Transcatheter Aortic Valve Implantation of the Self-Expanding Corevalve in a Patient with Bicuspid Aortic Stenosis: Case Report

Biküspit Aort Kapak Darlığı Olan Hastada "Self-Expanding Corevalve" ile Transkateter Aort Kapak İmplantasyonu

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ABSTRACT Transcatheter aortic valve implantation (TAVI) has emerged as an alternative to surgical aortic valve replacement for patients with symptomatic severe aortic stenosis considered to be at very high or prohibitive operative risk. Although bicuspid aortic valve is regarded as a relative contraindication to transcatheter aortic valve implantation several reports stated their TAVI experiences with bicuspid aortic valve. A 58-year old male patient presented with dyspne. Echocardiography demonstrated decreased left ventricular ejection fraction and severe calcified bicuspid aortic stenosis with valve area of 0.6 cm^2 and mean transvalvular gradient of 45 mmHg. Aortic annulus diameter measured as 24 mm and ascending aorta 33 mm. He had very high surgical risk (Logistic EuroSCORE= 25.92% and STS score 15.6%). A 29 mm CoreValve device was successfully implanted percutaneously through the right femoral artery. In this case report, we present a patient with bicuspid aortic valveand symptomatic severe aortic stenosis treated successfully with TAVI.

Key Words: Aortic valve stenosis; bicuspid

ÖZET Transkateter aortik kapak implantasyonu (TAVI), ciddi aort kapak stenozu olup cerrahi için yüksek risk taşıyan hastalarda alternatif bir tedavi seçeneğidir. Biküspit aort kapak, TAVI için relatif kontrendikasyon olmasına rağmen biküspit aort kapaklarda başarılı TAVI işlemleri ile ilgili az sayıda olgu mevcuttur. Bilinen hipertansiyon, atrial fibrilasyon, konjestif kalp yetersizliği, ciddi kronik obstrüktif pulmoner hastalığı ve tromboembolik serebrovasküler hastalığı öyküsü olan 58 yaşında erkek hasta dispne nedeni ile kliniğimize başvurdu. Ekokardiyografik incelemede azalmış sol ventriküler ejeksiyon fraksiyonu ve ciddi kalsifiye biküspit aort kapak darlığı saptandı. Aort kapak alanı 0.6 cm^2 ve ortalama transvalvular gradiyent 45 mmHg idi. Aortik annulus çapı 24 mm ve asendan aort çapı 33 mm saptandı. Hastanın cerrahi risk skorları yüksek idi (Logistic EuroSCORE= %25,92 ve STS score %15,6). TAVI için değerlendirilen hastaya 29 mm CoreValve cihazı sağ femoral arterden girişim yapılarak başarılı bir şekilde yerleştirildi. Bu olgu ciddi kalsifiye biküspit aort kapak darlığı olup TAVI ile başarılı bir şekilde tedavi edilmesi nedeniyle sunuldu.

Anahtar Kelimeler: Aort kapağı stenozu; biküspit

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Transcatheter aortic valve implantation (TAVI) has emerged as an alternative to surgical aortic valve replacement for patients with symptomatic severe aortic stenosis considered to be at very high or prohibitive operative risk. Although bicuspid aortic valve (BAV) is regarded as a relative contraindication to transcatheter aortic valve implantation several reports stated their TAVI experiences with BAV.

CASE REPORT

A 58-year old male patient with a known history of hypertension, atrial fibrillation, congestive heart failure, severe chronic obstructive pulmonary disease (FEV1 <0.6L) and thromboembolic stroke presented with dyspnea. Patient had NYHA class IV symptoms though he was on full medical treatment. He had very high surgical risk (Logistic EuroSCORE= 25.92% and STS score 15.6%). Echocardiography demonstrated decreased left ventricular ejection fraction (LVEF 30%) and severe calcified bicuspid aortic stenosis (Figure 1) with valve area of 0.6 cm^2 and mean transvalvular gradient of 45 mmHg. Aortic annulus diameter measured as 24 mm and ascending aorta 33 mm. In addition, he had moderate mitral regurgitation, and moderate tricuspid regurgitation with estimated pulmonary artery pressure of 60 mmHg. Coronary artery angiogram revealed no significant coronary disease.

A 29 mm CoreValve device was successfully implanted percutaneously through the right femoral artery. Immediate post procedure echocardiography (Figure 2) and aortography revealed moderate paravalvular leak and 4 mm shift of the implanted valve toward the ventricular side. Patient was discharged from hospital on the 7th day. Follow up echocardiographic examination on the sixth month, paravalvular leak was decreased to mild-moderate degree and mean transvalvular gradient was 9 mmHg. Also, aortic valve area increased to 1.8 cm^2 and left ventricular ejection fraction to 40%. Patient's functional capacity improved to NYHA Class I-II.

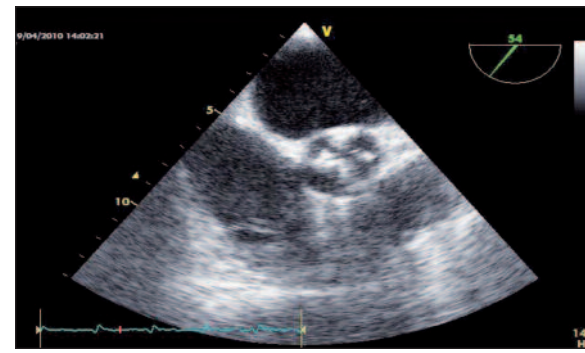

FIGURE 1: Calcified bicuspid aortic valve.
(See color figure at
http://www.turkiyeklinikleri.com/journal/cardiovascular-sciences/1306-7656/)

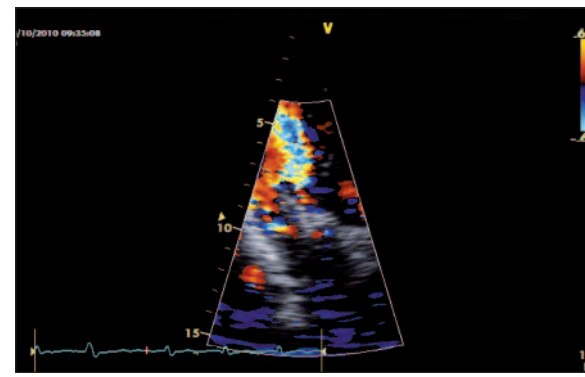

FIGURE 2: Post procedure aortic regurgitation transthoracic echocardiography five-chamber view.
(See color figure at
http://www.turkiyeklinikleri.com/journal/cardiovascular-sciences/1306-7656/)

DISCUSSION

Transcatheter aortic valve implantation (TAVI) has emerged as an alternative to surgical aortic valve replacement for patients with symptomatic severe aortic stenosis and frail who is considered to be at very high or prohibitive operative risk.[1,2] Frailty is defined as a nonspecific state of vulnerability. The use of a standardized approach based on measurable factors (weakness, weight loss, exhaustion, low physical activity, and slowed walking speed) and validated indices is recommended to limit subjectivity.[3]

There are currently two percutaneous heart valves in clinical trials, the balloon-expandable Cribier-Edwards and Edwards SAPIEN valve (Edwards Lifesciences, Irvine, California), and the self-expanding CoreValve (Medtronic, Minneapolis). The selection of the TAVI valve and the approach is based on size, calcification and tortuosity of the femoral and iliac arteries, the calcification of the aortic arch and size of the annulus.

Bicuspid aortic valve (BAV) is a common inborn error in our country and causing troubles in the management of high risk patients in terms of approach. Although BAV is regarded as a relative contraindication to transcatheter aortic valve implantation several reports stated their TAVI expe-

riences with Edwards SAPIEN valve in patients with BAV.[4] Lower part of CoreValve's has the high radial expansion force to prevent valve to escape back, while the upper part of the stent is expanded in ascending aorta in order to fix the valve to aorta and the longitudinal stability achieved in this way. CoreValve mainly differs from Edwards SAPIEN valve device as it has self expandability feature. This feature increases the compliance with the different aortic dimensions of the device.[5] Also upper part of the valve is further expanded to fix it better to the ascending aorta. We elected to place CoreValve in our patient since it supports the aortic root better.

Paravalvular insufficiency was higher in the first generation valves but with the new jeneration valves severe and moderate paravalvular insufficiency occurs less and mild to moderate paravalvular insufficiency is tolerated well. Significant paravalvular leak may occur after TAVI due to wrong placement of the prosthesis, selection of smaller size valve, severe calcification of native valve's tips or bicuspid aortic valve.[6] In our patient, moderate paravalvular insufficiency developed after procedure and this happened most likely due to little malpositioning and native bicuspid aortic valve.

Finally, TAVI experience with BAV is limited. How to approach patients with high risk for surgery is not known well yet. Although successful in our case, paravalvular aortic insufficiency is an important problem with these patients.

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