

## Intermittent dysfunction of prosthetic aortic valve causing acute coronary syndrome

*Akut koroner sendroma neden olan protez aort kapakçığının intermitan disfonksiyonu*

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Intermittent dysfunction of prosthetic aortic valve is a rare, but life-threatening condition which may be difficult to recognize. The clinical presentation, include a severe acute ischemia due to the load/perfusion mismatch or heart failure. In this article, we report a case of intermittent dysfunction of prosthetic aortic valve in a 37-year-old female case who underwent Bentall operation five years ago for bicuspid aortic valve stenosis with ascending aortic aneurysm. An electrocardiogram showed sinus tachycardia with transient ST elevation in leads aVR and V1 and ST depression in leads I, II, III, aVF and V3-V6. Physical examination and laboratory results were normal but transthoracic echocardiography showed, a flap like pannus arising from the valve near the left main ostium. Coronary angiography showed normal coronaries. The patient was scheduled for surgery and a pannus was excised. Postoperative course was uneventful.

**Key words:** Acute coronary syndrome; intermittent aortic regurgitation; pannus.

Complications of any mechanical prosthesis include thrombus or pannus formation,<sup>[1]</sup> and both require prompt diagnosis and treatment as they can be life-threatening.<sup>[1]</sup> The presenting symptoms and clinical signs of these complications are consistent but non-specific and can include embolism, obstruction, or acute valvular regurgitation of a cyclic pattern.<sup>[1,2]</sup> Echocardiography is the diagnostic tool of choice in this acute setting.<sup>[1-6]</sup> In this report, we present a case of non-cyclic failure in the closure of a valvular leaflet resulting in possible acute massive aortic regurgitation

Protez aort kapakçığının intermitan disfonksiyonu nadir, fakat saptanması güç olabilen yaşamı tehdit eden bir durumdur. Klinik tablo kendini yük/perfüzyon dengesizliğine bağlı şiddetli bir akut iskemi veya kalp yetmezliği olarak gösterebilir. Bu yazıda inen aort anevrizması ile birlikte biküspid aort kapakçık stenozu nedeniyle beş yıl önce Bentall ameliyatı yapılan, protez aort kapakçığında intermitan disfonksiyon olan 37 yaşında bir kadın olgu sunuldu. Elektrokardiyografide aVR ve V1 derivasyonlarda geçici ST yükselmesinin eşlik ettiği sinüs taşikardi ve I, II, III, aVF ve V3-V6 derivasyonlarında ST çökmesi izlendi. Fizik muayene ve laboratuvar sonuçları normal olmakla birlikte, transtorasik ekokardiyografide sol ana ostiumun yakınındaki kapaktan köken alan flep benzeri pannus izlendi. Koroner anjiyografide koronerler normaldi. Hastaya ameliyat planlandı ve pannus eksize edildi. Ameliyat sonrası dönem sorunsuzdu.

**Anahtar sözcükler:** Akut koroner sendrom; intermitan aort yetmezliği; pannus.

that led to symptoms of acute coronary syndrome (ACS).

### CASE REPORT

A 37-year-old female who had undergone aortic root replacement via a modified Bentall operation using a 25 mm Medtronic valve graft conduit (Medtronic Inc., Minneapolis, MN, USA) five years previously presented to the emergency room with a 15-20-day history of repeated intermittent chest pain. A physical



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examination revealed a heart rate of 140/minute and blood pressure of 126/80 mmHg. On admission, the patient was clinically stable according to a normal electrocardiogram (ECG). In view of this, a Holter monitor study was conducted, and the results were normal. In addition, only occasional atrial and ventricular premature contractions were noticed. Her international normalized ratio (INR) was 2.8 with normal troponin-I levels. A transthoracic echocardiogram (TTE) showed a flap-like pannus near the left main ostium (Figure 1), normal prosthetic aortic valve functions, no valvar or paravalvar leaks, and no wall motion abnormality. Furthermore, a computed tomography (CT) scan of the thorax did not show any additional relevant information. Because of the suspicion of ACS, coronary angiography was performed, but it revealed nothing out of the ordinary. The patient developed similar complaints two days after admission to our facility, and a repeat ECG showed sinus tachycardia with transient ST elevation in the leads augmented vector right (aVR) and V1 and ST depression in leads I, II, III, augmented vector left (aVL) and V3-V6 (Figure 2), but this resolved within five to 10 minutes. Heparin infusion, and sorbitrate were then started, and a physical examination at that time revealed the absence of a valve click and severe hypotension (systolic blood pressure of 60 mmHg) with nearly a loss of consciousness and concomitant cardiogenic shock. The patient recovered spontaneously, and a new ECG showed no significant abnormalities. A TTE revealed a normally functioning prosthetic aortic valve and close to normal left ventricular (LV) function with the same flap-like pannus near the left main ostium. The diagnosis of acute aortic regurgitation (AR) and ACS caused by a valve that was stuck open was then made. An urgent reoperation was performed in which a left femorofemoral bypass was established, and the patient underwent a sternotomy

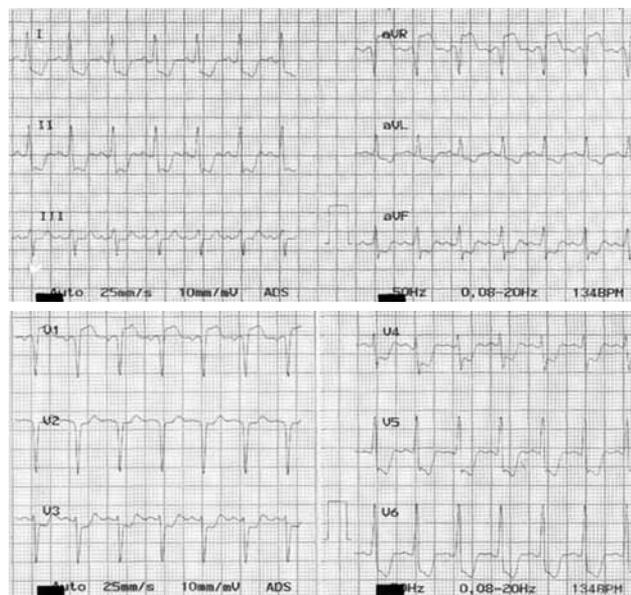


**Figure 1.** Transthoracic echocardiography showing the small pannus beneath the sewing ring (arrow).

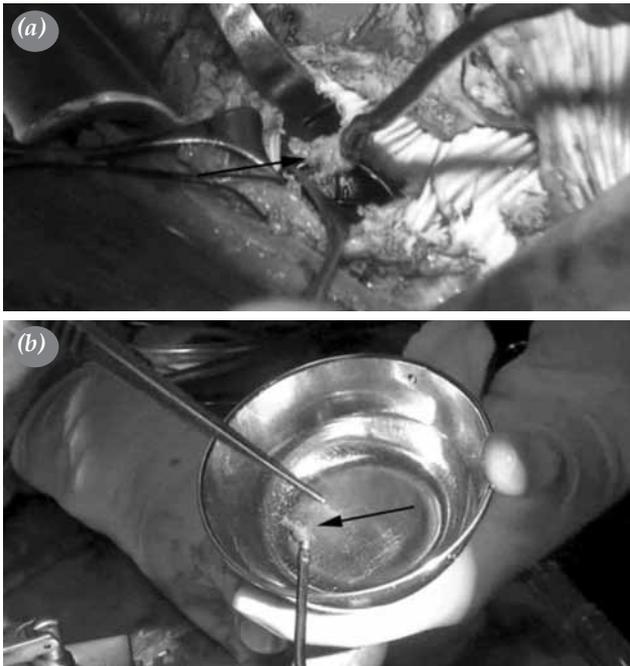
with an oscillating saw as well. Once the chest was opened, the adhesions were released, and the conduit was opened vertically. Next, the prosthetic valve was inspected, and the valve leaflet appeared to be opening and closing well. However, there was a pannus below the sewing ring that was possibly obstructing the closure of the leaflet (Figure 3a, b). It was excised, and the area near the left main ostium was then free from the pannus or thrombus. A clean saline wash was applied, and the aortotomy was closed using 4-0 polypropylene. The patient was then rewarmed and weaned off of the cardiopulmonary bypass (CPB) with stable hemodynamics. Postoperative echocardiography showed a normally functioning aortic valve, an aortic valve gradient (AVG) of 7/4 mmHg, good biventricular function, and no pericardial effusion or pannus. Her postoperative course was uneventful, and the patient was discharged after 12 days. At her three-month follow-up, the patient was asymptomatic and a TTE revealed a normally functioning aortic prosthesis.

## DISCUSSION

In comparison with the mitral position, intermittent prosthetic regurgitation in the aortic position is very rare,<sup>[1-4]</sup> with only a few cases of acute intermittent AR having been reported in the literature.<sup>[5]</sup> Not only did our patient have intermittent AR, but this also occurred after aortic root replacement, making this case an extremely unusual with only a few other similar documented cases.<sup>[1-3]</sup> Galli



**Figure 2.** Electrocardiogram showing the sinus tachycardia with transient ST elevation in leads augmented vector right and V1 along with the ST depression in leads I, II, III, aVL, and V3-V6.



**Figure 3.** Intraoperative images of (a) the pannus tissue being removed (arrow) and (b) the small pannus tissue after excision (arrow).

et al.,<sup>[4]</sup> strongly suggested that the intermittent nature of the AR is due to subvalvular pannus overgrowth on the inflow aspect of the prosthesis. This can impede the normal closing of the leaflet intermittently, leading to the phasic AR.<sup>[1-6]</sup> Single tilting disc prostheses are more prone to develop this condition,<sup>[1]</sup> and it has also been linked to subvalvular nonobstructing pannus.<sup>[2]</sup> In addition, intermittent prosthetic aortic valve regurgitation (AVR) can present as severe acute ischemia<sup>[3]</sup> from the load/perfusion mismatch or as heart failure (HF); therefore, prompt recognition can save lives. Given the fact that the valve may appear almost normal in between the episodes, valve malfunction may be difficult to identify.<sup>[5,6]</sup> The loss of normal diastolic pressure decay in the arterial pressure waveform together with the absence of an audible click could indicate this problem, and it should be monitored by a careful, repeated echocardiographic interrogation of the valve during the episode of hemodynamic instability.<sup>[5,6]</sup> Transthoracic echocardiography is a quick and effective tool that is commonly used to diagnose this rare condition.<sup>[1-6]</sup> Treatment for these serious complications is controversial, but thrombolysis seems to be the first choice in cases of thrombus formation and a reoperation is usually performed in patients with pannus formation.<sup>[1,4]</sup> Montero et al.<sup>[7]</sup> and Dhawan et al.<sup>[8]</sup>

reported that the mortality rate is high in patients who had undergone prosthetic valve replacement and requiring re-operations. The mortality rate is up to 40% in patients undergoing redo valve replacement than mortality of 8% in patients undergoing thrombectomies and valve rotation. They further added that replacement of the prosthetic valve should be limited to cases of extensive, circular pannus underlying the thrombus-like material. In addition, replacement is necessary when the primary mechanical cause (e.g., disc wear, mobile module strut, irregular ring contour) has been identified.<sup>[7,8]</sup>

Park et al.<sup>[9]</sup> believed that saving the original prosthetic valve could contribute to a shortening of the ischemic time, a decrease in the possibility of paravalvular leakage, and the prevention of arrhythmic complications.

In our case, aortic root replacement was performed using a 25 mm Medtronic tilting disc aortic valve graft conduit (Medtronic Inc., Minneapolis, MN, USA) because the patient presented with randomly repeated episodes of unstable angina and cardiogenic shock with spontaneous recovery. The cause was small subvalvar pannus, which produced acute intermittent AR that caused ACS. The absence of an audible click in the clinical examination during the episodes, the ECG findings, and the TTE results led to our diagnosis of this rare condition. In view of its small size, the removal of the pannus was sufficient to treat the cause of the intermittent AR in our case. The patient's postoperative TTE was normal, and her follow-up visit at three months showed a normally functioning aortic prosthesis.

In conclusion, even in the presence of a virtually normally functioning mechanical prosthesis, an intermittent non-cyclic block that is not seen on TTE can be diagnosed by the loss of normal diastolic pressure fall-off in the arterial pressure waveform along with the absence of an audible click, abnormalities in the ECG findings, and repeated careful echocardiographic interrogation of the valve during the episode of hemodynamic instability. In cases involving a small pannus, surgical removal is sufficient. The replacement of the prosthetic valve should be limited to cases of extensive, circular pannus underlying the thrombus-like material, or to situations in which the primary mechanical cause is known.

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