

## Acute type A aortic dissection and left main coronary artery obstruction detected by transesophageal echocardiography

Transözofageal ekokardiyografi ile saptanan akut tip A aort diseksiyonu ve sol ana koroner arter tıkanıklığı

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A 63-year-old man was admitted with severe chest pain. The electrocardiogram demonstrated ST-segment depression in the anterior and lateral leads suggesting acute anterior myocardial ischemia. Contrast-enhanced thoracic computed tomography performed due to severe back pain showed acute dissection of the descending aorta. Coronary angiography showed normal coronary arteries. Transesophageal echocardiography revealed a Stanford type A aortic dissection involving the left main coronary ostium and causing left main coronary occlusion. The dissected flap caused partial obstruction of the coronary ostium and occasional separation of the lumen, resulting in nonsustained ventricular tachycardia. At emergency operation, the entry of the dissection was seen in the ascending aorta and the dissection extended throughout almost the entire sinus of Valsalva and the left main coronary trunk. The aortic flap was seen in the coronary ostium. Both the right and left coronary arteries were prepared widely and sutured directly to a composite graft. The ascending aorta was replaced with a composite graft through a Bentall procedure. Descending aortic repair was planned for a subsequent operation. The patient was hemodynamically stable for three weeks, but then developed respiratory insufficiency due to severe nosocomial pneumonia and died one month after the operation.

**Key words:** Aneurysm, dissecting/surgery; angiography; aortic aneurysm/surgery; coronary occlusion; echocardiography, transesophageal.

When a Stanford type A aortic dissection extends to the left main trunk of the coronary artery, catastrophic hemodynamic changes occur, frequently resulting in sudden death.<sup>[1,2]</sup> Several case reports of type A aortic dissection in combination with myocardial infarction have been published, and in almost all these cases

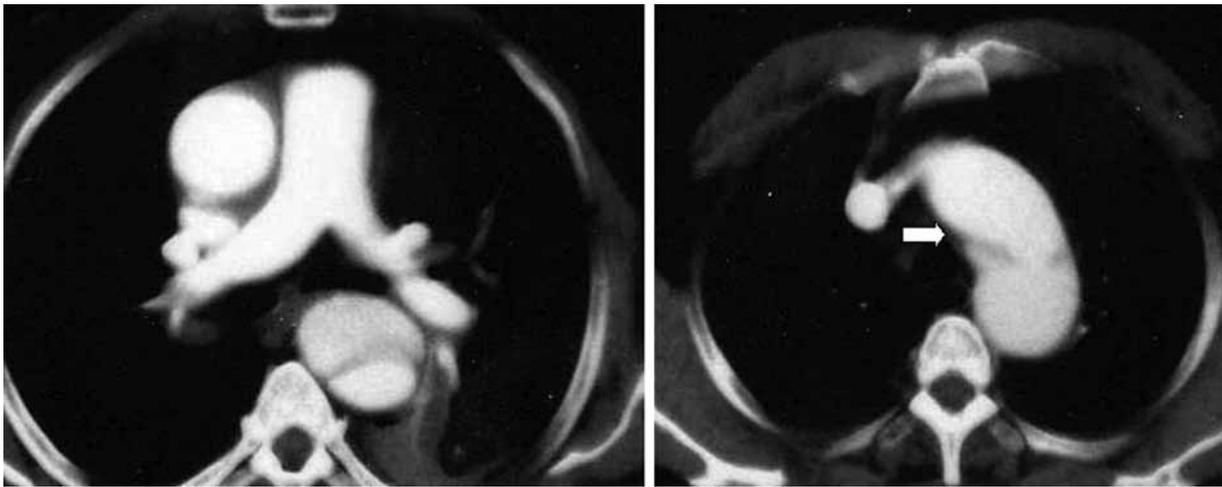
Altmış üç yaşında erkek hasta şiddetli göğüs ağrısı ile yatırıldı. Elektrokardiyografide, anterior ve lateral derivasyonlarda, akut anterior miyokart iskemisini gösteren ST-segment çökmesi izlendi. Şiddetli sırt ağrısı nedeniyle çekilen kontrastlı göğüs bilgisayarlı tomografisinde inen aortta akut diseksiyon görüldü. Koroner anjiyografide koroner arterler normal bulundu. Transözofageal ekokardiyografide, sol ana koroner ostiyumunu tutan ve sol ana koroner arter tıkanıklığına yol açan Stanford tip A aort diseksiyonu saptandı. Diseksiyon flebinin koroner ostiyumda kısmi tıkanıklığa yol açması ve zaman zaman lümeni ikiye bölmesi nedeniyle hastanın sürekli olmayan ventrikül taşikardisine girdiği gözlemlendi. Acil ameliyata alınan hastada diseksiyon girişinin çıkan aortta olduğu ve diseksiyonun neredeyse tüm Valsalva sinüsüne ve sol ana koroner arter gövdesine uzandığı görüldü. Aort flebi koroner ostiyumu içindeydi. Sağ ve sol koroner arterler geniş olarak hazırlandı ve kompozit grefte doğrudan dikildi. Çıkan aort Bentall prosedürüyle kompozit greft ile değiştirildi. İnen aort onarımı ise ikinci bir ameliyata bırakıldı. Ameliyat sonrası üç hafta hastanın hemodinamisi iyi seyretmesine rağmen, şiddetli hastane içi pnömoniye bağlı solunum yetmezliği gelişmesi üzerine hasta ameliyattan bir ay sonra kaybedildi.

**Anahtar sözcükler:** Anevrizma, diseksiyon/cerrahi; anjiyografi; aort anevrizması/cerrahi; koroner arter tıkanıklığı; ekokardiyografi, transözofageal.

the right coronary artery was involved.<sup>[3-6]</sup> We report on a case of type A aortic dissection with severe cardiogenic shock due to involvement of the left main coronary ostium and aortic valve. In this case, the ascending aortic dissection could not be shown with contrast-enhanced computed tomography (CT) but

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**Figure 1.** Computed tomography scans showing dissection of the descending aorta. Arrow: Intimal flap.

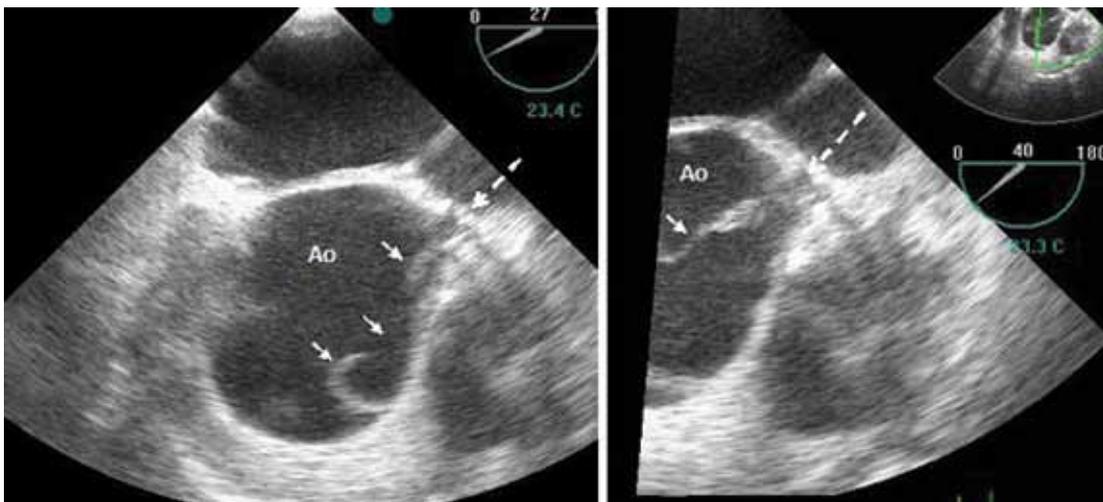
only with transesophageal echocardiography (TEE). To our knowledge, it is the first case in the literature reporting associated intermittent partial obstruction of the left coronary ostia resulting in ventricular tachycardia.

### CASE REPORT

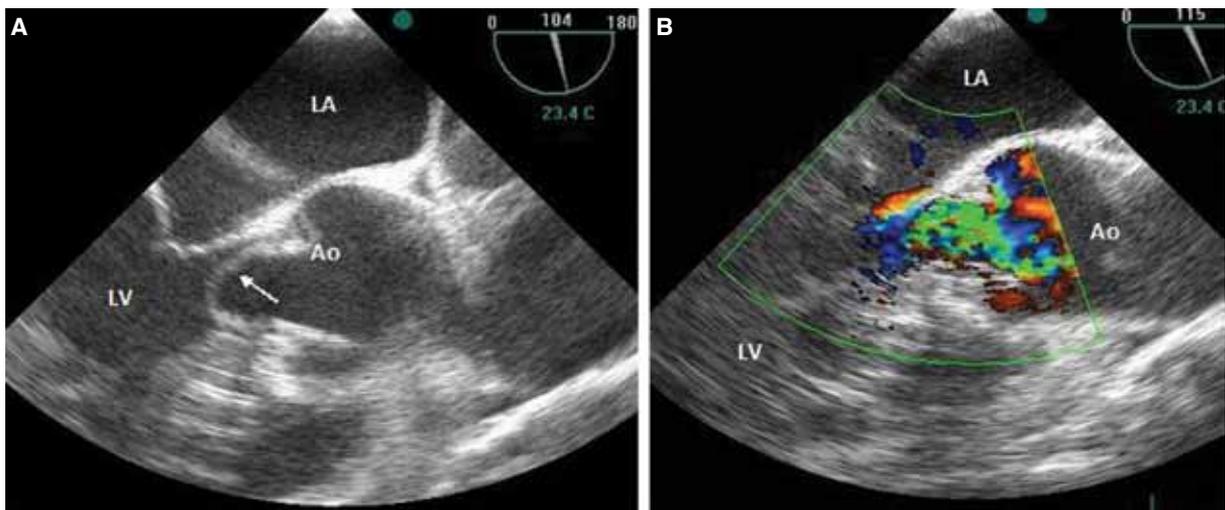
A 63-year-old man was admitted to our hospital with severe chest pain. The electrocardiogram demonstrated ST-segment depression in the anterior and lateral leads suggesting acute anterior myocardial ischemia. Contrast-enhanced thoracic CT performed due to severe back pain of the patient showed acute dissection of the descending aorta (Fig 1). Coronary angiography via the right brachial approach showed normal coronary arteries. The patient was intubated due to hemodynamic instability. Transesophageal

echocardiography revealed a Stanford type A aortic dissection involving the left main coronary ostium and the aortic valve resulting in left main coronary artery occlusion and severe aortic valve regurgitation, respectively (Fig. 2, 3). Moreover, it was observed during TEE evaluation that the dissected flap caused partial obstruction of the coronary ostium and occasional separation of the lumen, resulting in nonsustained ventricular tachycardia. The dissection was extending to the aortic arch and descending aorta.

An emergency operation was undertaken under general anesthesia and through a median sternotomy. Shortly afterwards, the QRS waveform on the electrocardiogram monitor became wider, and it soon changed to ventricular fibrillation. Cardiac massage was immediately performed until a cardiopulmonary bypass was initiated. An aortotomy revealed that the



**Figure 2.** Transesophageal echocardiograms showing intermittent obstruction of the left main coronary artery due to separation of the lumen by the intimal flap. AO: Aorta; Arrows: Intimal flap; Dotted line with the arrowhead: Left main coronary artery.



**Figure 3.** (A) The intimal flap is passing into the left ventricle through the aortic valve. (B) Severe aortic insufficiency caused by the flap. AO: Aorta; LA: Left atrium; LV: Left ventricle; Arrow: Intimal flap.

entry of the dissection was in the ascending aorta and extended throughout almost the entire sinus of Valsalva and the left main trunk of the coronary artery. The aortic flap was seen in the coronary ostium but fortunately, the inside of the coronary artery was intact. Aortic valve repair was impossible due to involvement and destruction of the valve. Both the right and left coronary arteries were prepared widely and sutured directly to a composite graft. The ascending aorta was replaced with a composite graft through a Bentall procedure without total circulatory arrest. Descending aortic repair was planned for a subsequent operation. The patient remained hemodynamically stable till postoperative three weeks, but then developed respiratory insufficiency due to severe nosocomial pneumonia caused by *Acinetobacter* sp. and died one month after the operation.

## DISCUSSION

An acute type A aortic dissection combined with left main coronary trunk obstruction is one of the most lethal conditions, requiring a prompt and accurate diagnosis and appropriate surgical treatment to save the patient. However, it is difficult to make a differential diagnosis between the usual myocardial infarction related to an atherosclerotic process and that due to the extension of the aortic dissection into the coronary ostia. Only meticulous evaluation of the ascending aorta upon suspicion of this entity with transthoracic or transesophageal echocardiography and CT, when possible, may allow for a prompt diagnosis. Confirmation of the proximal beginning entry point of the dissection is crucial in terms of the treatment strategy in aortic dissections. When an acute type A

aortic dissection is diagnosed, the patient should be submitted to emergency operation with the primary goal to minimize morbidity and mortality, while acute type B dissections can be followed by medical treatment until development of end-organ malperfusion or a descending aneurysm.

Despite high sensitivity (83%-94%) and specificity (87%-100%) rates reported in large prospective studies on the evaluation of aortic dissections with conventional contrast-enhanced CT,<sup>[7,8]</sup> in our case, this modality could show the dissection only in the descending aorta, but not in the ascending aorta (Fig. 1). Contrast-enhanced CT may fail to demonstrate an intimal flap due to insufficient contrast enhancement of the aortic lumen caused by improper timing of contrast administration or slow injection rate, yielding a false-negative diagnosis.<sup>[9]</sup> Additionally, coronary angiography showed normal coronary anatomy with an intact left main coronary ostium. Eventually, intermittent left main coronary obstruction was demonstrated only by TEE before the operation. Interestingly, it was noted that intermittent left main coronary obstruction occasionally altered to full obstruction resulting in non-sustained ventricular tachycardia.

Even though a definite method to rescue the infarcted myocardium has yet to be established, it is important to restore the coronary circulation as quick as possible. Surgical procedure for coronary artery dissections may vary depending on the severity. Neri et al.<sup>[5]</sup> classified aortic dissections into three main types in relation to coronary malperfusion: type A, ostial dissection; type B, dissection with a coronary false lumen; and type C, circumferential detachment

with an inner cylinder intussusception. However, some authors recommend coronary ostium repair or to perform coronary bypass even for type A coronary dissections. Aortic tissue in this area may be fragile and the needle holes may dissect the coronary artery. In our case, the coronary artery orifice was carefully observed from the inside of the aorta and no additional procedure was deemed necessary, because the inner aortic tissue was strong enough and the coronary artery itself showed no dissection. Hemodynamic stability observed after the operation shows that surgical coronary intervention was successful.

In conclusion, TEE was superior to contrast-enhanced CT in providing critical information on the features of a Stanford type A aortic dissection involving the left main trunk of the coronary artery and causing intermittent intimal flap obstruction.

## REFERENCES

1. Zegers ES, Gehlmann HR, Verheugt FW. Acute myocardial infarction due to an acute type A aortic dissection involving the left main coronary artery. *Neth Heart J* 2007;15:263-4.
2. DeSanctis RW, Doroghazi RM, Austen WG, Buckley MJ. Aortic dissection. *N Engl J Med* 1987;317:1060-7.
3. Horszczaruk GJ, Roik MF, Kochman J, Bakoń L, Stolarz P, Pachó R, et al. Aortic dissection involving ostium of right coronary artery as the reason of myocardial infarction. *Eur Heart J* 2006;27:518.
4. Kawahito K, Adachi H, Murata S, Yamaguchi A, Ino T. Coronary malperfusion due to type A aortic dissection: mechanism and surgical management. *Ann Thorac Surg* 2003;76:1471-6.
5. Neri E, Toscano T, Papalia U, Frati G, Massetti M, Capannini G, et al. Proximal aortic dissection with coronary malperfusion: presentation, management, and outcome. *J Thorac Cardiovasc Surg* 2001;121:552-60.
6. Pêgo-Fernandes PM, Stolf NA, Hervoso CM, Silva JM, Arteaga E, Jatene AD. Management of aortic dissection that involves the right coronary artery. *Cardiovasc Surg* 1999;7:545-8.
7. Sommer T, Fehske W, Holzknacht N, Smekal AV, Keller E, Lutterbey G, et al. Aortic dissection: a comparative study of diagnosis with spiral CT, multiplanar transesophageal echocardiography, and MR imaging. *Radiology* 1996;199:347-52.
8. Erbel R, Alfonso F, Boileau C, Dirsch O, Eber B, Haverich A, et al. Diagnosis and management of aortic dissection. *Eur Heart J* 2001;22:1642-81.
9. Batra P, Bigoni B, Manning J, Aberle DR, Brown K, Hart E, et al. Pitfalls in the diagnosis of thoracic aortic dissection at CT angiography. *Radiographics* 2000;20:309-20.