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Management of a Fully Deployed Coronary Stent Migrated to the Left Main Artery

Sol Ana Koroner Artere Göç Eden Tam Açılmış Koroner Stentin Yönetimi

ABSTRACT

Migration of a coronary stent is an uncommon but potentially dangerous event during percutaneous coronary intervention (PCI), and it is even rarer once the stent has been fully deployed. We describe a 39-year-old man presenting with non-ST elevation myocardial infarction (NSTEMI) who underwent PCI of the left circumflex artery (LCx). After implantation, a drug-eluting stent unexpectedly migrated backward into the left main coronary artery (LMCA). An attempt to capture it with a snare via the femoral approach was unsuccessful. Using a balloon anchoring maneuver, the stent was carefully advanced to the radial artery and fixed in position with an additional stent, preserving arterial flow. PCI of the LCx was then completed with a good angiographic outcome. This case underlines the importance of choosing an appropriate stent size, recognizing predisposing factors such as vessel spasm, and being familiar with different retrieval or management techniques to deal with such rare complications.

Keywords: Coronary stent migration, left main coronary artery, percutaneous coronary intervention, radial artery

ÖZET

Koroner stent göçü, perkütan koroner girişim (PCI) sırasında nadiren görülen ancak potansiyel olarak tehlikeli bir durumdur ve stentin tamamen yerleştirilmesinden (implante edilmesinden) sonra ortaya çıkması ise çok daha enderdir. Bu yazıda, sol sirkumfleks arter (LCx) PCI uygulanan 39 yaşında, ST yükselmesiz miyokard enfarktüsü (NSTEMI) tanılı bir erkek olgu sunulmaktadır. İmplantasyon sonrasında, ilaç salınımlı stentlerden biri beklenmedik şekilde geri kayarak sol ana koroner arter (LMCA) içine göç etmiştir. Femoral yoldan yapılan snare ile yakalama girişimi başarısız olmuştur. Balon ankraj manevrası kullanılarak stent dikkatlice radyal artere ilerletilmiş ve ek bir stent ile bu konumda sabitlenerek damar akımı korunmuştur. Ardından LCx'ye yönelik PCI başarıyla tamamlanmış ve iyi bir anjiyografik sonuç elde edilmiştir. Bu olgu, uygun stent boyutunun seçiminin, damar spazmı gibi predispozan faktörlerin farkında olmanın ve bu tür nadir komplikasyonlarla başa çıkmak için farklı geri alma veya yönetim tekniklerine hâkim olmanın önemini vurgulamaktadır.

Anahtar Kelimeler: Koroner stent göçü, sol ana koroner arter, perkütan koroner girişim, radyal arter

CASE REPORT
OLGU SUNUMU

Enes Çelik[1]
Neryan Özgül Özden[2]
Gürkan İmre[1]
Çağatay Ertan[1]

[1]*Department of Cardiology, Bilecik Şeyh Edebali University, Faculty of Medicine, Bilecik, Türkiye*
[2]*Department of Cardiology, Bilecik Training and Research Hospital, Bilecik, Türkiye*

Corresponding author:
Enes Çelik
✉ enescelikmd@gmail.com

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Displacement of a stent implanted in a coronary artery is a rare complication of percutaneous coronary intervention.[1]

Complications related to stent migration in patients presenting with acute coronary syndrome (ACS) can result in serious, potentially life-threatening complications.[2]

A migrated stent can be retrieved using various surgical or percutaneous techniques.[3] In this case report, we describe a patient with ACS in whom a fully deployed coronary stent became dislodged and migrated into the left main coronary artery. By anchoring a balloon distal to the dislodged stent, we were able to guide it along the vasculature to the radial artery, where it was ultimately secured.

Case Report

We evaluated a 39-year-old male patient, an active smoker with no prior comorbidities, who presented to the emergency department with chest pain and was admitted to the catheterization laboratory with a diagnosis of non-ST elevation

myocardial infarction (NSTEMI). Due to persistent chest pain, he was scheduled for early percutaneous intervention and taken to the catheterization laboratory. Diagnostic coronary angiography performed via the right radial route revealed an ulcerated atherosclerotic plaque occluding 70% of the lumen of the left circumflex artery (LCx). The second obtuse marginal (OM2) branch was completely occluded, with no significant stenosis in other vessels. The LCx was considered the culprit lesion, and PCI was planned accordingly.

The diagnostic catheter was exchanged for a 6 Fr left Judkins 4.0 guiding catheter. The LCx was crossed with a floppy guidewire, and the OM2 was then wired with a floppy guidewire. However, the vessel diameter was less than 2 mm, and flow was restored with the wire. After predilatation with a 2.5 × 10 mm non-compliant balloon, a 3.0 × 16 mm drug-eluting stent (DES) (Promus Premier, Boston Scientific, MN, USA) was implanted into the LCx lesion at 14 atm pressure (Figure 1A). Upon withdrawal of the stent balloon, the proximal stent unexpectedly migrated toward the LCx ostium. To address this, a 3.0 × 12 mm drug-eluting stent (DES) (Promus Premier) was implanted distally, overlapping the proximal stent (Figure 1B). Despite this intervention, the proximal stent migrated into the left main coronary artery (LMCA), while the distal stent shifted beneath the lesion (Figure 1C). Initially, removal of the LMCA stent via the femoral approach was attempted. The LMCA was intubated with a second catheter using a 7 Fr left Judkins catheter, but the stent could not be grasped with the snare. To avoid systemic embolism and complications within the LMCA, it was decided to remove the stent via the radial route. A 2.75 × 20 mm semi-compliant balloon (Shunmei Medical, Guangdong, China) was advanced distal to the stent and inflated to 8 atm, compressing the stent between the balloon and the catheter and guiding it to the radial artery (Figure 1D).

ABBREVIATIONS

ACS	Acute coronary syndrome
DES	Drug-eluting stent
LCx	Left circumflex artery
LMCA	Left main coronary artery
NSTEMI	Non-ST elevation myocardial infarction
OM2	Second obtuse marginal
PCI	Percutaneous coronary intervention
TIMI	Thrombolysis in myocardial infarction

However, the deformed stent caused severe radial spasm. Right upper extremity angiography revealed good ulnar artery calibration, and the stent was located at the level of the mid-radial artery (Figure 1E). A 3.0 × 12 mm DES (Promus Premier, Boston Scientific, MN, USA) was introduced adjacent to the existing stent and implanted into the radial artery at 12 atm. Radial artery flow was observed to be preserved (Figure 1F). The LCx procedure was then resumed. A 4.0 × 15 mm DES (Xience Xpedition, Abbott Vascular, Santa Clara, CA, USA) was implanted into the LCx at 14 atm, overlapping the distal stent (Figure 1G). Thrombolysis in myocardial infarction (TIMI) grade 3 flow was achieved in the LCx and OM2 vessels, and the procedure was concluded (Figure 1H, Video 1).

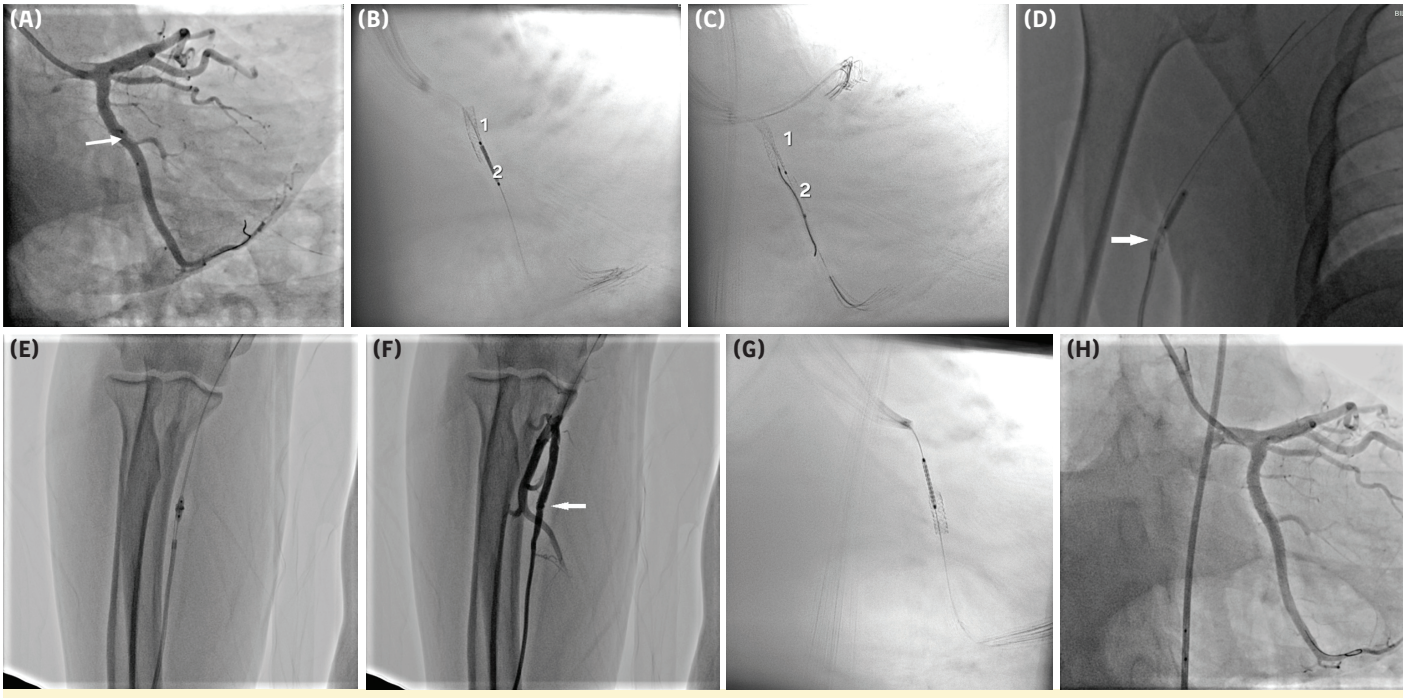


Figure 1. (A) Coronary angiogram showing the left circumflex artery (LCx) lesion. (B) Deployment of a second stent (2) distally to stabilize the first stent (1) using the overlap technique. (C) Proximal migration of the first stent (1) into the left main coronary artery and distal displacement of the second stent (2) below the lesion. (D) Balloon anchoring maneuver for stent retrieval. (E) Localization of the migrated stent in the radial artery. (F) Fixation of the migrated stent in the radial artery. (G) Final stent deployment in the left circumflex artery. (H) Final angiographic result after percutaneous coronary intervention (PCI) completion.

Discussion

Coronary stent migration is a rare complication of percutaneous coronary intervention (PCI), and migration of already deployed stents is even less common.[1,4] Depending on the stent's location, migration can result in serious morbidities, including obstruction, perforation, or dissection of coronary or peripheral arteries, and even death.[2] Stent dislodgement is typically observed in undeployed stents, often occurring during attempts to retrieve the stent within the guide catheter or due to slippage of the delivery system through calcified or tortuous lesions.[5]

There is no standardized approach for managing stent migration, embolization, or separation from delivery balloon systems during PCI; strategies generally depend on operator experience and the equipment available in the laboratory. Common causes of dislodgement include entanglement in side-branch wires, compression of a newly placed stent while passing through a previously deployed stent, and deformation or displacement of the stent during wire manipulation beneath the stent to facilitate lesion passage.[5,6]

In our case, the stent was likely undersized due to initial coronary spasm, which contributed to proximal migration toward the left main coronary artery. A similar scenario was reported by Celik et al.,[7] in which a stent placed in the right coronary artery embolized distally after intracoronary glyceryl trinitrate administration and was subsequently implanted in the branch it migrated into. In our patient, the stent was deployed at nominal pressure, but proximal migration was still observed. Migration can sometimes occur during stent implantation due to deep inspiration or extrasystolic beats.

To manage this, a 3.0 × 12 mm DES was deployed distal to the lesion, overlapping the proximal stent at 16 atm. The balloon was slightly withdrawn and re-inflated at the stent junction. Follow-up imaging revealed that the proximal stent had reached the mid-LMCA, while the distal stent had migrated even further distal to the lesion.

There is no definitive approach for stents that migrate in this manner or slip from the balloon system during lesion advancement. If the stents do not compromise flow, they may be left in place, dilated with a balloon, or, if deformed, crushed and secured with a new stent.[8] In our patient, considering his young age and the relatively small stent size compared to the LMCA diameter, leaving the stent in place was deemed unsafe. Initial attempts to advance the stent from the LMCA to the LCx using a 2.75 × 20 mm semi-compliant balloon were unsuccessful.

Because maneuvers performed in the main coronary artery could cause complications, a 7 Fr catheter was advanced via the femoral route to approach the left main coronary artery. The plan was to cross the stent struts and capture the stent with a microsnare over the wire. However, as the stent had already been fully deployed, it could not be grasped with the snare, and the retrieval attempt via the femoral approach was unsuccessful. To avoid systemic embolization, the stent was withdrawn toward the radial artery using a balloon anchoring technique. Alternative methods, such as twisting wires through the stent or using forceps, may also be considered, though they carry a risk of peripheral embolization.[9,10] Barçın et al.[10] successfully retrieved a stent using a larger sheath from the contralateral femoral artery. Some authors suggest that leaving a stent embolized in a peripheral artery may be acceptable.

In our patient, the deformed stent was ultimately anchored to the radial artery wall with an additional stent. A similar approach was reported by Greathouse et al.,[5] who transferred an extruded LCx stent to the femoral artery using a small-balloon anchoring technique and left it embolized in the right superior gluteal artery. If percutaneous retrieval is unsuccessful, surgical removal remains an option. Cha et al.[11] described two cases in which uninflated, deformed stents that could not be mounted on the guide catheter were surgically removed from the radial artery.

Conclusion

Stent migration is a rare but potentially serious complication of percutaneous coronary intervention. Failure to retrieve a migrated stent lodged in a coronary artery can pose life-threatening risks. This case is notable due to retrograde migration of the stent, likely resulting from undersizing during implantation in the LCx, possibly related to coronary spasm. When the patient's hemodynamic condition allows, stent sizing should ideally be performed after intracoronary glyceryl trinitrate administration. Furthermore, it is essential for interventional cardiologists to be familiar with techniques for managing stent dislocation and for catheterization laboratories to be equipped with the appropriate devices to effectively address such complications.

Ethics Committee Approval: This is a single case report; therefore, ethics committee approval was not required in accordance with institutional policies.

Informed Consent: The patient provided written informed consent for publication of this case.

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Video 1. Angiographic sequence of stent migration and management.

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