

Anomalous right coronary artery from the left sinus of Valsalva presenting a challenge for percutaneous coronary intervention

Sol Valsalva sinüsünden köken alan anormal sağ koroner artere perkütan koroner girişimin güçlükleri

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A 41-year-old man presented with worsening angina. Coronary angiography showed 70% narrowing in the middle segment of the left anterior descending (LAD) coronary artery. Selective cannulation of the right coronary artery (RCA) could not be achieved with Judkins right 3.5- and 4.0-cm curve diagnostic catheters. Nonselective injection into the aortic root revealed an anomalous RCA originating from the left sinus of Valsalva and 80% narrowing just proximal to the right ventricle branch. Initial percutaneous coronary intervention (PCI) was directed to the LAD and an adequate angiographic result was achieved. One week later, PCI was performed for the RCA. Cannulation of the RCA was not possible with Judkins curve guiding catheters (right 4 and 5 cm; left 4, 5, and 6 cm). Eventually, selective cannulation was achieved with a 7-F multipurpose Hockey Stick guiding catheter and stent placement was accomplished. The patient had an uneventful recovery. The use of a multipurpose Hockey Stick catheter may be considered when the usual techniques fail to cannulate an anomalous RCA.

Key words: Angioplasty, transluminal, percutaneous coronary; coronary angiography; coronary vessel anomalies; heart catheterization; sinus of Valsalva; stents.

Kırk bir yaşında erkek hasta kötüleşen angina yakınımasıyla başvurdu. Yapılan koroner anjiyografide sol ön inen (LAD) koroner arterin orta bölümünde %70 darlık görüldü. Sağ koroner arterde (RCA) Judkins sağ 3.5 ve 4.0 cm'lik tanısal kateterler ile selektif kanülasyon sağlanamaması üzerine, aort köküne nonselektif injeksiyonla, sol Valsalva sinüsünden köken alan anormal RCA ve sağ ventrikül dalının hemen proksimalinde %80 darlık görüntüledi. İlk perkütan koroner girişim (PKG) LAD'ye yapılarak yeterli anjiyografik sonuç sağlandı. Bir hafta sonra tekrarlanan PKG'de Judkins tanısal kateterler (sağ 4 ve 5 cm; sol 4, 5 ve 6 cm) ile RCA'nın kanülasyonu yine gerçekleştirilemedi. Sonunda, çokamaçlı 7-F *Hockey Stick* kılavuz kateter ile selektif kanülasyon sağlanabildi ve artere stent yerleştirildi. Girişimden sonra hasta sorunsuz şekilde iyileşti. Anormal RCA'lı olgularda alışılmış tekniklerle kanülasyonunun sağlanamadığı durumlarda çokamaçlı *Hockey Stick* kılavuz kateter kullanılması işe yarayabilir.

Anahtar sözcükler: Anjiyoplasti, transluminal, perkütan koroner; koroner anjiyografi; koroner damar anomalisi; kalp kateterizasyonu; Valsalva sinüsü; stent.

Various anomalies of coronary artery origin have been described in the literature. Anomalous right coronary artery (RCA) from the left sinus of Valsalva is found only in about 0.003% to 0.9% of patients undergoing coronary angiography.^[1,2] The anomalous RCA ostium originates either from within the left coronary sinus or from the left aortic wall above the sinotubular line. In either type, it courses between the ascending aorta posteriorly and pulmonary trunk anteriorly. This anomaly has

been found in necropsy studies of young individuals with sudden, unexpected death.^[1] It is not rare to see individuals in late adulthood presenting with an anomalous RCA from the left sinus of Valsalva with coexistent atherosclerotic disease. Because of the unusual location and the noncircular coronary orifice of this anomaly, selective catheterization and percutaneous coronary intervention (PCI) may be technically challenging, particularly with regard to adequate guide-catheter support. We report a case

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in which a different technique was utilized for stent implantation in an anomalous RCA.

CASE REPORT

A 41-year-old man was evaluated in our cardiology outpatient clinic for worsening angina of class IC according to the Braunwald unstable angina pectoris classification. He had a history of hypertension, hypercholesterolemia, acute anterior myocardial infarction and current smoking. Coronary angiography showed normal left main coronary artery and left circumflex artery, but there was 70% narrowing in the middle segment of the left anterior descending (LAD) coro-

nary artery. Selective cannulation of the RCA could not be achieved with either Judkins right 3.5- or 4.0-cm curve diagnostic catheters. Nonselective injection into the aortic root revealed an aberrant origin of the RCA from the left coronary sinus of Valsalva, with 80% narrowing just proximal to the right ventricular branch (Fig. 1a, b). Initially, intervention was directed to the LAD and an adequate angiographic result was achieved. One week later and after dual antiplatelet therapy with aspirin and clopidogrel, PCI was performed for the RCA. Cannulation of the RCA was not possible with Judkins right 4- and 5-cm curve guiding catheters and Judkins left 4-, 5-, and 6-cm catheters.

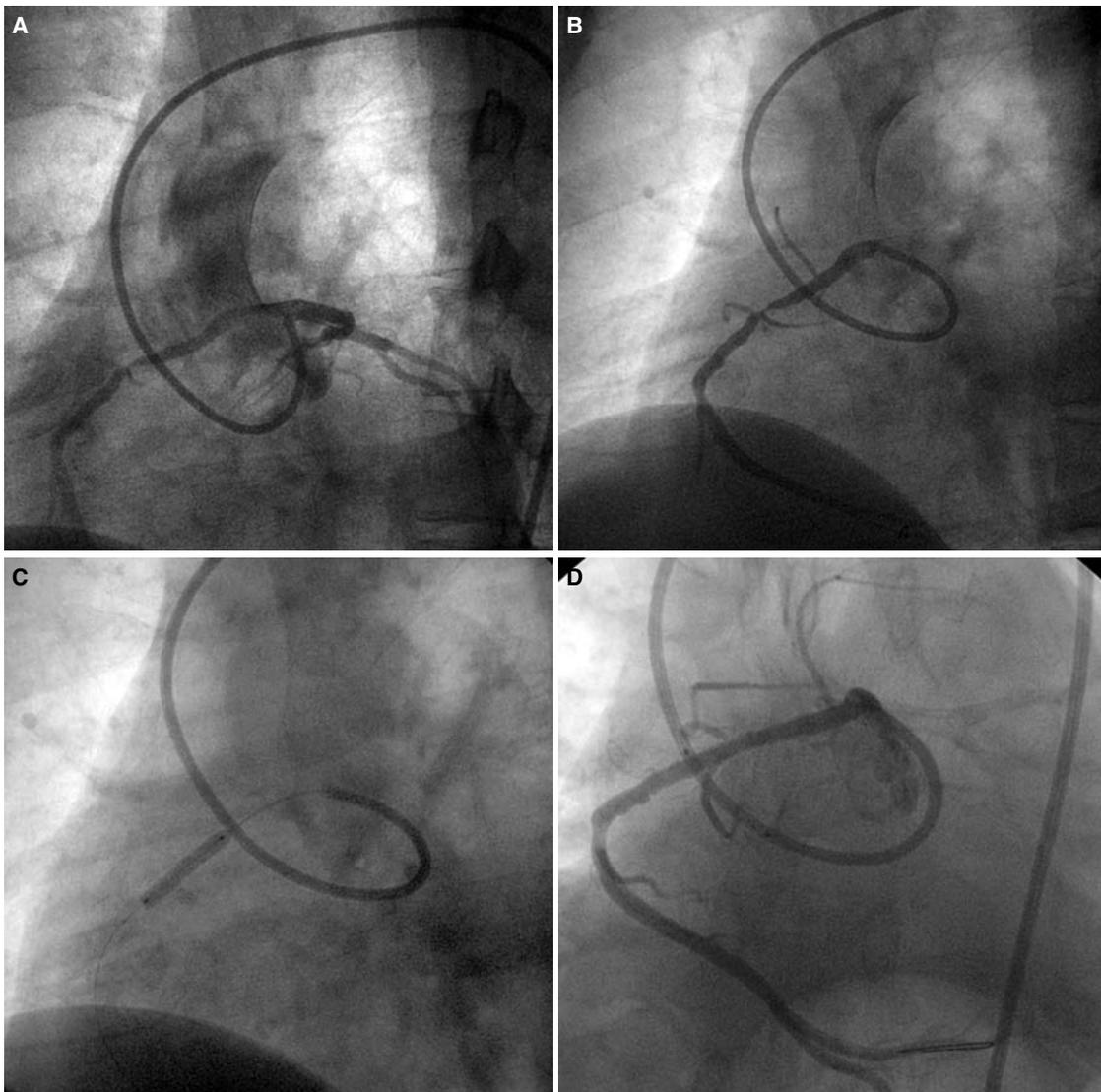


Figure 1. (A) Left lateral and (B) anteroposterior caudal views of an anomalous right coronary artery originating from the left sinus of Valsalva. (C) Selective cannulation was achieved with a 7-F multipurpose Hockey Stick guiding catheter and stent implantation was accomplished. (D) Anteroposterior caudal view of the anomalous right coronary artery following stent implantation.

Eventually, selective cannulation was achieved with a 7-F multipurpose Hockey Stick guiding catheter (Boston Scientific; Natick, MA, USA). The lesion was crossed with a 0.0014-inch floppy guide wire (Boston Scientific). Direct stent placement was accomplished with a 2.5-10 mm stent (Fig. 1c). The residual stenosis was less than 10% (Fig. 1d). At the beginning of the procedure, 70 U/kg unfractionated heparin was given intravenously and activated clotting time was effective during PCI. After the procedure, dual antiplatelet therapy was continued. The patient had an uneventful recovery and was discharged on the second day on antiplatelet, beta-blocker, and statin therapies. Subsequent evaluation of the coronary anatomy with multislice computed tomography confirmed the anomalous origin of the RCA from the left sinus of Valsalva.

DISCUSSION

Selective catheterization of an anomalous RCA may be technically difficult. The acute angle of the origin of anomalous RCA with the aorta can create a slit-like orifice that may prevent selective cannulation, coaxial alignment, and adequate guide catheter support, which are essential for PCI. In our patient, selective cannulation attempts with various curve guiding right and left Judkins catheters were unsuccessful. Eventually, selective cannulation was achieved with a 7-F multipurpose Hockey Stick guiding catheter. The Hockey Stick guiding catheter provided an excellent backup support for delivery of the angioplasty balloon and stent.

Although the overall percentage of coronary anomalies is relatively low, interventional cardiologists will encounter unusual cases. Selective cannulation of aberrant arteries can be difficult and time-consuming. Knowledge of variations in coronary artery origin can help in selecting appropriate catheters for diagnostic and therapeutic intervention.^[3] Specifically, anomalous origin of the RCA from the left sinus of Valsalva was reported in 0.02% to 0.17% of coronary angiographies.^[4] The artery is most commonly situated anterior and cephalad to the left main coronary artery. It typically makes an acute caudal and right turn anterior to the aorta and between the great vessels, and then proceed to the right atrioventricular groove.^[5]

The presence of an anomalous RCA arising from the left sinus of Valsalva associated with unusual chest pain or syncope, or provokable inferior ischemia in a young patient requires surgical correction. In the presence of coexistent atherosclerotic disease, an

anomalous RCA, as in our case, may make coronary cannulation and establishing backup support a challenge due to the anterior location of the ostium in the left sinus, the tortuous proximal portion, and initial anterior-caudal and rightward course.^[5] Thus, knowledge on such variations is important for catheter-based treatment or bypass surgery.

The right coronary artery originating from the left sinus of Valsalva or pulmonary artery may be considered to be maliciously anomalous,^[5] because decrease in coronary blood flow may lead to acute myocardial ischemia resulting in cardiac arrhythmias and sudden death.^[6]

There are several case reports on PCI performed for anomalous RCA originating from the left sinus of Valsalva.^[5,7-9] Most of these describe the experience with balloon angioplasty alone using 8-F guiding catheters of different configurations. The Amplatz AL-1 guiding catheter was successfully used in three cases.^[8,9] In two of these cases, a balloon-on-a-wire system had to be used to treat the target lesion because of poor guiding catheter support.^[8,9] Oral et al.^[7] reported that stable support could not be accomplished with the use of an Amplatz AL-2 guiding catheter, and that they were unable to advance the balloon catheter into the anomalous coronary artery. Cohen et al.^[5] reported successful stenting in two cases of anomalous RCA with the use of a 6-F Judkins left 5.0 cm guiding catheter. In our case, we used a multipurpose Hockey Stick guiding catheter.

In order for PCI to be successful in anomalous coronary arteries, optimal guiding catheter seating and catheter backup support should be achieved, both of which may require modifications in the kind of guiding catheter used. We believe that the method described here for cannulation of an aberrant RCA arising from the left sinus of Valsalva will increase the likelihood of technical success. The use of a multipurpose Hockey Stick catheter may be considered when the usual techniques fail to visualize an anomalous RCA.

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