We report a case where real-time three-dimensional transoesophageal echocardiography (3D-TEE) was able to detect a complicated transseptal puncture during a Mitraclip procedure which was not seen on the two-dimensional TEE (2D-TEE) images. This case demonstrates the incremental value of 3D-TEE during transseptal puncture.

**Keywords**

Transseptal puncture • Mitral valve repair • Percutaneous intervention • 3D-TEE

A 57-year-old man, with a history of coronary artery bypass grafting in 1992 and 2005, implantable cardioverter defibrillator implantation for primary prevention in ischaemic cardiomyopathy with a left ventricular ejection fraction of 15%, and non-sustained ventricular tachycardias, was referred to our hospital with progressive dyspnoea and a decrease in functional capacity (NYHA class IV). Transoesophageal echocardiography (TEE) revealed a severe functional mitral valve regurgitation due to malcoaptation of the mitral valve leaflets because of left ventricular annulus dilatation and tenting of the mitral valve leaflets. Taking into account a high surgical risk (logistic Euroscore, 30.5%; STS-score, 8.7%), the patient was denied for re-re-operation and accepted for percutaneous mitral valve repair with the Mitraclip device.

The specific puncture site for transseptal puncture [the superior and (mid-)posterior area of the fossa ovalis] required for the Mitraclip procedure was determined with two-dimensional (2D) TEE. The transseptal puncture was effortless and seemed to be uncomplicated with the guidewire shown in the left atrium on 2D-TEE (Figure 1, Supplementary data online, Movie 1).

**Figure 1** Two-dimensional transoesophageal echocardiography short axis at the base view after transseptal puncture showing the guidewire in the left atrium (arrow). AV, aortic valve; LA, left atrium; RA, right atrium; RV, right ventricle.

**Figure 2** Three-dimensional transoesophageal echocardiography left atrial view from another procedure clearly showing the guidewire in the left atrium after transseptal puncture (arrow). AV, aortic valve; IAS, interatrial septum; LA, left atrium; MV, mitral valve.
Because the shadow of the guidewire seemed to be vague, a 3D-TEE image was made to confirm the exact position of the guidewire. In a left atrial view, looking en face towards the mitral valve in a normal situation, it is easy to confirm that the guidewire is in the left atrium (Figure 2), although in our case there was no guidewire seen in the left atrium (Figure 3A). Rotation of the 3D-TEE image revealed the intramural location of the guidewire since the anterior atrial wall was puffing up (Figure 3B, Supplementary data online, Movie 2). Probably the guidewire had slit through the persistent foramen ovale into the left atrial wall. The guidewire was retracted and pericardial effusion was excluded in several echocardiographic views. Consequently, a new transseptal puncture was performed with successful placement of the Mitraclip. Unfortunately, shortly after the procedure the patient developed clinical signs of cardiac tamponade with large amount of pericardial effusion which required subxyphoidal drainage. The further clinical course was uneventful, the patient was discharged in good condition. Complications could have been worse if this intramural position of the guidewire was not assessed by 3D-TEE, and the dilator and 24-French guide catheter was inserted over this guidewire.

Therefore, we conclude that 3D-TEE, because of its excellent visualization capacities, increases the safety of transseptal puncture during interventions for structural heart disease.

**Supplementary data**

Supplementary data are available at European Journal of Echocardiography online.

**Conflict of interest:** M.J.S. and J.A.S.H. are both faculty members of the Abbott’s Crossroads training facility.