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Case Report / Olgu Sunumu

Mitral paravalvular leak closure via minimal invasive transapical approach

Minimal invaziv transapikal yaklaşım ile mitral paravalvüler kaçak tamiri

Atila İyisoy,[1] Turgay Çelik,[1] Sait Demirkol,[1] Faruk Cingöz,[2] Emre Yalçınkaya,[1] Uygar Çağdaş Yüksel,[1] Ersel Onrat[3]

Institution where the research was done:
Department of Cardiology, Gülhane Military Medical Academy, Ankara, Turkey

Author Affiliations:
Departments of [1]Cardiology and [2]Cardiovascular Surgery, Gülhane Military Medical Academy, Ankara, Turkey
[3]Department of Cardiology, Medical Faculty of Afyon Kocatepe University, Afyon, Turkey

Paravalvular leak is a common postoperative complication of cardiac valve replacement, leading to a significant morbidity. Leak closure surgery is usually performed in symptomatic patients. Since most patients with paravalvular leak have a high risk profile for surgical closure, percutaneous closure is the preferred treatment modality. However, complex anatomy of the defects may complicate percutaneous closure procedures, requiring substantial surgical expertise. It is unlikely to close severe mitral paravalvular leaks in patients with dual mechanical prostheses percutaneously due to technical difficulties. In this article, we report a 49-year-old male case with mitral paravalvular leak closure via transapical approach using minimal invasive surgery.

Key words: Minimal invasive; paravalvular leak; transapical.

Paravalvüler kaçak, kalp kapak replasmanı ameliyatı sonrasında morbiditeyi anlamlı düzeyde artırabilen sık görülen bir komplikasyondur. Semptomatik hastalara genellikle kaçak tamiri cerrahisi yapılır. Paravalvüler kaçağı bulunan hastaların büyük çoğunluğunun cerrahi kapatma açısından yüksek risk sınıfında bulunması nedeni ile perkütan kapama tercih edilen tedavi yöntemidir. Ancak, defekt anatomilerinin kompleks yapısı perkütan kapama işlemini zorlaştırmakta ve önemli düzeyde cerrahi deneyim gerektirmektedir. Çift mekanik protez bulunan hastalarda teknik zorluklar nedeni ile perkütan yolla ciddi mitral paravalvüler kaçak tamiri yapılamayabilir. Bu yazıda, minimal invaziv transapikal yaklaşımla mitral paravalvüler kaçak tamiri yapılan 49 yaşında bir erkek olgu sunuldu.

Anahtar sözcükler: Minimal invaziv; paravalvüler kaçak; transapikal.

A paravalvular leak (PVL) is a complication that has been reported in 3-12.5% of previously replaced mitral valves.[1] Most leaks become apparent in the first six months after the original procedure, but many patients remain asymptomatic and do not require further intervention. However, some leaks are associated with heart failure, hemolytic anemia, arrhythmias, and infective endocarditis. In addition, many patients with symptomatic PVL benefit from a corrective intervention. The majority also have a prohibitively high risk profile for repeat surgical procedures; therefore, percutaneus closure techniques have emerged as an alternative treatment option. Paravalvular leaks located in the posterolateral and anterolateral portions of the mitral valve prosthesis are difficult to access using the transfemoral approach, so in the last few years, hybrid operations, such as the transapical approach using percutaneous technical materials, have been developed to access and close the defect.[2-4]

CASE REPORT

A 49-year-old male patient with mechanical aortic and mitral valves was referred to our hospital for further evaluation of a mitral PVL, especially for closure.

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Correspondence: Atila İyisoy, M.D. Gülhane Askeri Tıp Akademisi Kardiyoloji Anabilim Dalı, 06010 Etlik, Ankara, Turkey.
Tel: +90 312 - 304 42 51 / 4257 e-mail: aiyisoy@hotmail.com

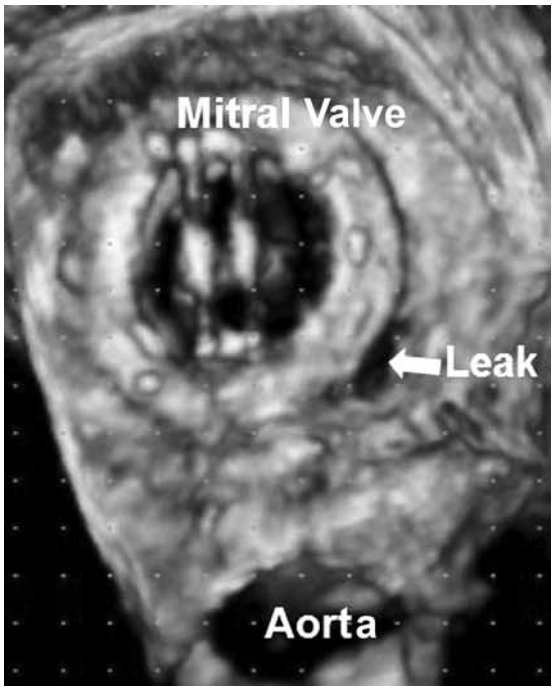

Figure 1. Three-dimensional transesophageal echocardiography showing the mitral paravalvular leak on the anterolateral portion of the mitral valve annulus.

He presented with shortness of breath after physical activity and hemolytic anemia (hemoglobin: 12.6 g/dl, lactate dehydrogenase: 821 U/L, creatine kinase: 1370 U/L, and indirect bilirubin: 2.3 mg). Furthermore, he was found to have a PVL on the anterolateral portion of the mitral valve annulus at the 11 o'clock position on three-dimensional (3D) transesophageal echocardiography (TEE) (Figure 1). The patient was offered the opportunity for a reoperation but refused. In the cardiac cathaterization laboratory, an antegrade transfemoral vein approach was initially attempted under general anesthesia in which an 8 Fr Mullins sheath (St. Jude Medical, St. Paul, Minn. USA) was advanced through the right femoral vein into the interatrial septum via a Brokenbrough needle (St. Jude, Inc., Minneapolis, MN, USA). After puncturing the septum, a Terumo Glidewire® straight-tipped, hydrophilic-coated guidewire measuring 0.035 inches in diameter (Terumo Interventional Systems, Somerset, NJ, USA) was used to cross the defect. After passing the defect, a 7 Fr Judkin's right guiding catheter (Boston Scientific Corp. Natic, MA, USA) was advanced into the left ventricle, and an Amplatz Super Stiff™ guidewire (Boston Scientific Corporation, Natick, MA, USA) of the same diameter was inserted into the left heart. Following several unsuccessful attempts to advance the delivery catheter over the superstiff guidewire, the procedure was aborted due to the unfavorable angulation of the route, which was an impediment.

Next, the patient was taken to the hybrid operating room to access the site via the transapical approach after the patient gave his permission. A left minithoracotomy incision of approximately 8 cm in length was made through the sixth intercostal space under general anesthesia, and two U-shaped mattress sutures were placed in the anterolateral part of the heart. Left ventricular access was achieved with a needle, and a 6-F sheath was inserted into the apical region of the left ventricle. The Terumo Glidewire®

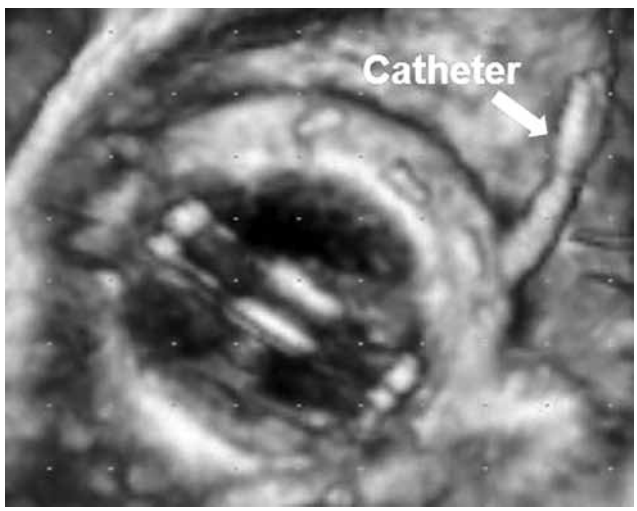

Figure 2. Three-dimensional transesophageal echocardiography showing the diagnostic catheter crossing through the annular dehiscence into the left atrium.

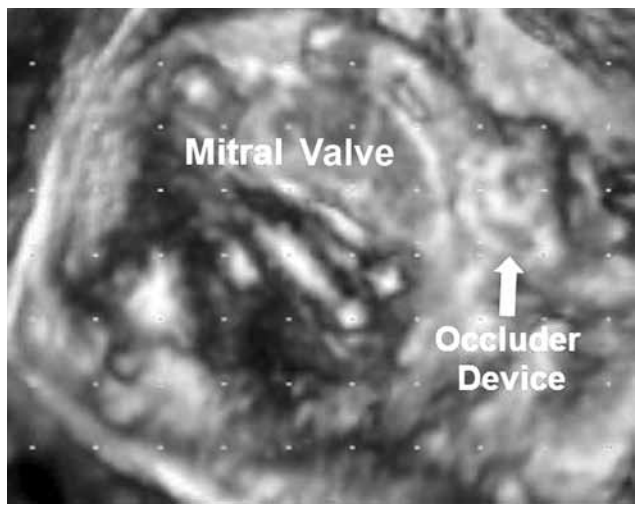

Figure 3. Three-dimensional transesophageal echocardiography showing the ADO II device (arrow) deployed for the mitral paravalvular leak.

was then used to cross the PVL under the guidance of 3D TEE and fluoroscopy. A 6-F multipurpose diagnostic catheter (Boston Scientific Corp. Natic, MA, USA) was also advanced through the annular dehiscence into the left atrium (Figure 2). The Glidewire® was then exchanged for another Amplatz Super Stiff™ guidewire that measured 0.035 inches in diameter. After placing the delivery catheter over the guidewire, a 5x5 mm Amplatzer™ Duct Occluder (ADO II) device (St. Jude Medical, Inc., St. Paul, MN, USA) was deployed to repair the mitral PVL (Figure 3). In addition, echocardiography showed the tight deployment and no residual PVL. After the procedure, the access site at the ventricular apex was closed with a primary suture. The patient was discharged on the postoperative fourth day, and the follow-up visits at one and three months revealed considerable improvement in his exercise tolerance and symptom status.

DISCUSSION

In stable low or medium-risk patients with prosthetic valve dysfunction, repeated traditional mitral valve replacement is the recommended treatment.[5] A reoperation to repair the PVL is associated with higher morbidity and mortality rates than the original procedure, with in-hospital mortality rates of 13%, 15% and 37% for the first, second, and third reoperations.[5] In addition, each reoperation carries an increased risk of a recurrence of the leak.[6,7]

The transfemoral approach is an alternative method to surgical repair. This technique avoids a thoracotomy and has been performed with technical success rates ranging from 60-90% in selected patients at highly experienced centers.[1] Unfortunately, in our case, such an approach could not be achieved because of dual mechanical valves and other technical difficulties.

The transapical approach is a safe and effective alternative for defects that are difficult to access via the transfemoral route due to the position of the leak or angulation of the route. It provides direct access to the mitral valve, avoids traversing the aorta and aortic valve, and is particularly useful for defects located in the anterolateral and anteromedial portions of the mitral annulus. However, this approach should not be considered a substitute for surgical repair and should only be preferred in patients with a high surgical risk and for PVLs that are difficult to access transfemorally.[2] Three-dimensional TEE guidance facilitates the procedure via better visualization of the intracardiac structures, closure devices, and anatomy of the defect.

We believe the complex and sometimes time-consuming hybrid technique that was used on our patient could be applicable for other patients when the percutaneous closure of PVLs fails. However, more research is needed to verify our hypothesis.

Declaration of conflicting interests

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