OLGU SUNUMU CASE REPORT

DOI: 10.5336/cardiosci.2021-86207

Cobrahead Deformity in Right Ventricular Disc of an Amplatzer Septal Occluder Device During Transcatheter Closure of the Post-Myocardial Infarction Ventricular Septal Rupture

Miyokard İnfarktüsü Sonrası Gelişen Ventriküler Septal Rüptürün Transkateter Kapatılması Sırasında Amplatzer Septal Okluderin Sağ Ventriküler Diskinde Oluşan Kobra Başı Deformitesi

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ABSTRACT In the modern era of reperfusion therapy, the incidence of post-myocardial infarction ventricular septal rupture has dramatically decreased by <1%, but unfortunately, it is still associated with high morbidity and mortality despite improvements in medical and surgical therapies. Percutaneous device closure of post-myocardial infarction ventricular septal rupture may be an alternative to surgical repair, with the advantage of immediate shunt reduction to prevent hemodynamic deterioration, especially in high-risk patients. Herein we report a case of post-myocardial infarction ventricular septal rupture which was successfully closed with an amplatzer atrial septal occluder device accompanied by cobrahead deformity in the right ventricular disc.

Keywords: Myocardial infarction; ventricular septal rupture; septal occluder device

ÖZET Modern reperfüzyon tedavi çağında, miyokard infarktüsü sonrası ventriküler septal rüptür görülme insidansı dramatik bir şekilde azalmış ve %1'in altına inmiştir, fakat ne yazık ki medikal ve cerrahi tedavilerdeki gelişmelere rağmen hâlâ yüksek morbidite ve mortalite ile ilişkilidir. Özellikle yüksek riskli hastalarda miyokard infarktüsü sonrası ventriküler septal rüptürün perkütan cihazla kapatılması, hemodinamik bozulmayı önlemek ve şantın hızlı düzeltilmesi avantajı ile cerrahi onarıma karşı önemli bir alternatif oluşturabilir. Burada, sağ ventriküler diskte kobra başı deformitesi gelişen amplatzer atriyal septal kapama cihazı ile başarıyla kapatılan miyokard infarktüsü sonrası ventriküler septal rüptürlü bir olguyu sunuyoruz.

Anahtar Kelimeler: Miyokard infarktüsü; ventriküler septal rüptür; septal okluder cihaz

Ventricular septal rupture (VSR) is a very scare complication of acute myocardial infarction (MI). VSR occurs most often in the first 24 hours than on days 3-5 and after 2 weeks acute MI.[1] Patients with post-MI VSR have a very high mortality rate. Surgical closure is the treatment of choice of guidelines, but the timing of surgical repair is controversial.[2] Surgical treatment has a high mortality rate because of the fragile tissue of the ventricular septum.[3] Percutaneous closure of the post-MI VSR may be an alternative treatment to surgery for appropriate anatomy of the defect in high-risk patients. It has a lower interventional risk than surgery and it can be a bridge treatment for surgical treatment.[4]

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Peer review under responsibility of Turkiye Klinikleri Cardiovascular Sciences.

Received: 15 Sep 2021 ***Received in revised form:*** 07 Dec 2021 ***Accepted:*** 08 Dec 2021 ***Available online:*** 13 Dec 2021

CASE REPORT

A 75-year-old male patient has been diagnosed with extensive subacute anterior wall MI 2 weeks ago and had successful revascularization in an external centre. But as the patient's general condition did not improve during the follow-ups, he was referred to our clinic for the treatment of advanced heart failure and hypotension. On physical examination, blood pressure was 80/50 mmHg with dopamine support, heart rate was regular and 100 beats/min and diffuse lung crackles were present in both lungs. And also, a pan-systolic severe murmur was detected on the left sternal border and the apical area radiates to the left axilla. Transthoracic echocardiography (TTE) and transesophageal echocardiography showed left ventricular ejection fraction 30%, anteroseptal akinesia, and an apical VSR approximately 10 mm length with colour Doppler (Figure 1). Cardiac computed tomography (CT) angiography analysis revealed a 10x12 mm defect with thinning toward the apical septum (Figure 2). Besides, the right ventricular part of the defect was limited to the trabecular muscles. Our heart team decided to perform transcatheter closure of VSR because of the high surgical risk for this clinical situation. The left ventriculography showed a large, muscular VSR in the apical septum on right anterior oblique (RAO) projection (Figure 3). After ventriculography, a hydrophilic guidewire was advanced from the left ventricle (LV) to the right ventricle (RV) via the right Judkins catheter through the defect. The hydrophilic guide wire was exchanged with a 0.035 inch 300 cm stiff guidewire. This exchange wire was snared in the superior vena cava and extruded via the right femoral vein to form an arteriovenous wire loop. A long delivery sheath (6 Fr) was advanced from the right femoral vein to the RV and crossed the VSR to LV over the wire. A 17 mm amplatzer septal occluder (ASO) device (AGA Medical Corporation, Plymouth, Minnesota, USA) measured by echocardiography and CT, was loaded and advanced into LV. The distal disc was opened without any problem and pulled back onto the right ventricular side of the septum under echocardiographic guidance. However, the proximal disc opening was not optimal due to the trabecular muscles of the RV. The proximal part of the device did not take its optimal shape, and we observed cobrahead deformity in the proximal disc (Figure 4).

Fortunately, when the Minnesota maneuver was performed under the fluoroscopy, the device did not

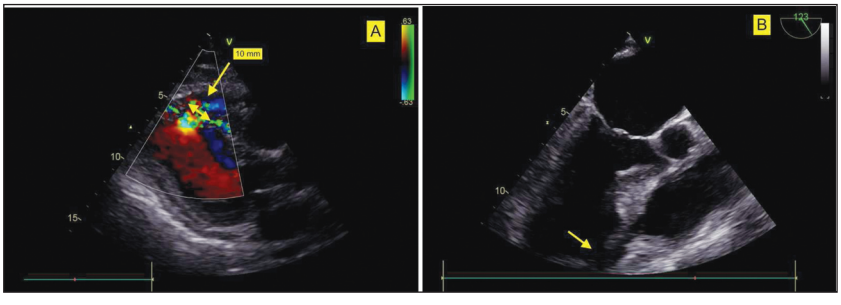

FIGURE 1: A-B) Transthoracic echocardiography 2D view of the post- myocardial infarction ventricular septal rupture with color Doppler.

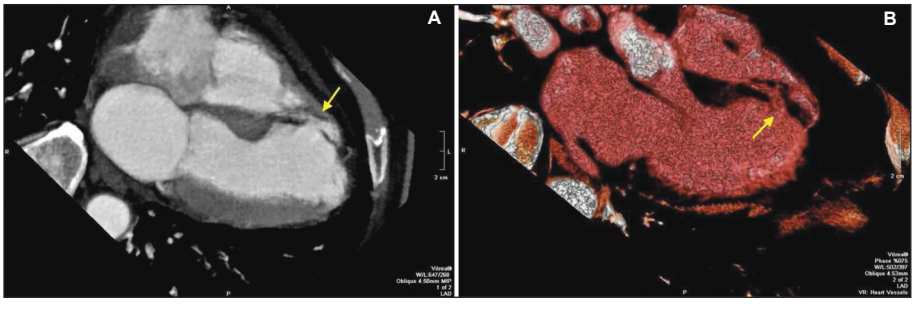

FIGURE 2: A-B) Cardiac computed tomography angiography showed apical muscular ventricular septal rupture.

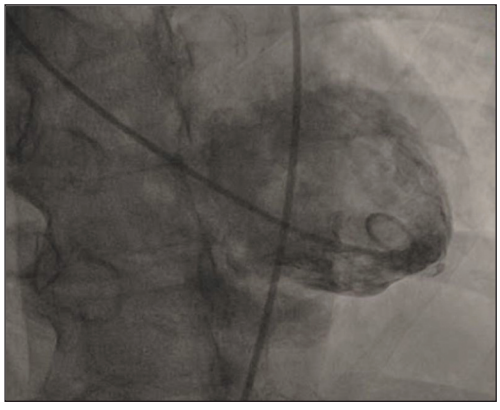

FIGURE 3: Ventriculography showed muscular ventricular septal rupture in the anterior apical location on right anterior oblige projection.

move and was stable. Due to the patient's critical situation, we released the device. The procedure was successfully terminated without any complications. TTE showed that the device was in place with a minimal residual shunt (Figure 5). The patient was discharged 5 days after the procedure without any complications. We could not perform control cardiac CT angiography because the patient lives in the countryside. After 18 months, we contacted the patient by phone and learned that the patient's general condition and physical capacity were very good. Informed consent was taken from the patient.

DISCUSSION

Post-MI VSR is a cardiac emergency and the outcome is very poor in medically treated patients. Emergency surgical repair is required even in hemodynamically stable patients. Although the result is better who undergo surgical repair compared to receiving medical treatment, mortality rates are still very high.[1] Urgent surgical repair is often suboptimal because of fragile tissue surrounding post-MI VSR. Post-operative residual shunts can occur in up to 20% of patients.[3-5] Percutaneous transcatheter closure (PTCC) has become an alternative or adjunct to surgical closure of post-MI VSR. It has a lower interventional risk than surgery and it can be a bridge treatment for surgical treatment.[4] There are various acceptable devices for PTCC of post-MI VSR, but none of the devices used to date are ideally suitable. In the current review, recommended treatment (PTCC or surgery) should be selected according to the VSR size; 15 mm was accepted as the threshold value.[6] Our heart team decided to perform PTCC in our case because of the high surgical risk and defect size. We chose the Amplatzer ASO device on account of self-centering and has a waist part, it is easier to place on the ruptured septum with minimal or no residual shunt. The proximal part of the ASO device could not be opened optimally due to the large trabecula in the right ventricular apex or the short waist but we successfully stably left the device and we managed to discharge the patient by significantly reducing the shunt. The "cobra-like" configuration distal disc of the ASO device is a rare but known shape abnormality of percutaneous treatment of atrial septal defects (ASD). Several hypotheses have been postulated about its cause, such as using a large or small delivery catheter, short waist of the device, deploying the left atrial disc into the left atrial appendage or pulmonary vein.[7,8]

Previously, Kilic et al. reported a cobrahead deformity case in the right atrial disc in an ASD closure procedure.[9] Similarly, shape deformity developed in the proximal part of the ASO device in our case. We evaluated this shape anomaly cobrahead deformity.

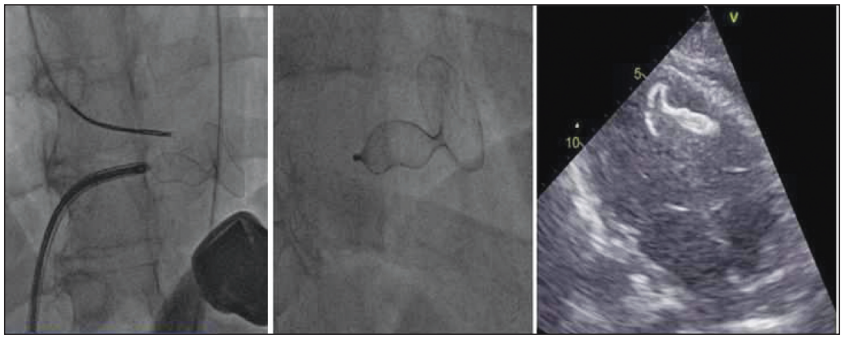

FIGURE 4: Fluoroscopic images show the cobrahead deformity of the right ventricular disc of an amplatzer atrial septal occluder device before and after deployment.

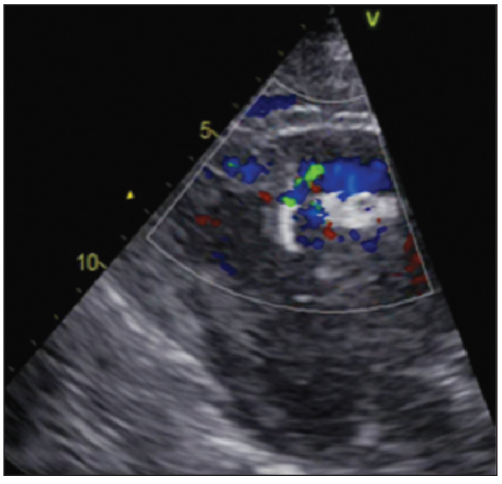

FIGURE 5: Transthoracic echocardiography demonstrated that the device was in a good position with a minimal residual shunt.

We thought that the cause of this deformity was right ventricular trabecular mass. So we did not withdraw the device and released it because of the patient's critical situation. To our knowledge, the cobrahead deformity in the right ventricular disc of the ASO device in the post-MI VSR closure case has never before been described. We present the first report of a cobrahead deformity in the right ventricular disc of an ASO device during transcatheter closure of a post-MI VSR closure. The judgment regarding PTCC against surgical closure for post-MI VSRs should be based on various factors such as defect size, morphology, anatomic location, age, hemodynamic situation, and experience of the operator. Especially in patients with high surgical risk, PTCC with ASO device should be considered as an important life-saving alternative treatment. An evolution in the design of future closure devices with diverse shapes and dimensions using personally tailored 3-dimensional printing techniques could better outcomes.[10]

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Mustafa Demir, Atilla İyisoy;* ***Design:*** *Ömer Faruk Keskin;* ***Control/Supervision:*** *Atilla İyisoy;* ***Data Collection and/or Processing:*** *Mustafa Demir, Ömer Faruk Keskin;* ***Analysis and/or Interpretation:*** *Ömer Faruk Keskin, Atilla İyisoy;* ***Literature Review:*** *Mustafa Demir;* ***Writing the Article:*** *Mustafa Demir, Ömer Faruk Keskin;* ***Critical Review:*** *Atilla İyisoy.*

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