

Value of real-time three-dimensional transesophageal echocardiography during patent foramen ovale closure: a case report

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SUMMARY

Although contrast injection during percutaneous closure of patent foramen ovale (PFO) has been used for assessing the adequacy of the procedure, transesophageal echocardiography (TEE) has an important role in both diagnosis and percutaneous closure of PFO. Three-dimensional (3D) TEE may have incremental value in PFO closure such that direct anatomic information about PFO can be obtained. More importantly, successful closure can be directly assessed via Real-time 3D TEE. This case report emphasizes the importance of Live 3D TEE usage during PFO closure in a 32-year-old male patient with two transient ischemic attacks and normal hematological tests.

Key words: Real-time, transesophageal echocardiography, patent foramen ovale, percutaneous closure

ÖZET

Patent foramen ovale kapatılması esnasında anlık üç boyutlu transözofageal ekokardiyografinin önemi: olgu sunumu

Patent foramen ovale'nin perkutan kapatılması esnasında kontrast enjeksiyonu, işlemin uygunluğunu tespit etmek için kullanılmasına rağmen, transözofageal ekokardiyografi (TEE) hem tanı, hem de PFO'nun perkutan kapatılmasında önemli bir araçtır. Üç boyutlu (3D) TEE, PFO kapatılmasında önemi zamanla artmaktadır, öyle ki defekt hakkında direk anatomik bilgi sağlayabilmektedir. Daha da önemlisi, işlem başarısı, anlık üç boyut aracılığıyla doğrudan gösterilebilir. Bu olgu sunumu, iki geçici iskemik atak geçiren ve hematolojik testleri normal olan 32 yaşında erkek bir hastada, PFO kapatılması esnasında, anlık 3D TEE kullanımının önemini vurgulamaktadır.

Anahtar kelimeler: Gerçek zamanlı, transözofageal ekokardiyografi, patent foramen ovale, perkutan kapama

Introduction

Patent foramen ovale (PFO) is the failure of the primum and secundum atrial septa to fuse postpartum(1-3). It has been implicated in several pathologic processes, including paradoxical embolism in cryptogenic stroke and venous-to-arterial gas embolism in serious forms of decompression sickness and migraine with aura(2,3). Many studies have demonstrated that transcatheter PFO closure significantly reduced the incidence of recurrent strokes in high-risk patients with PFO compared with antithrombotic drugs. Two-dimensional transoesophageal echocardiography (2D TEE) has been used for guiding atrial septal defect (ASD) and PFO closure. Real-time three-dimensional transoesophageal echocardiography (3D TEE) may be potentially superior to 2D TEE in the accurate assessment of the morphology and efficacy of transcatheter closure because of a better spacial visualization(1,4,5). We, herein, reported percutaneous closure of PFO with 3D TEE in a 32 years old male patient with two transient ischemic attacks.

Case Report

A 32-year-old male patient with two transient ischemic attacks and normal hematological tests was referred to our clinic for embolic source detection. We performed transesophageal echocardiographic study with a Philips EnVisor machine equipped with a multiplane S6 probe, which revealed right to left bubble passage during Valsalva maneuver with contrast injection. We performed PFO closure procedure one week after the diagnosis. The patient was under general anesthesia and we used Philips I33 ultrasound unit and an S7 probe capable of 3D imaging. Three-dimensional zoom property of the machine was acti-

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vated and all procedure followed on this mode. The PFO was clearly demonstrated (Figure 1). The device successfully implanted and totally covered the fora-

men ovale region (Figure 2). We rechecked efficiency of the procedure one week later with TEE and did not detect bubble transit with contrast injection.

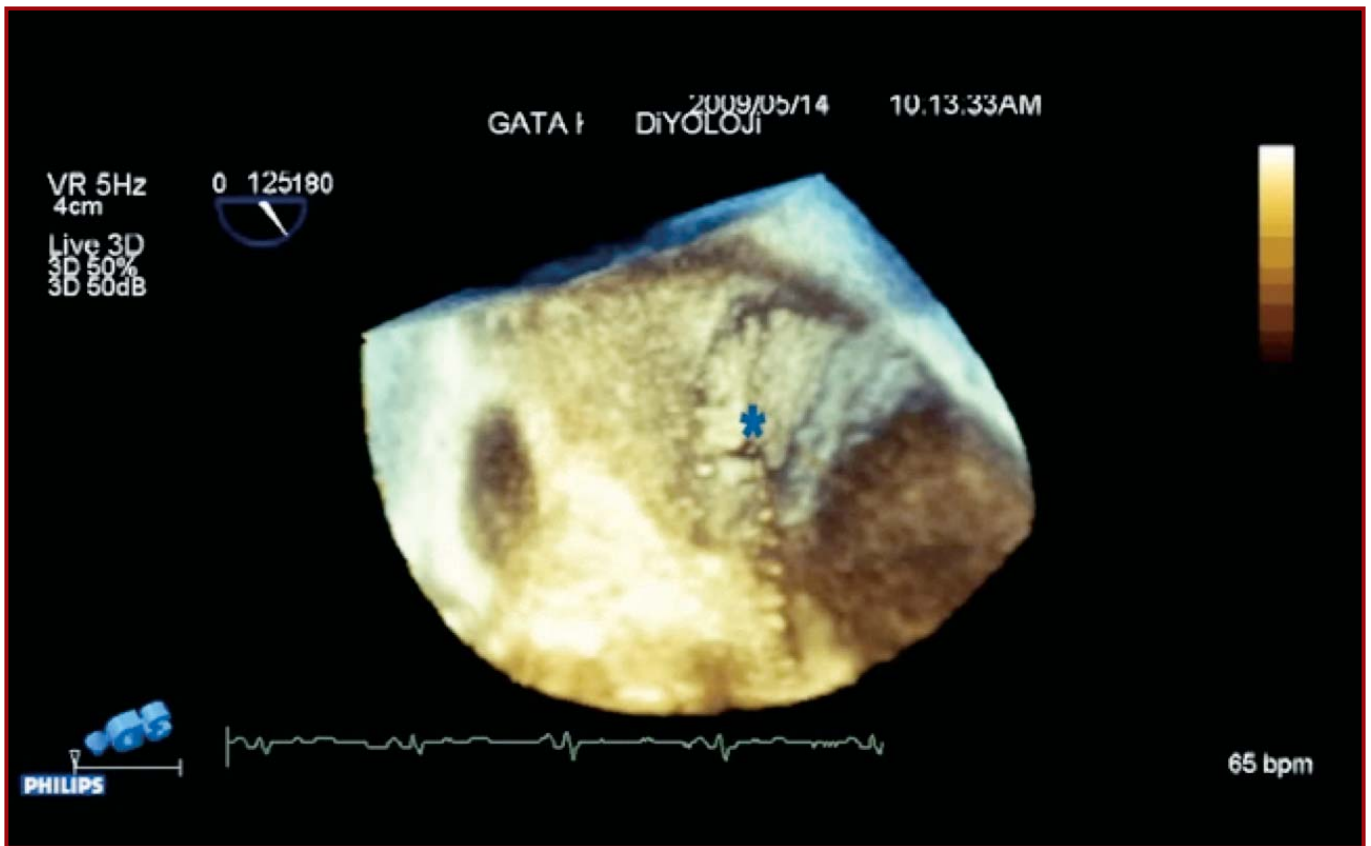


Figure 1. Patent foramen ovale and the wire passing through it (*)

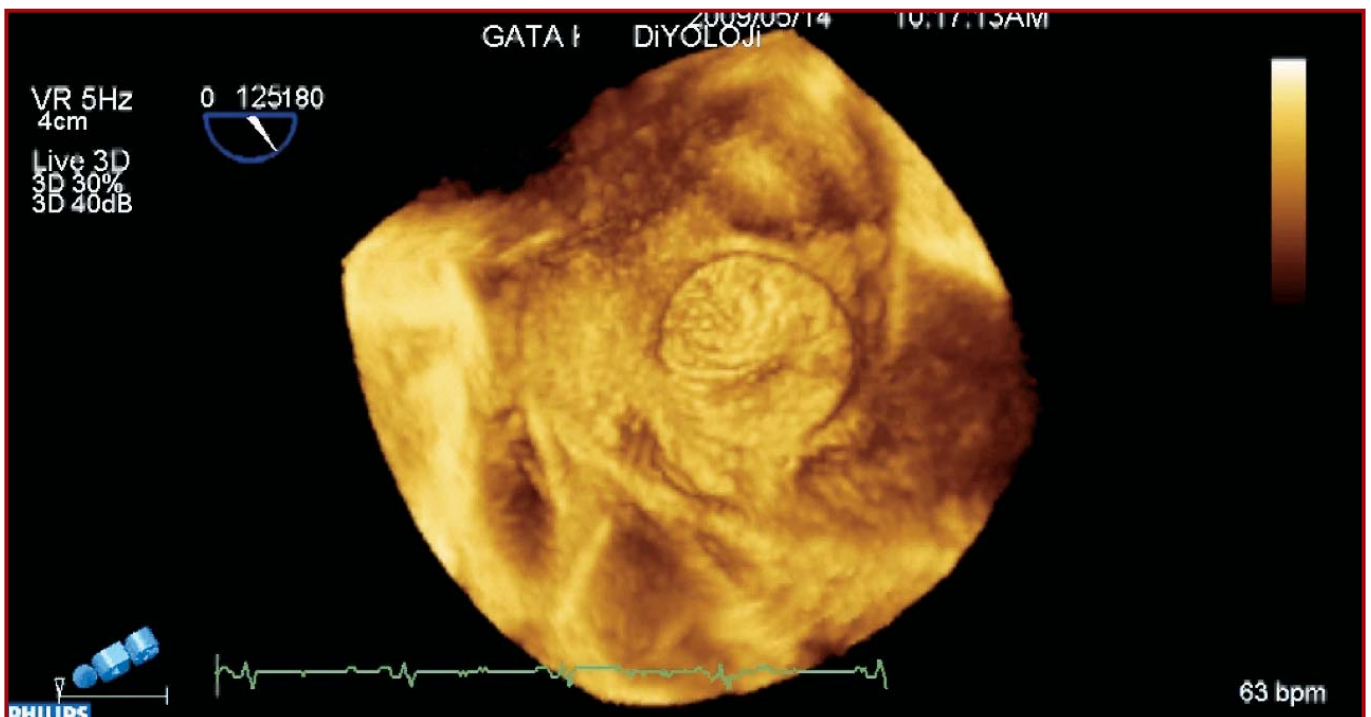


Figure 2. The closure device covering PFO

Discussion

The anatomy of PFO is highly variable, and must be carefully defined before percutaneous closure (1-3). Fluoroscopic and 2D TEE monitoring has been shown to be a feasible, accurate, and safe method for guiding transcatheter ASD and PFO closure, but only 2D TEE monitoring is limited to detect the position of a catheter or a device relative to its surrounding environment (1, 4, 5). The major advantage of 3D TEE over 2D TEE during closures of PFOs is the spatial orientation of left atrial structures and the monitoring of the entire procedure with an excellent 3D view. The 3D perspective from the left atrium on the interatrial septum and the surrounding structures allows the monitoring of all procedural steps during the intervention from the passage of the guide wire through the PFO until final release of the device. Therefore, improved visualization, and better understanding of the anatomic details of PFO and devices improve the results of procedure with minimal fluoroscopy (1, 4, 6). On the other hand, Güngör et al. (5) showed that 2-D or 3-D TEE can successfully be used for determination of the defect size without concomitant use of balloon sizing in percutaneous ASD closure. However, 3-D echocardiographic measurement may estimate the defect size more appropriately.

In conclusion, direct visualization of a PFO and ability to assess successful device implantation make

3D echocardiography a viable option during PFO closure.

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