Decompression of the left heart chambers via atrial flow regulator: A new insight into heart failure treatment

A 63-year-old male patient was admitted to the intensive care unit due to decompensated [New York Heart Association (NYHA) III-IV] heart failure with reduced ejection fraction (25%) despite optimal medical therapy. Atrial flow regulator (AFR) implantation was decided by the heart team for decompressing the left heart chambers, alleviating the symptoms. Prior to the procedure, the pulmonary capillary wedge pressure (PCWP) and mean pulmonary artery pressure (PAP) by right heart catheterization were 22 mm Hg and 25 mm Hg, respectively. Under transesophageal echocardiography (TEE) guidance, AFR implantation following interatrial septal puncture was performed by deploying the left and right atrial disks, respectively (Fig. 1a, Video 1). A post-deployment echocardiography showed a well-positioned and well-functioning device creating an interatrial left-to-right shunt (Fig. 1b, Video 2). The patient was discharged without any complications.

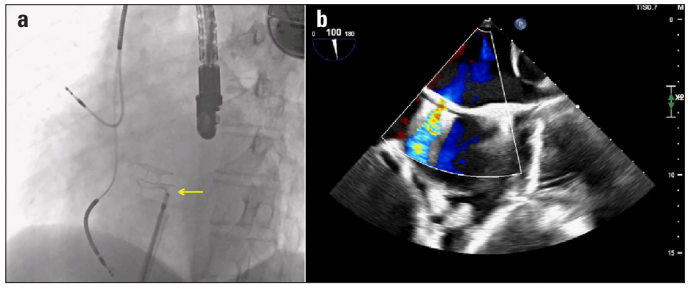

Figure 1. A flouroscopic image of the atrial flow regulator device implantation. The arrow denotes the connection between the delivery wire and loading hub just before withdrawing the system (a). A bicaval view on two-dimensional TEE shows a left-to-right shunt flow through color Doppler imaging (b)

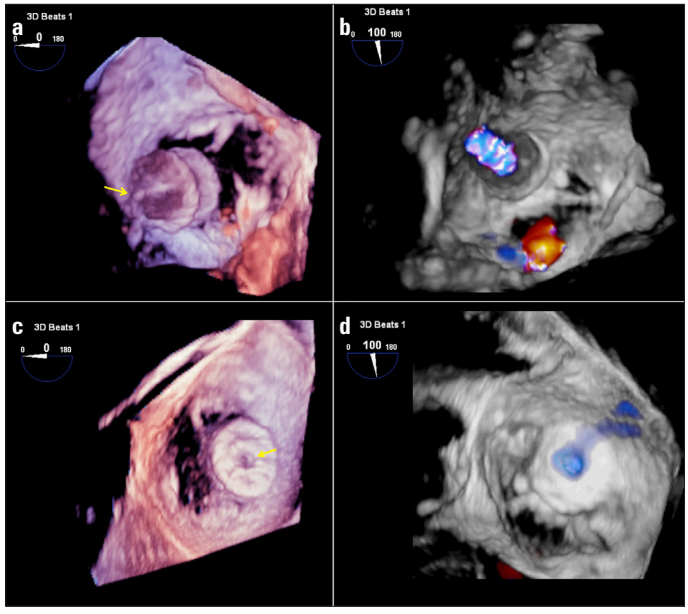

Figure 2. A three-dimensional TEE shows the right disk of the device and loading hub (arrow) (a); shows the shunt flow into the right atrium through the fenestration (b); shows the left atrial side and central fenestration (arrow) (c); and shows the shunt flow passing through the central fenestration in the left atrial view (d)

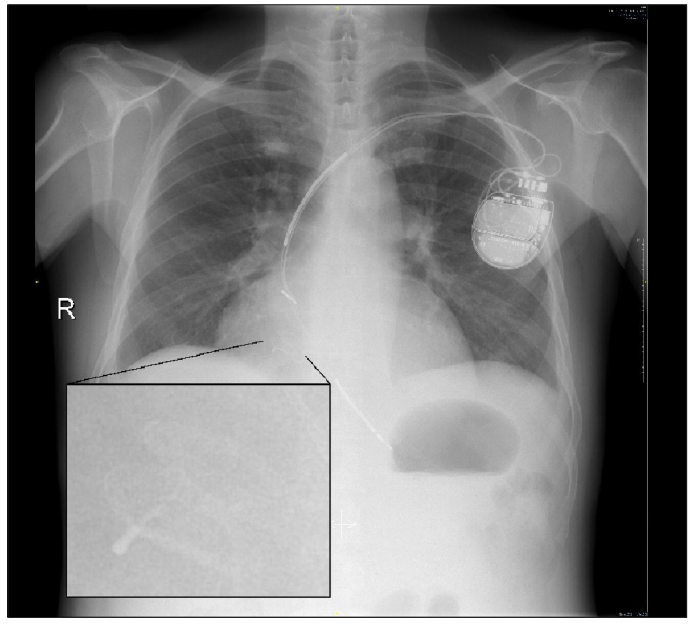

Figure 3. A chest radiogram shows the localization of the device, disks, and loading hub. A magnified view of the device can be seen at the bottom left

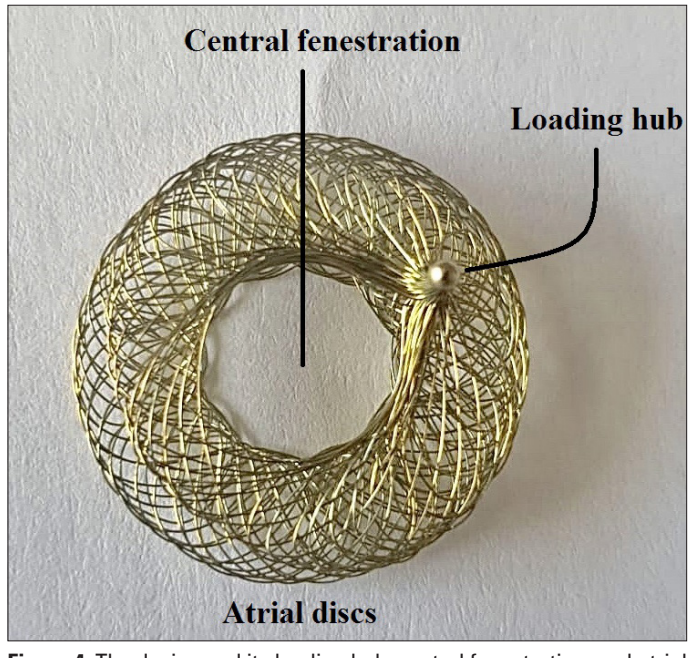

Figure 4. The device and its loading hub, central fenestration, and atrial disks

Anatol J Cardiol 2021; 25: E-17-18
DOI:10.14744/AnatolJCardiol.2020.05949

Nine months postoperative, the patient's clinical status improved (NYHA II). The three-dimensional TEE revealed the right atrial disk with loading hub located on its edge (Fig. 2a), the shunt flow into the right atrium (Fig. 2b, Video 3), left atrial disk (Fig. 2c), and shunt flow passing through the central fenestration (Fig. 2d, Video 4). A chest radiograph also revealed the disks and loading hub (Fig. 3).

An AFR (Fig. 4) is an intracardiac device dedicated to creating a communication between the two atria and mainly used in the treatment of drug-resistant pulmonary arterial hypertension (1, 2). However, it can also be used in the treatment of symptomatic heart failure provided PCWP ≥15 mm Hg with normal PAP (3, 4).

Informed consent: Written informed consent was obtained from the patient.

Video 1. A flouroscopic image of the atrial flow regulator device implantation under TEE guidance

Video 2. A bicaval view on two-dimensional TEE shows the left-to-right shunt flow by the color Doppler imaging

Video 3. A three-dimensional TEE shows the shunt flow into the right atrium through fenestration

Video 4. A three-dimensional TEE shows the shunt flow passing through the central fenestration from the left atrial view

References

1. Rajeshkumar R, Pavithran S, Sivakumar K, Vettukattil JJ. Atrial septostomy with a predefined diameter using a novel occlutech atrial flow regulator improves symptoms and cardiac index in patients with severe pulmonary arterial hypertension. Catheter Cardiovasc Interv 2017; 90: 1145-53. [Crossref]
2. Dąbrowska-Kugacka A, Ciećwierz D, Żuk G, Fijałkowski M, Ottowicz A, Kwiatkowska J, et al. Atrial flow regulator for severe drug resistant pulmonary arterial hypertension after congenital heart defect correction. Cardiol J 2019; 26: 102-4. [Crossref]
3. Paitazoglou C, Özdemir R, Pfister R, Bergmann MW, Bartunek J, Kilic T, et al. The AFR-PRELIEVE trial: a prospective, non-randomised, pilot study to assess the Atrial Flow Regulator (AFR) in heart failure patients with either preserved or reduced ejection fraction. EuroIntervention 2019; 15: 403-10. [Crossref]
4. Guimarães L, Del Val D, Rodés-Cabau J. The Atrial Flow Regulator device: expanding the field of interatrial shunting for treating heart failure patients. EuroIntervention 2019; 15: 398-400. [Crossref]

Uğur Nadir Karakulak, Ergün Barış Kaya, Mehmet Levent Şahiner, Kudret Aytemir
Department of Cardiology, Faculty of Medicine, Hacettepe University; Ankara-*Turkey*

Address for Correspondence: Dr. Uğur Nadir Karakulak, Hacettepe Üniversitesi Tıp Fakültesi, Kardiyoloji Anabilim Dalı, Sıhhiye 06170 Ankara-*Türkiye*
Phone: +903123051780
E-mail: ukarakulak@gmail.com

DOI:10.14744/AnatolJCardiol.2020.05949