



Creation of Aorto-Right Ventricular Fistula After Valve Deployment in TAVR: A Case Report

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INTRODUCTION

- Cardiac fistulas are a rare but significant complication of transcatheter aortic valve replacement (TAVR). Injury to the the aortic root or annulus during valve deployment can result in an aorto-right ventricular fistula, a pathologic connection between the aorta and the right ventricle (RV).
- Left-to-right shunting between high-pressure aorta and lower pressure right ventricle presents risks for RV overload, pulmonary hypertension, and ultimately heart failure.
- These risks highlight the importance of early recognition, careful anesthetic planning, and coordinated intervention.

CASE DESCRIPTION

- An 81-year-old man with mildly reduced ejection fraction (45%) and moderate-severe aortic stenosis (mean gradient 18.6 mmHg, aortic valve area 0.87 cm²) underwent a transesophageal echocardiography (TEE) guided TAVR (Figure 1).
- To optimize hemodynamics in the setting of aortic stenosis, arterial pressure was monitored. Patient induced with a combination of etomidate and propofol; placed on a phenylephrine drip.
- Following valve deployment (Figure 2), the valve was interrogated by TEE which showed no sign of leak (Figure 3). TEE visualized a small aorto-right ventricular fistula (Figure 4).
- Patient remained hemodynamically stable. He was extubated with a plan for follow-up cardiac CT and cardiothoracic surgery consult.
- Cardiac CT confirmed presence of a small fistulous communication between the aortic root and RV outflow tract above the right-oriented prosthetic cusp due to erosion from the upper edge of TAVR struts.
- The following day, patient was taken back for aortic root repair and fistula closure. The pre- aortic root repair TEE visualized the fistula proximal to the coronary ostia with a left-to-right flow; post-repair TEE no longer demonstrated the fistula.

IMAGING

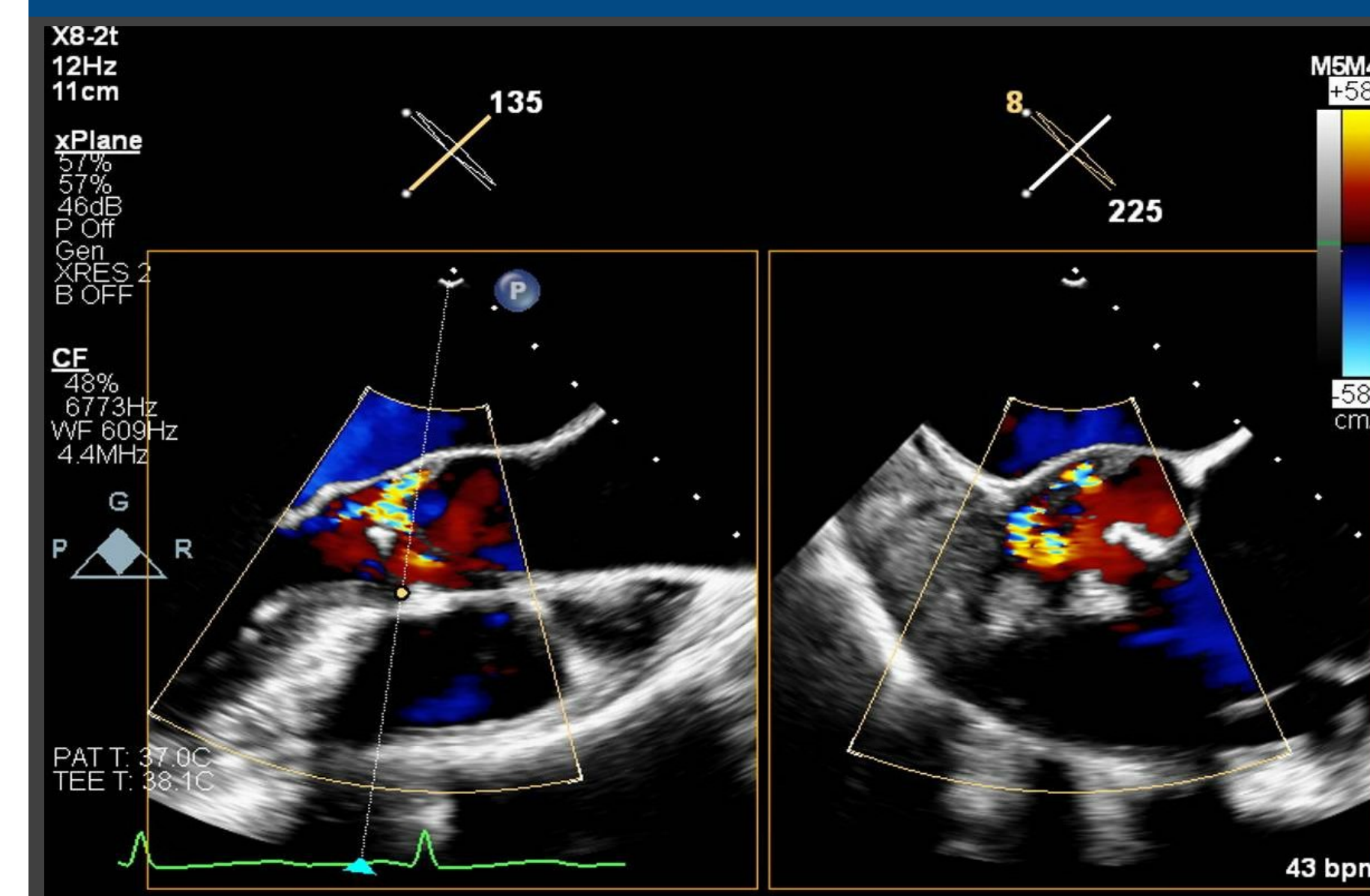


Figure 1. Mid-esophageal aortic valve long axis view showing bicuspid morphology and severe eccentric aortic insufficiency

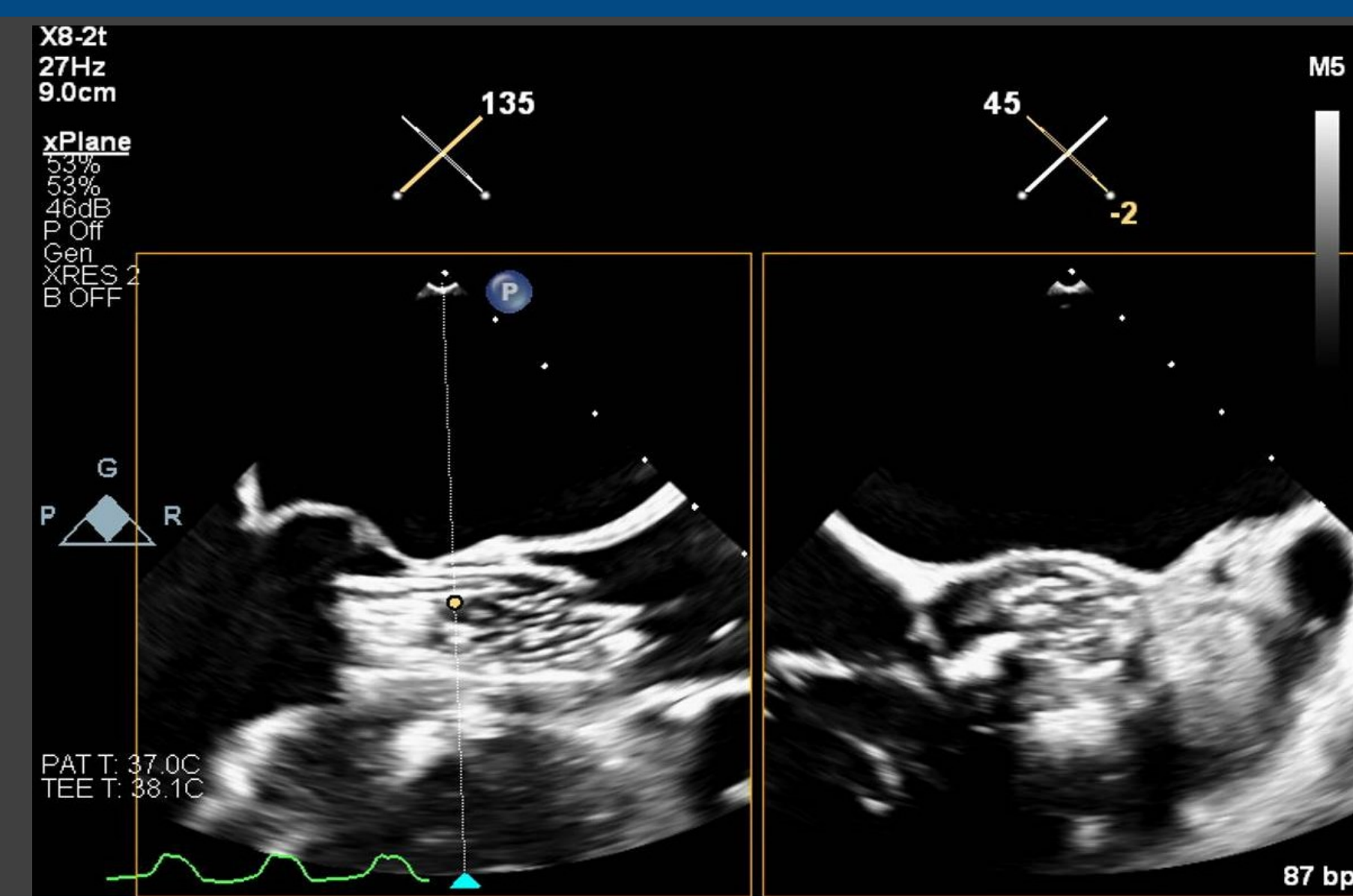


Figure 2. Aortic balloon valvuloplasty

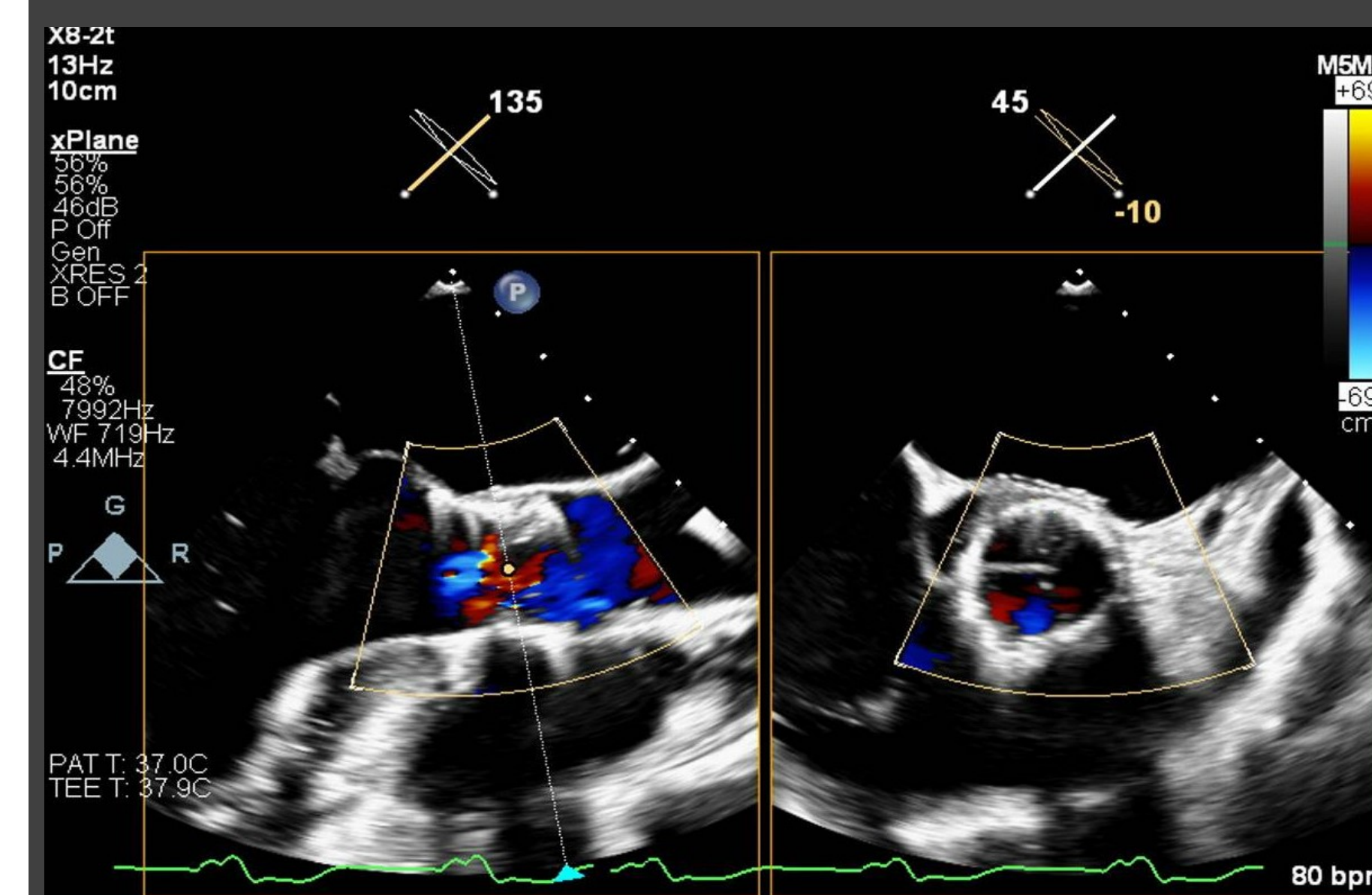


Figure 3. Post deployment with no sign of leak

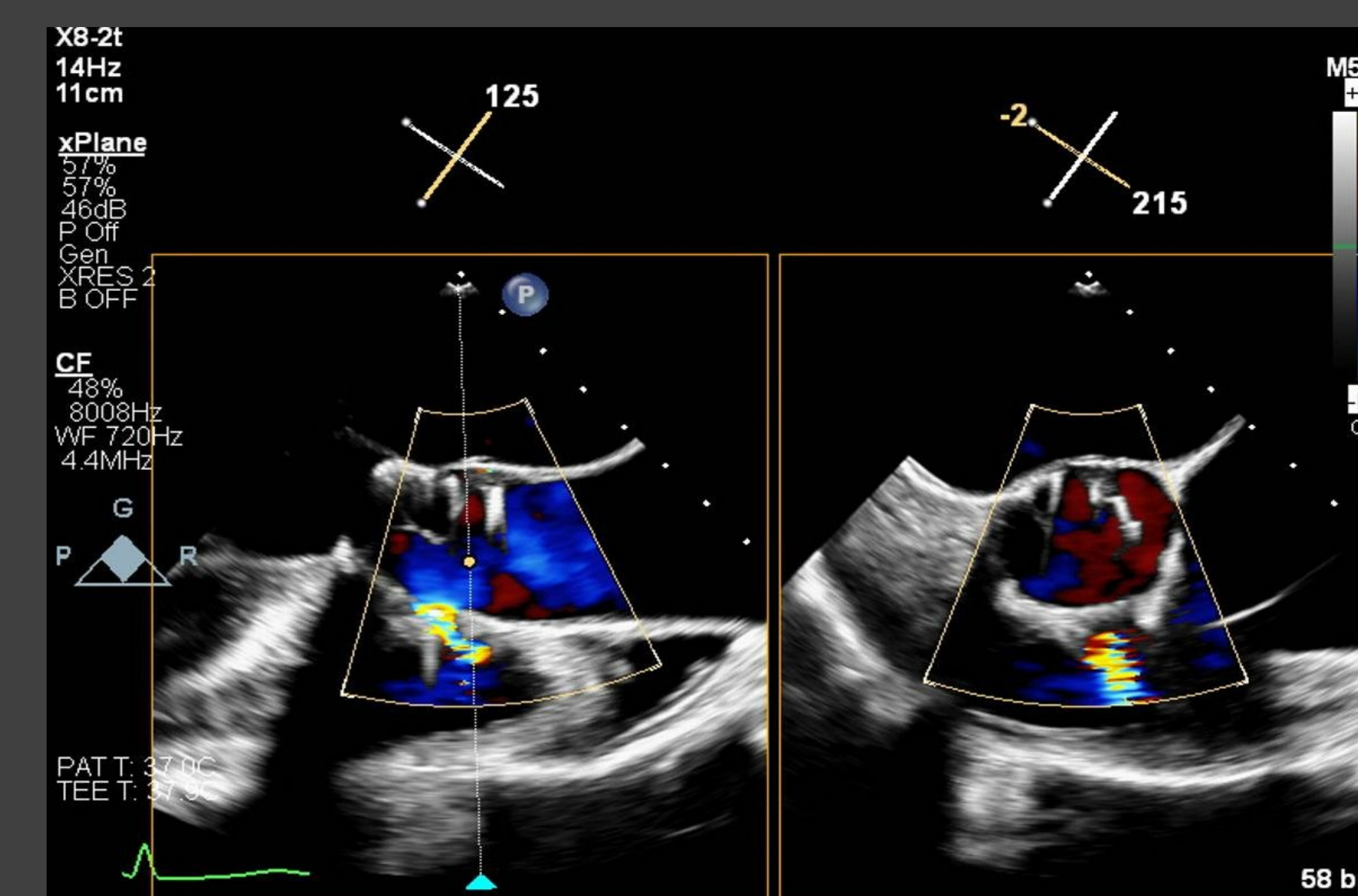


Figure 4. Aorto-RV fistula

DISCUSSION

- Though rare, aorto-right ventricular fistulas may lead to a variety of complications. Large or expanding fistulas pose a risk of sudden cardiogenic shock due to left-to-right shunt and right ventricle overload.
- Intraprocedural TEE allows for early diagnosis through the characterization of size and severity of the fistula. In this case, TEE identified the connection between the aorta and right ventricle immediately upon the completion of the TAVR, characterizing its small size and localizing it proximal to the coronary ostia. The imaging reassuringly did not reveal any signs of significant right ventricular dysfunction in this case, though this would be cause for closer monitoring and perhaps a greater anticipation for hemodynamic instability.
- Arterial pressure monitoring is not always indicated for aortic stenosis or TAVR. However, for this patient, the arterial line facilitated hemodynamic control in the setting of severe aortic stenosis and subsequently newfound aorto-right ventricular fistula.
- The transition from identifying the iatrogenic cardiac fistula to prompt intervention was safely and efficiently facilitated by perioperative monitoring and anesthetic management. Further research is warranted to optimize anesthetic approaches for complications regarding cardiac fistulas.

CONCLUSION

This case highlights the timely and effective anesthetic management of an aorto-right ventricular fistula. The process of identifying the iatrogenic cardiac fistula and assessing its severity with intraprocedural and postprocedural imaging, followed by continuous perioperative monitoring allowed for timely intervention and proper management of a rare iatrogenic complication.

CITATIONS

Chia R, Kalutota C, Cao K, Douedi S, Chang W, Pinciotti D, et al. Management of Aorto-Right Ventricular Fistulas After TAVR. *JACC Case Rep.* 2024;29(21):102655. doi:10.1016/j.jaccas.2024.102655.

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