATRIAL AND AORTO-RIGHT VENTRICULAR FISTULAS AS A COMPLICATION OF SUBACUTE INFECTIVE ENDOCARDITIS

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ABSTRACT

Aorto-atrial fistula (AAF) and aorto-ventricular fistula (AVF) are a rare, but potentially life-threatening condition, where an anomalous connection forms between the aortic structures and the cardiac atria or ventricles. The exact incidence of this condition is unknown, as are the major precipitating factors and best treatment options. It may be congenital, secondary to conditions such as aortic dissection, infective endocarditis, or valve replacement, or iatrogenic in nature. In the case reported here a 72-year-old male who was found to have an infective endocarditis complicated by right AAF and AVF. This case illustrates the important role of transesophageal echocardiography in the evaluation of a patient with subacute infective endocarditis with a very rare complication.

KEYWORDS

Infective endocarditis, aorto-right atrial fistula, aorto-right ventricular fistula

LEARNING POINTS

- Aortic fistulas are a rare, potentially fatal, complications of subacute infective endocarditis.
- Early recognition is greatly assisted by transesophageal echocardiography.

INTRODUCTION

Infective endocarditis is a spectrum of diseases that results in infection of internal structures of the heart. It may be caused by a variety of organisms requiring expeditious recognition and aggressive management. The inflammatory processes involved in this disease, together with bacterial destruction of tissue, can weaken the integrity of the aortic and atrial or ventricular walls and hence increase vulnerability to fistula formation[1]. The incidence of aorto-atrial fistula (AAF) in the setting of endocarditis ranges from 1.6% in patients with native valves up to 5.8% in patients with a prosthetic valve[2]. Patients who develop AAF present with signs and symptoms

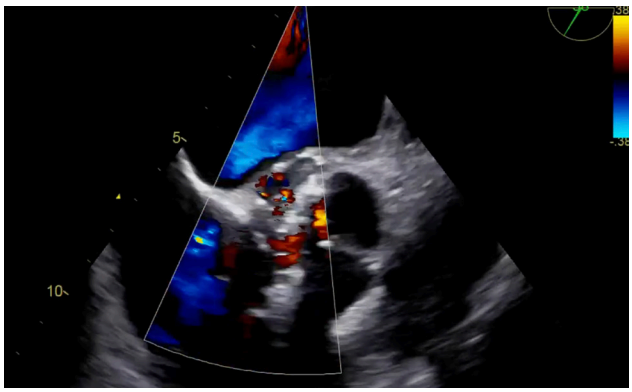
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pertaining to the underlying cause, the most common being dyspnea, fever, weakness and chest pain. If not detected, AAF may lead to cardiac overload and eventual death. Diagnosis relies heavily on clinical suspicion and imaging modalities. AAFs are best visualized with echocardiography transthoracic (TTE) or transesophageal (TEE). Ultimately, a timely diagnosis and expeditious treatment are imperative to avoid mortality[3].

CASE DESCRIPTION

We report the case of a 72-year-old man without a history of cardiovascular disease, who presented with symptoms of worsening dyspnea, dizziness and fatigue. He reported an insidious onset of these symptoms about 1 month previously. On physical examination there was a grade V/VI systolic-diastolic murmur in the aortic area with irradiation in the entire precordial area, and an Austin-Flint type murmur in the mitral area TTE showed moderate aortic valve regurgitation secondary to an abscess, severe mitral valve regurgitation with a central jet with a small hyperechoic formation attached to the anterior mitral valve. Three sets of blood cultures had a positive result for *Streptococcus gordonii*. Antibiotic treatment was initiated according to the antibiogram. TEE showed a dilated and hypertrophic left ventricle (LV) with preserved ejection fraction, dilated left and right atrium, reshaped mitral valve with grade IV regurgitation (2 jets, one towards the anterior cusp with A1-A2 perforation and one in the eccentric ripening area towards the side wall with the Coanda effect); aortic valve: 3 intensely rearranged cusps with perforated right coronary cusp, fistulized abscess towards the right atrium



Video 1. Doppler transesophageal echocardiography shows that the aortic annular area at the near side of the left atrium is enlarged and has a hypoechogenic structure inside (abscess). https://youtu.be/ovuJVtixbFA

(RA) and right ventricle (RV) *(Video 1)*, and probably a small perimembranous ventricular septal defect with probable LV-RV communication *(Fig.1)*.

After 51 days of specific antibiotic treatment, followed by negative blood cultures and the absence of inflammatory syndrome, surgical intervention was proposed. A biological prosthesis was mounted at the level of the aortic valve. Fistulous tracts that communicated with RA and RV were closed with a patch. An incision was made at the level of the RV with patch wires, followed by ventriculography. Excision of the native mitral valve was also performed, and a biological prosthesis was mounted.

Postoperative TEE revealed normo-functional biological prostheses without paraprosthetic leaks and without communications. The patient presented complete

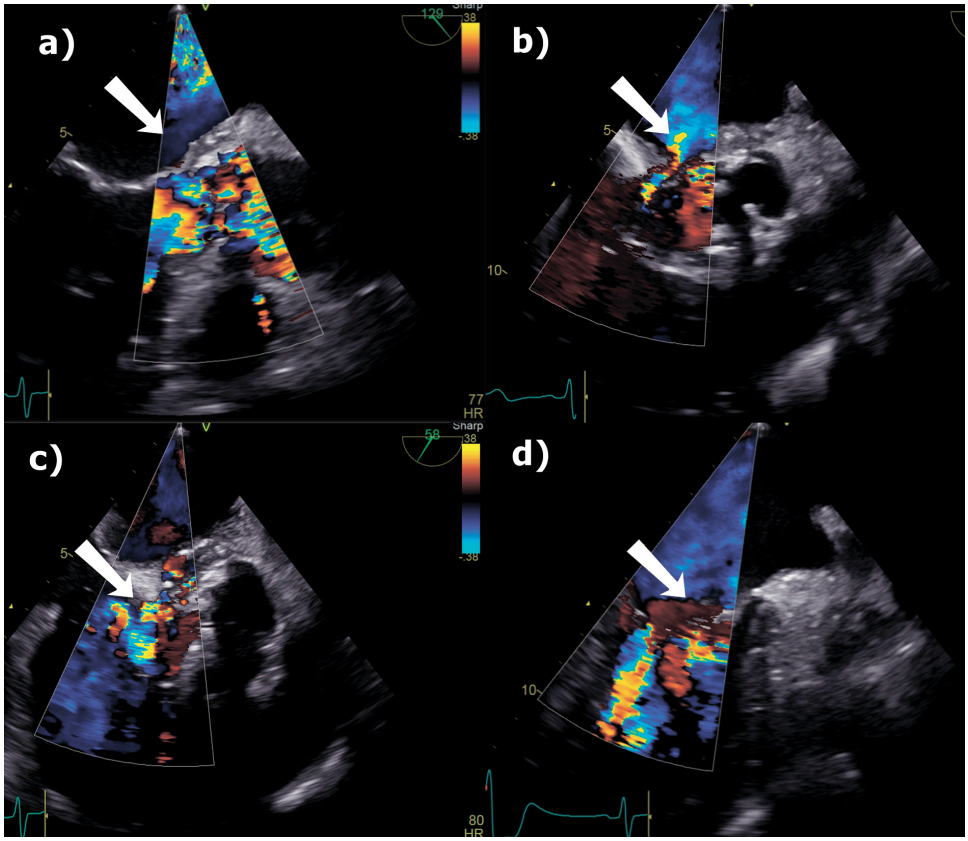


Figure 1. A) Transesophageal echocardiography (TEE) images a two-dimensional TEE revealed severe aortic regurgitation (white arrow) and the B) abscess DopplerTEE confirmed presence of aortic-right atrium fistulized abscess (white arrow); C) DopplerTEE showed aortic-right ventricule fistula (white arrow) and D) severe mitral regurgitation (white arrow).

postoperative atrioventricular block persistent at 7 days for which a bicameral pacemaker was implanted. The patient made a slow recovery and after a 4-week hospital stay he was discharged home. At the 6-month follow-up he was in good clinical condition.

DISCUSSION

The diagnosis of patients with AAF and AVF can be challenging depending on the size of the shunt. It requires a high degree of clinical suspicion in patients with sudden onset of congestive heart failure symptoms who have a recent history of an invasive or surgical cardiac procedure. In our patient, clinical symptoms such as a systolic-diastolic murmur on auscultation of the aortic valve can arouse suspicion of potential complications of infective endocarditis. The limitation of TTE is its inability to characterize early abscesses when their densities are similar to those of the surrounding tissues[3]. With a low sensitivity of detection, TTE is able to detect fistulous tracts in 50% of cases. However, when combined with TEE, detection rates increase to 97%, due to the high pressure differences across the aorta and atria and the anatomical positions of the atria and esophagus, leading to easily detectable fistula flow by use of continuous doppler monitoring[4]. Thus, TEE provides a higher sensitivity and specificity and is the gold-standard for diagnosis of AAF and AVF[3]. Our case demonstrates the greater effectiveness of TEE compared to TTE, considering that all diagnoses were confirmed intraoperatively. The management of the AAF is dependent on the underlying cardiac condition and suspected cause of fistula formation.

Due to the low incidence of AAF, no clinical trials have been performed in these patients and treatment strategies are based on expert opinion and consensus amongst the treating physicians[5]. Correction of an AAF is strongly recommended when the AAF is not trivial. Uncorrected AAF may continue to impose a risk of progression to overt heart failure. Options may include percutaneous closure, minimally invasive surgery, or thoracotomy. The surgical approach to close the fistula often entails suturing or the use of a patch. Percutaneous closure of AAF has been employed more often in the last few years[6]. Given that the majority of information regarding AAF is from case reports, it is difficult to accurately gauge the treatments success rates or mortality rates. Overall treatment success rates are at least 70% with a mortality rate of around 15%[7]. Small asymptomatic aorto-atrial fistulas can sometimes be managed pharmacologically, by reduction of cardiac afterload and the use of diuretics. Conservative management should involve close monitoring of the patient and if his/her clinical condition deteriorates, active closure of the fistula should be reconsidered. Clinicians should always keep in mind that even asymptomatic and small AAF have a tendency to worsen over time, with subsequent higher surgical risk when patients become symptomatic. In the case of our patient due to the presence of both fistulas associated with severe aortic and mitral regurgitation, surgical treatment was inevitable.

CONCLUSION

AAF and AVF in the setting of infective endocarditis remain rare but potentially life-threatening complications. Prompt diagnosis using advanced imaging techniques, particularly TEE, is critical for successful identification and management. The case presented illustrates the complexity of diagnosing and the importance of timely, individualized treatment approaches in managing AAF to improve patient outcomes.

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