

## Coronary stent embolism to the right posterior cerebral artery

### Sağ posteriyor serebral artere embolize olan koroner stent olgusu

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**Summary**– A 57-year-old male was admitted to the emergency room with chest pain that has been present for 3 hours. His blood pressure was 70/50 mmHg and heart rate was 48 bpm. 12-lead surface electrocardiography revealed inferior myocardial infarction and third-degree atrioventricular (AV) block. An emergency coronary angiography showed a 50% stenosis in the middle segment of the left anterior descending artery and 90% in the proximal circumflex (Cx) artery. The right coronary artery was totally occluded. After the predilatation with a 2.0x15 mm compliant balloon at 10 atm, a 3.5x24 mm bare metal stent was implanted. The third-degree AV block improved and a sinus rhythm of 124 bpm was achieved, but hemodynamic stability was not attained. Percutaneous coronary intervention for the Cx artery was performed. Without predilatation, a 3.5x12 mm low profile BMS was easily advanced over the lesion. Just before the stent implantation, asystole developed, followed by convulsions. Blood pressure and heart rate recovered after the administration of 1 mg of atropine. However, during the seizure, the guidewire and coronary stent device fell to the aortic root. Stent struts were not seen on the balloon catheter in a fluoroscopic examination. Fluoroscopic scanning of the vascular system showed that the coronary stent was in the right posterior cerebral artery. There were no symptoms or signs of neurological disorder. Consultant invasive neuroradiologist recommended medical follow-up. Clopidogrel and acetylsalicylic acid were prescribed indefinitely. Two months after the primary PCI, a successful coronary artery bypass graft operation was performed. After 4 years, the patient remained without any symptoms of neurological problems.

**P**ercutaneous coronary intervention (PCI) generally has few complications. Embolism of a catheter fragment or a ruptured piece of the guidewire or coro-

**Özet**– Elli yedi yaşında erkek hasta acile üç saatlik göğüs ağrısı ile başvurdu. Kan basıncı 70/50 mmHg ve kalp hızı 48/dk idi. 12 derivasyonlu elektrokardiyografide inferiyor miyokart infarktüsü ile birlikte üçüncü derece atriyoventriküler (AV) blok gözlemlendi. Acil yapılan koroner anjiyografi, sol ön inen arterin orta segmentinde %50, proksimal sirkumfleks (Cx) arterde %90 darlık olduğunu gösterdi. Sağ koroner arterde tam tıkanıklık saptandı. 2.0x15 mm komplan balon ile 10 atm’de predilatasyon sonrası 3.5x24 mm çıplak metal stent takıldı. Üçüncü derece AV blok düzeldi ve 124/dk hızında sinüs ritmi sağlandı, fakat hastanın hemodinamisinin düzelmemesi üzerine Cx lezyonuna girişim planlandı. Predilatasyon olmadan 3.5x12 mm düşük profilli çıplak metal stent kolayca lezyonu geçti. İmplantasyondan hemen önce asistoli ve konvülsiyon gelişti. 1 mg atropin uygulandıktan sonra kalp hızı ve kan basıncı değerleri toparlandı. Kılavuz tel ve stentin koroner arterden çıkararak aortaya düştüğü gözlemlendi. Sonrasında floroskopide, balon kateter üzerinde stent gözlenemedi. Vasküler sistemin floroskopik taramasında stentin sağ posteriyor serebral arterde olduğu saptandı. Hastada nörolojik bozukluk belirtisi veya bulgusu yoktu. İnvazif nöroradyoloji konsültasyonu medikal takip önerdi. Klopidoğrel ve aspirinden oluşan ikili antiagregan tedavi ömür boyu olmak üzere verildi. Primer perkütan koroner girişimden 2 ay sonra hastaya başarılı koroner baypas cerrahisi yapıldı. Dördüncü yıl takibinde hastanın nörolojik bulgusu yoktu.

nary stent to the cerebral circulation is extremely rare. This is a case of stent embolism to the posterior cerebral artery.

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### CASE REPORT

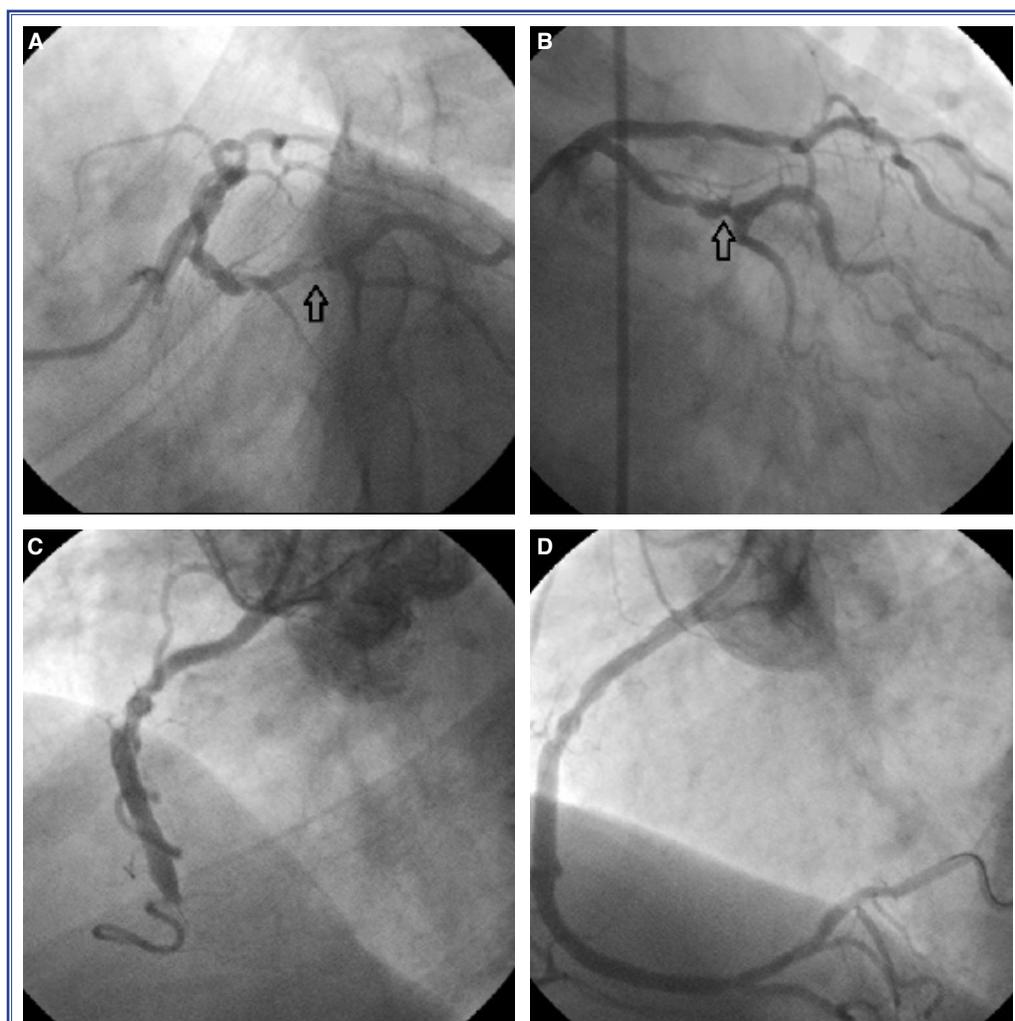
A 57-year-old male was admitted to the emergency room with chest pain ongoing for about 3 hours. He had hypertension regulated with a ramipril+hydrochlorothiazide combination. There was no history of diabetes, hyperlipidemia, smoking, coronary artery disease, or other systemic disease. His blood pressure was 70/50 mmHg and his heart rate was 48 bpm. Electrocardiography (ECG) revealed third-degree atrioventricular (AV) block and ST elevation at the inferior leads. The patient was referred to the catheter laboratory for primary PCI. Coronary stenosis of 50% was observed in the mid segment of the left anterior descending (LAD) artery and 90% in the circumflex (Cx) artery proximal segment. The right coronary artery (RCA) was to-

tally occluded (Fig. 1). After predilatation with a 2.0x15 mm compliant balloon at 10 atm, a 3.5x24 mm bare metal stent (BMS) was implanted. The third-degree AV block improved to sinus rhythm at 124 bpm, but hemodynamic stability was not achieved.

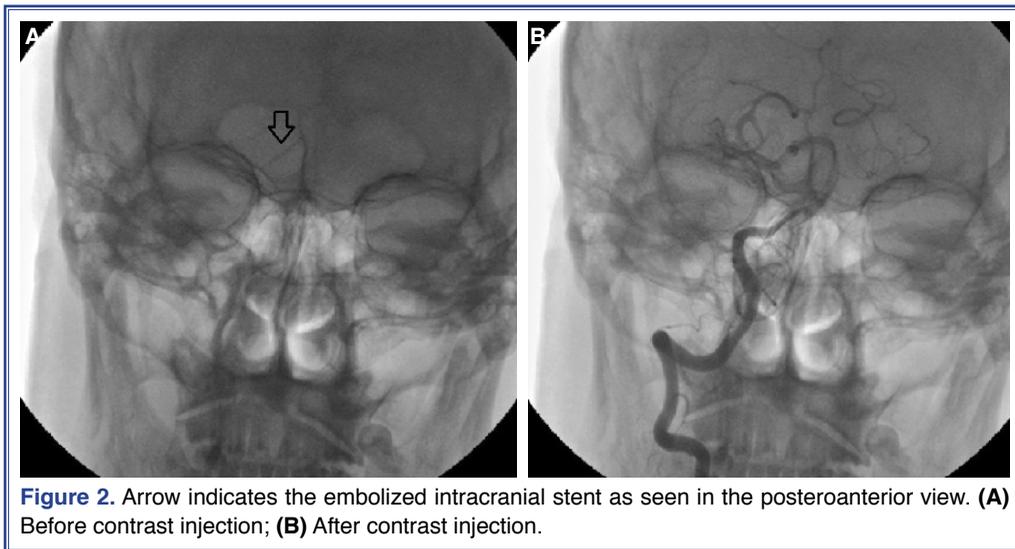
PCI for the Cx artery was performed. The left main coronary artery was cannulated with a Judkins left 4 catheter. A 0.014 inch extra-support guidewire was passed over the Cx lesion. A 3.5x12 mm low-profile BMS was easily advanced over the lesion. Negative-pressure preparation of the stent balloon was completed. Just before the stent implantation, bradycardia

#### Abbreviations:

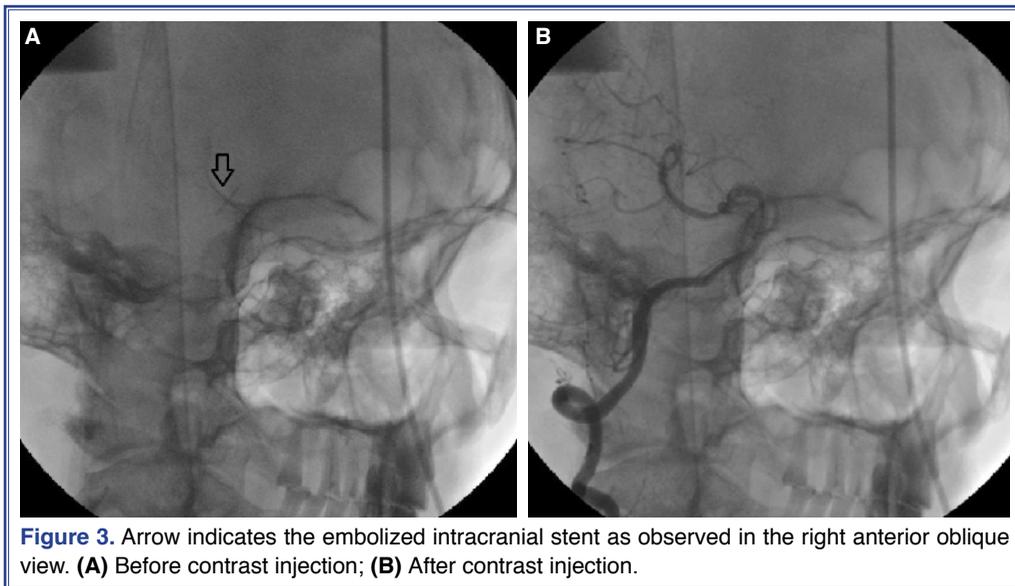
AV	Atrioventricular
BMS	Bare metal stent
CABG	Coronary artery bypass graft
Cx	Circumflex
LAD	Left anterior descending
PCI	Percutaneous coronary intervention
RCA	Right coronary artery



**Figure 1.** (A) Coronary angiography showed 90% stenosis of the circumflex artery and (B) 50% stenosis of the left anterior descending artery. (C) The right coronary artery was completely occluded. (D) After stent implantation, thrombolysis in myocardial infarction flow 3 was achieved.



**Figure 2.** Arrow indicates the embolized intracranial stent as seen in the posteroanterior view. **(A)** Before contrast injection; **(B)** After contrast injection.



**Figure 3.** Arrow indicates the embolized intracranial stent as observed in the right anterior oblique view. **(A)** Before contrast injection; **(B)** After contrast injection.

developed, followed by asystole. The patient had a transient convulsive attack due to cerebral hypoperfusion. An urgent administration of atropine 1 mg. was provided. The patient's blood pressure and heart rate recovered. However, during the seizure, the extra-support guidewire and coronary stent device fell to the aortic root. Subsequently, the stent struts were not seen on the balloon catheter in a fluoroscopic examination. In vitro investigation revealed that the stent was not on the coronary balloon. Fluoroscopic scanning of the vascular system showed that the coronary stent was in the intracranial arterial system (Fig. 2, 3). There were no symptoms or signs of neurological difficulty. After obtaining selective angiographic images, it was determined that the stent had embolized to the right poste-

rior cerebral artery via the right vertebral artery. Based on an invasive neuroradiology consultation, medical follow-up was recommended due to the unrestricted blood flow. Clopidogrel and acetylsalicylic acid were prescribed indefinitely. There were no signs of neurological difficulty during follow-up at the first month. Two months after the primary PCI, he had a successful coronary artery bypass graft (CABG) operation. After 4 years, the patient remained free of symptoms of neurological problems.

## DISCUSSION

The incidence of coronary stent embolism has been reported to be 0.32% to 8.3%.<sup>[1]</sup> The incidence has

reportedly decreased; however, despite advances in equipment design and the worldwide utilization of premounted stents, the possibility still exists. It can lead to serious complications, such as acute vessel closure, coronary thrombosis, or myocardial infarction. Systemic embolism of the stent can cause cerebrovascular accidents and rarely, limb ischemia. In a German registry, 411 lost stents were reported in a total of 56,807 procedures performed between August 1995 and June 1997. The operator tried to retrieve the embolized stent in 63% of cases. However, only 29% could be retrieved.<sup>[2]</sup> In another retrospective study of 4797 procedures, embolization was encountered in 14 cases (0.29%). Emergency cardiac bypass surgery, advancement of a low-profile delivery balloon through the stent, inflating the balloon and replacing the stent at the lesion site, crushing the stent against the coronary wall, and use of another stent and loop snare were used to manage the circumstances. None of the cases had a bleeding event that required a transfusion.<sup>[3]</sup> Myocardial biopsy forceps can be used for retrieval in selected cases.<sup>[4]</sup> Dislodgement from the delivery system can occur when the stent-balloon assembly is pulled back into the catheter because the target lesion either could not be reached or could not be passed. Factors predisposing to an inability to deliver a stent are poor support of the catheter or the guidewire, vessel tortuosity proximal to the lesion, or severe vessel calcification.<sup>[5,6]</sup> The risk of stent embolism is also greater in cases of manually crimped stents, higher predilatation pressure, lesion angulation,<sup>[7]</sup> and severe coronary vasospasm.<sup>[8]</sup> Higher predilatation pressure and a >45° vessel angulation have been found to be associated with stent embolism. Intracoronary stent embolization in which the stent remains misdeployed in the coronary circulation is associated with poor long-term outcomes compared with extracoronary embolism.<sup>[7]</sup>

In the current literature, there are limited data about the embolization of coronary stents into the cerebral circulation. This may be the first case of coronary stent embolism to the posterior cerebral artery via the right vertebral artery. In this case, the stent was observed in the posterior cerebral circulation but not limiting blood flow. We thought that the risk of retrieval of the stent in stable condition outweighed the clinical benefit, so we decided to recommend indefinite dual antiplatelet therapy with aspirin and clopidogrel.

Studies have demonstrated that the intracranial arteries are much different from the coronary arteries. The microscopic structure of both the internal carotid and the vertebral arteries exhibits marked changes as they enter the skull. The adventitia layer becomes much thinner and elastic fibers are markedly reduced in the media and adventitia layers. While the media layer is thinner, the internal elastic lamina becomes relatively prominent.<sup>[9–11]</sup> Due to these anatomical properties, retrieval of embolized material with a loop snare without causing any dissection, perforation, or compromise to blood flow is very challenging. In our case, medical therapy with the dual antiplatelet agent was adequate.

Stent embolism is a rare, but serious, complication. The decision to pursue retrieval of the embolized stent or medical follow-up should be individually assessed for each case.

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**Authorship contributions:** Concept: S.V.; Design: S.V.; Materials: G.K., İ. Ş., S.V., F.K.; Data Collection: S.V., İ.Ş., G.K., F.K.; Writing: S.V.; Critical revision: E.O.

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