

Successful percutaneous management of occluded “woven” coronary artery: a case report

Skuteczne leczenie przezskórne zamkniętej „tkanej” tętnicy wieńcowej – opis przypadku

Abdurrahman Tasal¹, Ahmet Bacaksiz¹, Ercan Erdogan¹, Zekeriya Küçükdurmaz²

¹Department of Cardiology, Faculty of Medicine, BezmiÂlem Foundation University, Istanbul, Turkey

²Department of Cardiology, Faculty of Medicine, Cumhuriyet University, Sivas, Turkey

Postep Kardiol Inter 2012; 8, 2 (28): 168–172

DOI: 10.5114/pwki.2012.29660

Abstract

“Woven” coronary artery is an uncommon anomaly characterized by the branching of a major epicardial artery into thin channels, which then merge again in order to form the main lumen. Although it is accepted as a benign condition, reduced coronary blood flow and increased shear stress in the narrow braid segments may accelerate atherosclerosis and predispose to the formation of intracoronary thrombus. We describe a 60-year-old man with “woven” left anterior descending and circumflex (Cx) arteries. He had ischemic symptoms due to occlusion in the woven Cx and percutaneous coronary intervention was performed successfully.

Key words: woven coronary artery anomaly, percutaneous coronary intervention

Streszczenie

„Tkana” tętnica wieńcowa jest rzadką anomalią i charakteryzuje się odcinkowym podziałem głównej tętnicy nasierdziejowej na cienkie kanały, które następnie łączą się ponownie, tworząc główne światło naczynia. Choć ten stan uznawany jest za łagodny, zmniejszony przepływ krwi oraz zwiększone napięcie ścinające w wąskich odcinkach „tkanej” tętnicy może przyspieszać rozwój zmian miażdżycowych oraz predysponować do powstawania skrzepliny wewnątrzwieńcowej. Przedstawiamy przypadek 60-letniego mężczyzny z „tkaną” gałęzią przednią zstępującą i gałęzią okalającą (Cx). U pacjenta wystąpiły objawy niedokrwienia spowodowane niedrożnością „tkanej” Cx leczoną skutecznie za pomocą przezskórnej interwencji wieńcowej.

Słowa kluczowe: anomalia w postaci „tkanej” tętnicy wieńcowej, przezskórna interwencja wieńcowa

Introduction

Woven coronary artery is a rare congenital abnormality defined as branching of the epicardial coronary arteries into multiple thin channels at any segment which then cross each other and fuse again to form distal reanastomosis [1]. There have been only a few case reports about patients with this morphology [1-8]. We describe a patient with woven left anterior descending (LAD) and circumflex (Cx) coronary arteries.

Case report

A 60-year-old man with the coronary risk factors of hypertension and a history of cigarette use was admitted to our outpatient clinic with resting chest pain. His phys-

ical examination was unremarkable. The resting 12-lead electrocardiography was within normal limits. Transthoracic echocardiography revealed left ventricular hypertrophy, mild diastolic dysfunction and hypokinesia of the posterolateral wall with an ejection fraction of 55%.

The patient had undergone exercise stress testing one week ago which demonstrated 2 mm horizontal ST depression in leads V4-6. Coronary angiography was performed and revealed dissected plaques in the proximal segments of the LAD and Cx and total occlusion of the distal segment of the Cx. The other coronary arterial segments were angiographically normal. No interventional therapy was performed; the clinicians had decided to perform revascularization with bypass surgery but the patient refused the surgery.

Corresponding author/Adres do korespondencji:

Ahmet Bacaksiz MD, Department of Cardiology, Faculty of Medicine, BezmiÂlem Foundation University, Vatan Street 34093 Fatih, Istanbul, Turkey, tel.: + 90 212 453 17 00, fax: + 90 (212) 621 75 80, e-mail: ahmetbacaxiz@mynet.com

Praca wpłynęła: 19.04.2012, przyjęta do druku: 20.06.2012.

When we reconsidered the coronary angiogram, we saw a total occlusion in the distal segment of the Cx and a significant ostial stenosis in the second obtuse marginal branch (OM2). The coronary angiogram also showed that the Cx and LAD were subdivided into thin channels with a normal flow rate, which fused again (Figure 1). We described the distal Cx, the proximal segment of the OM2 and mid-LAD artery as woven coronary artery anomaly. Some of the channels forming braid segment in the Cx were occluded with retrograde filling from the LAD. We planned to perform percutaneous coronary intervention (PCI) for the lesions in the distal Cx and ostial OM2.

We performed the sequential Culotte approach for both bifurcation lesions using three stents. This technique could be described as initial stenting of the side branches. The main vessel is wired, dilated and stented through the struts of the first and second stents. Finally, the first and second stents are rewired and sequential final kissing inflations are

performed. A 7 Fr Extra back up 3.75 guiding catheter (Launcher, Medtronic Inc, Minneapolis, MN, USA) was used to cannulate the left main artery. Road-map angiograms in right anterior oblique/caudal view revealed occlusion of the channels forming braid segment in the mid Cx with retrograde filling from the LAD (Figure 1). Firstly, the OM2 was wired with a hi-torque Whisper® LS guidewire (Abbott Laboratories, Abbott Park, IL, USA). Another Whisper® LS guidewire was placed in the third OM. A hi-torque Pilot® 150 (Abbott Laboratories, Abbott Park, IL, USA) guidewire was negotiated through the total occlusion. A 1.25 mm × 10 mm over-the-wire angioplasty system (Ryuji Plus®, Terumo, Japan) was used for crossing through the lesion. Some of the thin channels were occluded in the braid segment of Cx so we passed the guidewire through an open channel with the help of an over-the-wire balloon. After passing the occlusion, we performed a puncture and the guidewire re-entered the true lumen in the distal Cx. The coronary angiogram

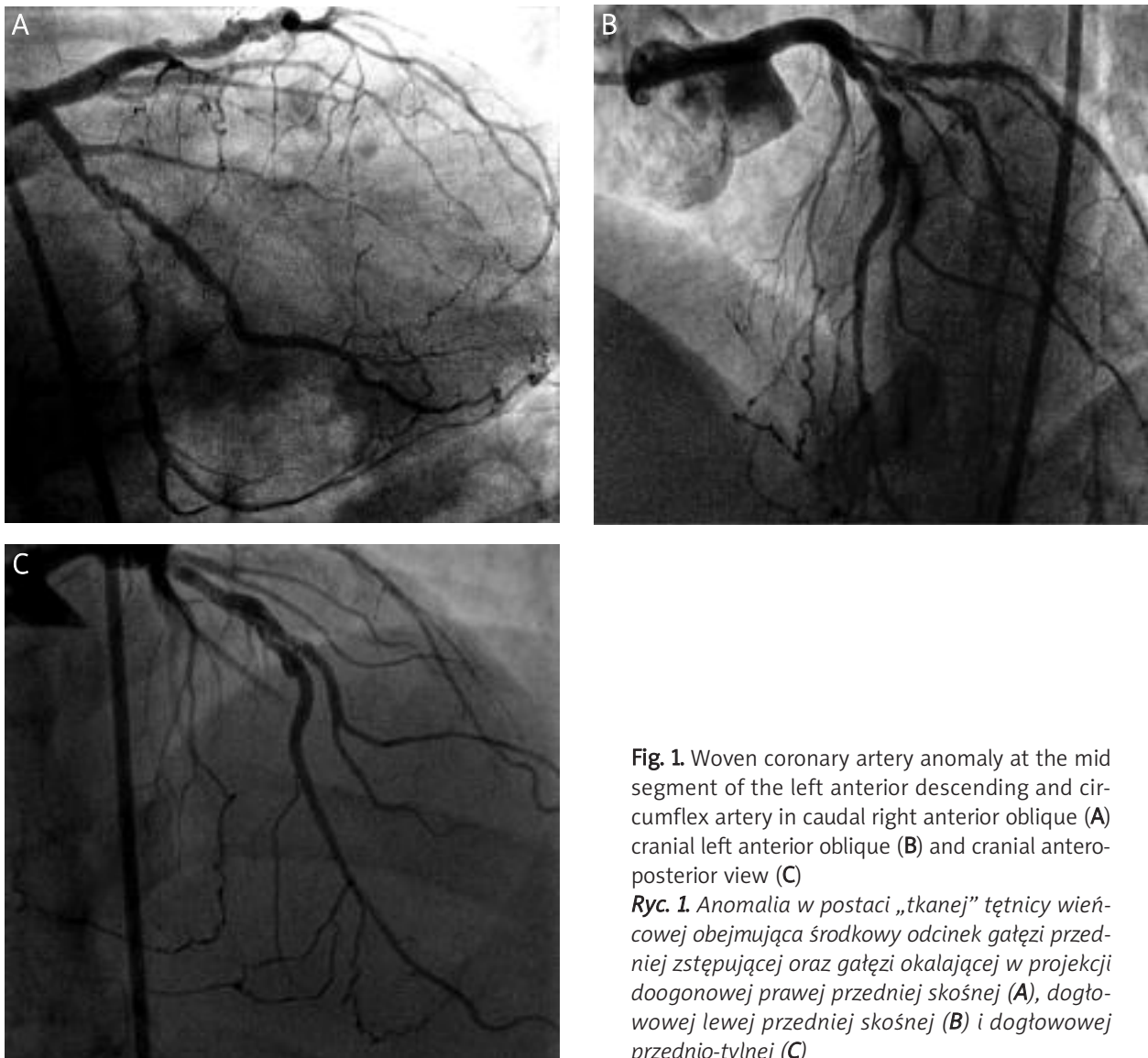


Fig. 1. Woven coronary artery anomaly at the mid segment of the left anterior descending and circumflex artery in caudal right anterior oblique (A) cranial left anterior oblique (B) and cranial antero-posterior view (C)

Ryc. 1. Anomalia w postaci „tkanej” tętnicy wieńcowej obejmująca środkowy odcinek gałęzi przedniej zstępującej oraz gałęzi okalającej w projekcji doogonowej prawej przedniej skośnej (A), dogłównowej lewej przedniej skośnej (B) i dogłównowej przednio-tylnej (C)

showed immediate dissection spreading OM3 after the puncture. We negotiated another guidewire (a hi-torque Whisper® LS guidewire, Abbott Laboratories, Abbott Park, IL, USA) to recanalize the true lumen. After confirming the second guidewire in the true lumen, the lesion was predilated with subsequent dilatations with a 2.0 mm × 20 mm Maverick® (Boston Scientific, Boston, MA, USA) balloon using 12-14 atm for 15 s to 30 s. A Biolimus-eluting stent (Biomatrix Flex®, Biosensors International GRO, Singapore) 3.0 mm × 18 mm was deployed in the OM3 lesion (Figure 2 A). About 3 mm of the proximal segment of the stent was left protruding into the Cx. The OM2 ostial lesion was predilated with a 2.0 mm × 20 mm Maverick® (Boston Scientific, Boston, MA, USA) balloon. A 2.75 mm × 36 mm Biolimus-eluting stent (Biomatrix Flex®, Biosensors International GRO, Singapore) was advanced across the OM2 ostium and deployed (Figure 2 B). About 5 mm of the proximal segment of the stent was left protruding into the Cx. A hi-torque Pilot® 50 (Abbott Labo-

raries, Abbott Park, IL, USA) guidewire was passed through the protruding stent struts from the OM2 and OM3 to the distal Cx. Then stent struts were dilated with a 2.0 mm × 20 mm Maverick® (Boston Scientific, Boston, MA, USA) balloon using 14 atm for 15 s. Using the Culotte technique, a 3.5 mm × 36 mm Biolimus-eluting stent (Biomatrix Flex®, Biosensors International GRO, Singapore) was deployed in the Cx trunk with maximum inflation pressure of 10 atm (Figure 2 C). Post-stent dilatation was performed with a 3.0 mm × 15 mm non-compliant balloon (Quantum Maverick®, Boston Scientific, Boston, MA, USA) in both obtuse marginal branches and with a 3.5 mm × 15 mm non-compliant balloon (Quantum Maverick®, Boston Scientific, Boston, MA, USA) in the Cx with maximum inflation pressure of 20 atm. Finally, simultaneous kissing balloons were inflated in the OM3 and the Cx using two non-compliant balloons (3.5 mm × 15 mm and 3.0 mm × 15 mm Quantum Maverick®, Boston Scientific, Boston, MA, USA) with maxi-

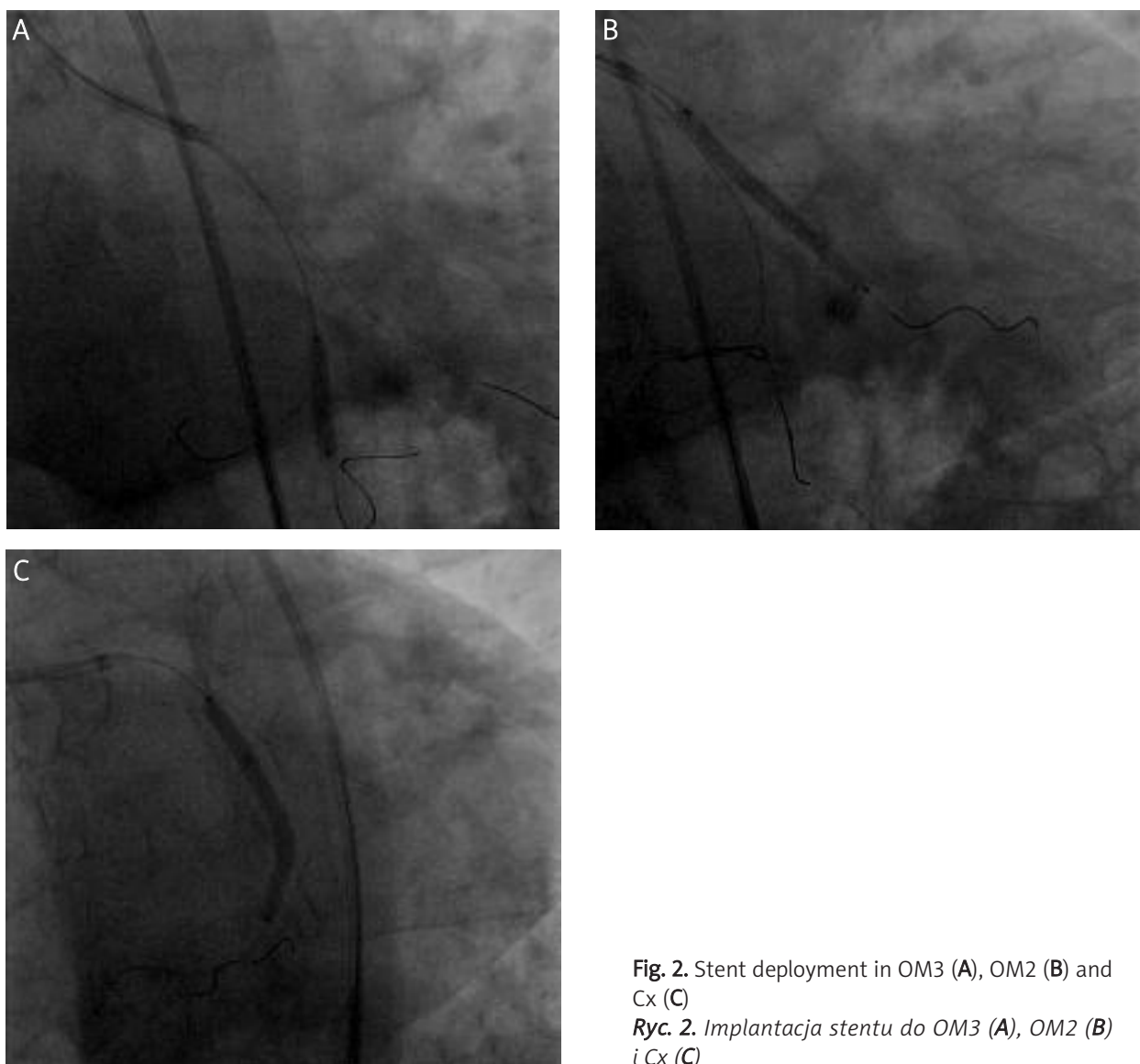


Fig. 2. Stent deployment in OM3 (A), OM2 (B) and Cx (C)
Ryc. 2. Implantacja stentu do OM3 (A), OM2 (B) i Cx (C)

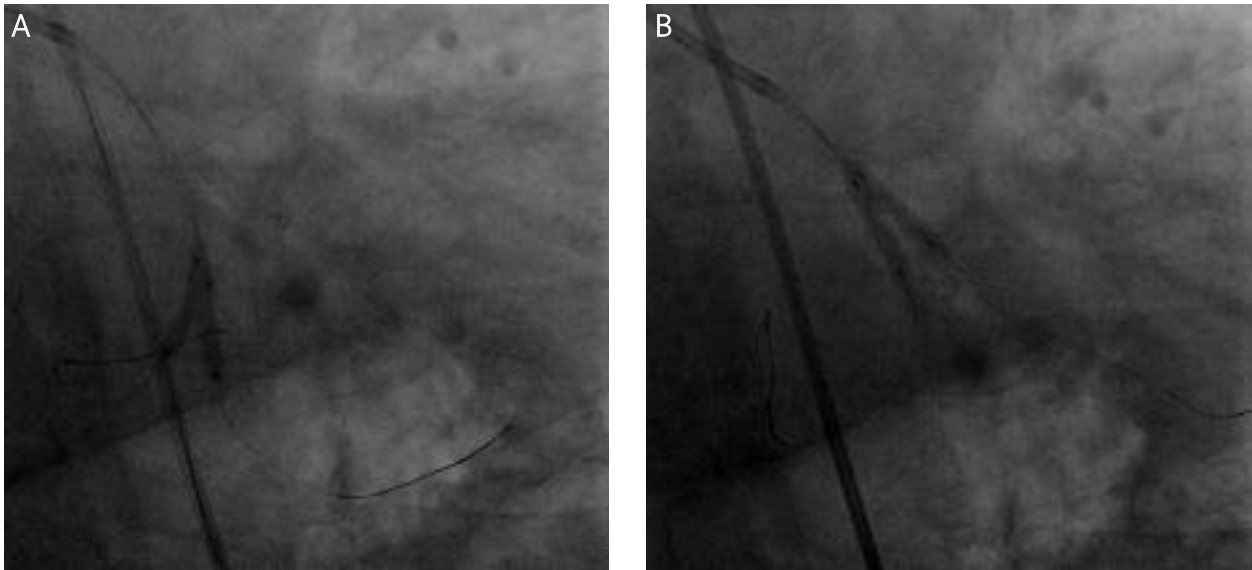


Fig. 3. Final kissing balloon dilatation for OM3 (A) and OM2 (B)

Ryc. 3. Końcowe poszerzenie OM3 (A) i OM2 (B) z użyciem techniki „kissing balloon”

imum inflation pressure of 12 atm in both (Figure 3 A). The same procedure was performed for OM2 and Cx bifurcation (Figure 3 B). The final angiogram demonstrated an excellent angiographic result without any residual stenosis or dissection in the Cx (Figure 4).

His further stay in the hospital was uneventful, and he was discharged after 2 days on dual anti-platelet therapy with aspirin, and clopidogrel for at least a year, as well as an angiotensin-converting enzyme inhibitor, a β -blocker and a statin.

Discussion

Woven coronary anomaly is an uncommon congenital malformation characterized by the branching of a major epicardial artery into thin channels, which then merge again in order to form the main lumen after twisting along the coronary artery axis [4-6]. The distance of the abnormal segment is limited so the downstream coronary blood flow distal to the woven segment is absolutely normal. This morphology has been previously described only in a few patients [1-7]. In most of the cases, the right coronary artery is affected but it could be visualized in the LAD and Cx. Because of its common misinterpretation as intracoronary thrombus, spontaneous coronary dissection or bridging collaterals of chronic total coronary arterial occlusion, the frequency of this anomaly is underestimated [5]. The etiology is unknown and it is generally accepted as a benign condition and medical surveillance is recommended for these cases [6]. On the other hand, Martuscelli *et al.* postulated that the coronary blood could be reduced to form an intracoronary thrombus [1]. Also, we speculated that increased shear stress in the narrow braid segments could accelerate atherosclerosis. The present case had

unstable angina despite optimal medical therapy so we performed PCI for the stenotic lesions in the Cx artery.

In conclusion, although it is an uncommon malformation, the case reported above shows that woven coronary artery anomaly can be misdiagnosed by interventional cardiologists. So, clinicians performing angiography should obtain multiple projections to discriminate malformation and anomalies from pathological conditions and be very careful in interpreting angiograms. Also, thrombotic lesions could develop in the braid segment of this anomaly and PCI could be performed successfully in case of ischemia.

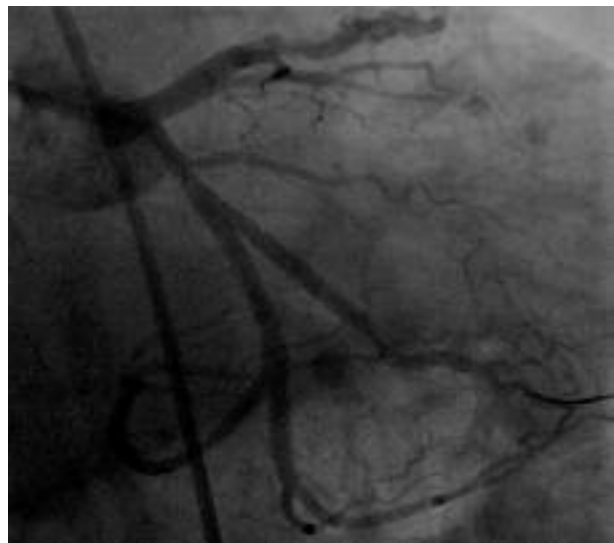


Fig. 4. Final angiogram demonstrated no residual stenosis or dissection in the Cx

Ryc. 4. Końcowy angiogram przedstawiający brak rezydualnego zwężenia oraz dyssekcji w obrębie Cx

Acknowledgments

Published with the written consent of the patient. No external funding and no competing interests declared. The authors would like to thank Prof. Dr. Omer Goktekin for all his input and guidance on this case report.

References

1. Martuscelli E, Romeo F, Giovannini M, et al. Woven coronary artery: differential diagnosis with diffuse intracoronary thrombus. *Ital Heart J* 2000; 1: 306-307.
2. Sane DC, Vidaillet HJ Jr. "Woven" right coronary artery: a previously undescribed congenital anomaly. *Am J Cardiol* 1988; 61: 1158.
3. Berman AD, Kim D, Baim DS. "Woven" right coronary artery: case report and therapeutic implications. *Cathet Cardiovasc Diagn* 1990; 21: 258-259.
4. Gregorini L, Perondi R, Pomidossi G, et al. Woven left coronary artery disease. *Am J Cardiol* 1995; 75: 311-312.
5. Kursaklioglu H, Iyisoy A, Celik T. Woven coronary artery: a case report and review of literature. *Int J Cardiol* 2006; 113: 121-123.
6. Iyisoy A, Celik T, Yuksel UC, et al. Woven right coronary artery: a case report and review of the literature. *Clin Cardiol* 2010; 33: E43-45.
7. Kaya D, Kilit C, Onrat E. An uncommon congenital anomaly of coronary arteries misdiagnosed as intracoronary thrombus: woven coronary artery disease. *Anadolu Kardiyol Derg* 2006; 6: 383-384.
8. Yildirim A, Oğuz D, Olguntürk R. Woven right and aneurysmatic left coronary artery associated with Kawasaki disease in a 9-month-old patient. *Cardiol Young* 2010; 20: 342-344.