

## Resistant spontaneous coronary artery spasm

### Dirençli spontan koroner arter spazmı

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**Summary**– Coronary artery spasm should always be suspected in patients who have myocardial infarction with normal coronary arteries. This case report presents a 33-year-old woman with anterior myocardial infarction, whose coronary angiograph revealed normal left anterior descending artery and new onset complete occlusion of the circumflex artery at the time of the procedure. Nitroglycerin up to 800 mcg was administered without success. In such resistant cases, when all efforts fail, including prompt recognition and application of vasodilator drugs, retracting the catheter and waiting may play a role.

Prompt reperfusion therapy is recommended for patients with ST elevation myocardial infarction (STEMI).<sup>[1]</sup> However, some patients who present with STEMI have normal coronary arteries, and evidence exists for the role of coronary spasm (CAS) in these circumstances.<sup>[2]</sup> CAS location, distribution and severity determine the seriousness of the clinical setting, which may lead to death. Treatment strategies for patients with STEMI due to CAS are different from those for patients with atherosclerotic obstructive coronary artery disease.

The present case outlines an experience of a spontaneous CAS refractory even to high doses of intracoronary nitroglycerin injection during coronary angiography. Treatment of such cases is challenging.

#### CASE REPORT

A 33-year-old woman with no history of cardiac disease was brought to our hospital with possible an-

**Özet**– Miyokart enfarktüsü geçiren ve koroner arterleri normal bulunan kişilerde koroner spazmından şüphelenilmelidir. Bu yazıda, anterior miyokart enfarktüsü nedeniyle koroner anjiyografi işlemine alınan ve sol ön inen arteri normal olmakla birlikte işlem esnasında akut sirkumfleks arter tam tıkanması gelişen 33 yaşında kadın bir olgu sunuldu. 800 mcg'a kadar yapılan nitrogliserin etki göstermedi. Bu tip dirençli olgularda, sorunun erken fark edilmesi ve vazodilatasyon yapıcı ilaçların uygulanması gibi yöntemler işe yaramadığında, kateterin geri çekilip bir süre beklenmesi bir seçenek olabilir.

terior myocardial infarction. She had been about to undergo a gynecological operation at a different hospital, where just prior to the induction of anesthesia she developed severe typical chest pain along with 2 mm ST elevation in the precordial leads, following which the operation was aborted. When she arrived at our hospital, she was completely pain free. There were no ECG changes and her physical exam was unremarkable. Her initial troponin I was negative, so it was decided to take the patient to the coronary care unit for close observation. The following day, cardiac markers increased and echocardiography revealed moderate hypokinesia in the septal, apical and anterior walls of the left ventricle. Because of suspicion of a left anterior descending artery lesion, the patient was taken to the catheter laboratory for coronary angiography.

#### Abbreviations:

CAS	Coronary spasm
Cx	Circumflex
STEMI	ST elevation myocardial infarction

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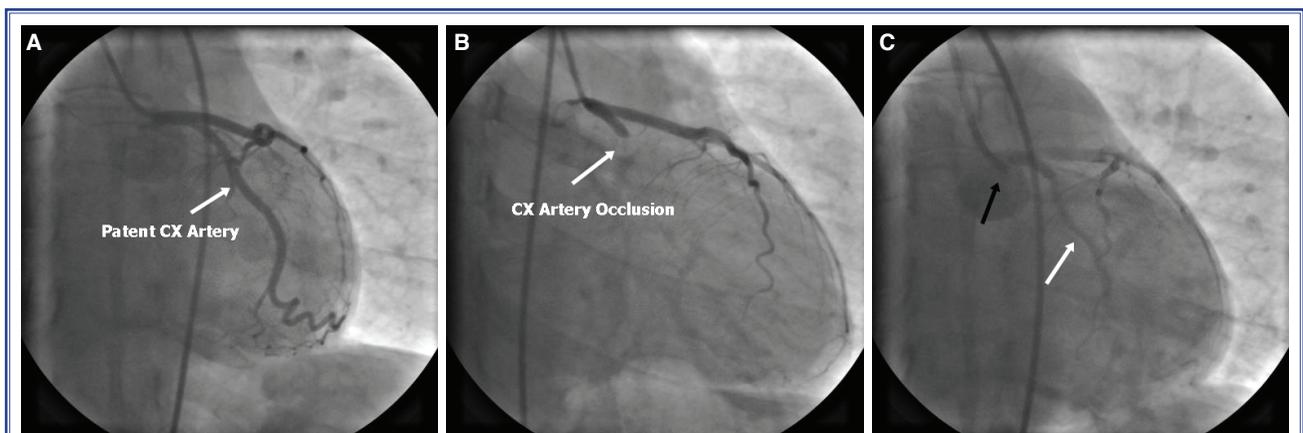
A left coronary angiogram with a JL-4 diagnostic catheter seemed normal until the last image was being taken (Figure 1a). On the right caudal view, acute complete occlusion of the circumflex (Cx) coronary artery proximally, not evident in previous views, was noticed (Figure 1b). Although there were ST-T wave changes on the monitor, the patient had no chest pain and her hemodynamic status was good. Assuming an unnoticed coronary dissection, a JL 4 diagnostic catheter was replaced with JL-4 guiding catheter, in case of possible coronary intervention. On repeated coronary angiography, complete occlusion persisted. Since the lesion did not appear to be secondary to dissection, it was considered a spasm, and a decision made to inject intracoronary nitroglycerin. In spite of increasing doses of nitroglycerin, eventually reaching 800 mcg, there was no flow in the Cx artery. Because of the refractory nature of coronary spasm, in a final attempt, the catheter was retracted slightly and a non-selective injection was made. When the catheter was slightly retracted from the left main coronary ostium, thrombolysis in myocardial infarction (TIMI) 1 flow appeared in the Cx artery (Figure 1c). We repeated this action twice. As soon as the left main coronary ostium was reengaged to obtain a better view, flow ceased due to complete occlusion, and when the catheter was retracted flow resumed partially.

Because of the dynamic nature of the occlusion, left injections were stopped and right coronary angiography was continued. This was unremarkable. The patient was started on IV nitroglycerin and diltiazem infusions and transferred back to the coronary care

unit. She was hospitalized for five days during which peak troponin levels reached 24 pg/ml. Control echocardiography revealed mild inferior hypokinesia in addition to mild anterior and septal hypokinesia with an EF of 42%. The patient was discharged with aspirin, diltiazem and nitrate.

## DISCUSSION

Among the differential diagnoses of chest pain, non-ischemic etiologies, and especially pulmonary embolism, should always be considered in patients in whom acute coronary syndrome is unlikely. In the present case, transient ST elevation in the precordial leads, accompanied by left ventricle wall motion abnormalities and normal right heart functions led us towards acute coronary ischemia. Even now, 56 years of its first description by Prinzmetal et al, CAS continues to be a challenging problem.<sup>[3]</sup> It may occur in any coronary artery, at multiple sites simultaneously, focally or diffuse, and is usually irregular, eccentric and associated with ST-T changes and dysrhythmias. These findings are in contrast with those of catheter-induced spasm, which is focal and close to the catheter tip. CAS can be precipitated by several factors, for example cold, anxiety, physical stress, nonselective beta blockers, and stimulants such as cocaine.<sup>[4]</sup> It is also a recognised but rare complication of non-cardiac surgery. Several contributory factors related to operation have been attributed to the etiology of CAS. Administration of adrenalin, catecholamine surges during or after operation, hypoxia and anesthesia itself can stimulate the sympathetic nervous system and induce



**Figure 1.** (A) Normal flow in the left coronary system. White arrow indicates circumflex artery. (B) White arrow points to proximal circumflex artery occlusion. (C) White arrow shows partial restoration of Cx artery flow. Black arrow indicates the tip of the catheter outside the left main stem.

CAS.<sup>[5,6]</sup> It is believed that CAS is due to constriction of coronary vascular smooth muscle cells triggered by alterations in the autonomic nervous system, an increase in intracellular calcium ions and vasoconstrictive substances.<sup>[7]</sup>

Although severe multi-vessel CAS has been reported in the literature, it is rare, and generally responsive to vasodilator drugs regardless of its severity. Unfortunately, in the present case even a high dose of nitroglycerin was ineffective. Surprisingly, simple withdrawal of the catheter and an image taken while the tip of the catheter was outside the left main coronary ostium led to a resumption of flow in the Cx artery. As soon as the catheter was reengaged to have a better view, complete obliteration recurred. This case illustrates the dynamic nature of spasm and possible overlapping mechanisms for its catheter-induced and spontaneous forms. Mechanical irritation along with other stimuli play a major role, and sometimes simple maneuvers such as retracting the catheter and patient waiting may bring about resolution of the spasm. This dynamic pattern was considered as strong evidence for CAS, and taking into account radiation exposure, we did not proceed with coronary CT angiography to image the Cx artery entirely.

Calcium channel blockers are generally recommended for both prevention and in the acute setting. Intracoronary administration of diltiazem or verapamil could also have been considered in the present case. Since verapamil has not been on the market for some time and diltiazem was not available in the laboratory during the procedure, we could not use these agents. A combination of nitrates and calcium channel blockers may have additive effects.

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## REFERENCES

1. American College of Emergency Physicians; Society for Cardiovascular Angiography and Interventions, O’Gara PT, Kushner FG, Ascheim DD, Casey DE Jr, Chung MK, de Lemos JA, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2013;61:78–140. [CrossRef](#)
2. Ong P, Athanasiadis A, Hill S, Vogelsberg H, Voehringer M, Sechtem U. Coronary artery spasm as a frequent cause of acute coronary syndrome: The CASPAR (Coronary Artery Spasm in Patients With Acute Coronary Syndrome) Study. *J Am Coll Cardiol* 2008;52:523–7. [CrossRef](#)
3. Prinzmetal M, Kennamer R, Merliss R, Wada T, Bor N. Angina pectoris. I. A variant form of angina pectoris; preliminary report. *Am J Med* 1959;27:375–88. [CrossRef](#)
4. Hung MJ, Hu P, Hung MY. Coronary artery spasm: review and update. *Int J Med Sci* 2014;11:1161,71.
5. Chang KH, Hanaoka K. Intraoperative coronary spasm in non-cardiac surgery. [Article in Japanese] *Masui* 2004;53:2–9. [Abstract]
6. Aikpokpo N, Hill S, Sechtem U. Case report: acute coronary artery spasm in a patient in the setting of non-cardiac surgery. *Clin Res Cardiol* 2012;101:683–6. [CrossRef](#)
7. Yasue H, Nakagawa H, Itoh T, Harada E, Mizuno Y. Coronary artery spasm—clinical features, diagnosis, pathogenesis, and treatment. *J Cardiol* 2008;51:2–17. [CrossRef](#)

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**Anahtar sözcükler:** Koroner anjiyografi; koroner spazm; miyokart enfarktüsü.