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Six Years After Coronary Artery Dissection: Natural Recanalization of True Lumen Compressed By Stent

CASE REPORT

INTRODUCTION

Spontaneous coronary artery dissection (SCAD) refers to non-iatrogenic, non-traumatic coronary intimal tear in patients without atherosclerotic coronary artery disease, affecting or blocking coronary blood flow. Patients often present with chest pain, ST-segment elevation acute coronary syndrome, ventricular arrhythmias, and sudden cardiac death. Here, a rare case of spontaneous right coronary artery (RCA) spiral dissection is reported, in which the true lumen was naturally opened after 6 years of inadvertent stent implantation in the false lumen during percutaneous coronary intervention (PCI), which is rare in clinical diagnosis and treatment. The purpose of this paper is to sort out and present the patient's clinical imaging and case information to provide ideas for the diagnosis and treatment of patients with SCAD.

CASE REPORT

A 69-year-old woman presented with 1 month of chest discomfort, exacerbated by left chest wall pain for one day. On January 11, 2018, she underwent a coronary angiography (CAG) that revealed a linear sign in the proximal to mid segments of the RCA, suggesting the existence of spiral dissection (Figure 1a). Based on symptoms and angiographic results, the patient was diagnosed with SCAD. During the operation, it was decided to perform stent implantation on the RCA. Repeated multi-position angiography confirmed that the guidewire was in the "true lumen" (Figure 1b). After balloon dilatation of the lesion, 3 stents were placed in the proximal, middle, and middle-distal segments of RCA, respectively. In the follow-up observation, the patient's condition remained stable. On November 24, 2024, the patient underwent a follow-up CAG and intravascular ultrasound (IVUS) examination of the coronary arteries. The CAG results showed that the RCA blood flow was unobstructed and the inner wall was smooth, but in the proximal, middle, and middle-distal segments, a stent shadow is observed accompanying the vessel (Figure 1c, Figure 2a, and e). Intravascular ultrasound findings revealed that the stent was positioned alongside the outer aspect of the true lumen, presenting a double-lumen sign (Figure 2b-d).

DISCUSSION

During the patient's initial CAG, the guidewire and stent were believed to be positioned within the "true lumen." However, surprisingly, 6 years later, CAG and IVUS imaging revealed that this so-called "true lumen" was actually a false lumen, while the actual true lumen at that time was completely compressed and blocked by the stents. This highlights that while CAG is the primary diagnostic technique for SCAD, it often misses cases and complicates classification, potentially delaying treatment due to misdiagnosis. For SCAD patients, further imaging exams like IVUS and optical coherence tomography (OCT) are crucial.[1] Intravascular ultrasound provides cross-sectional images of coronary arteries and vessel branches, distinguishing true from false lumens and atherosclerotic plaques from SCAD. Spontaneous coronary artery dissection under IVUS exhibits a classic white-black

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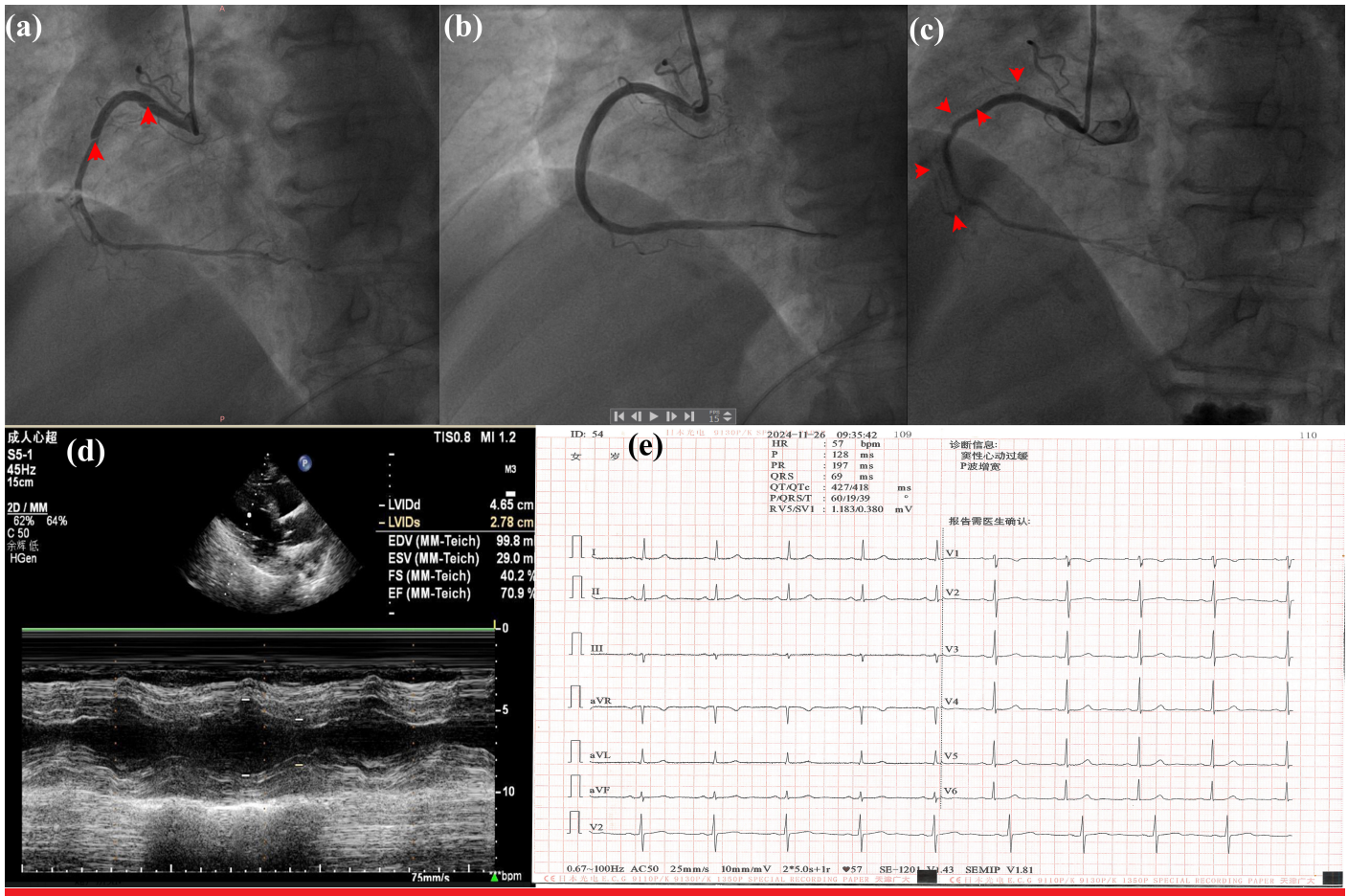

Figure 1. (a) Coronary angiography in 2018 showed linear signs; (b) Coronary angiography after 3 stent implantations in 2018 showed the "true lumen"; (c) Coronary angiography in 2024 showed in the proximal, middle, and middle-distal segments, a stent shadow is observed accompanying the vessel; (d) 2024 Echocardiogram: shows a mild abnormality of the left ventricular posterior wall (this is consistent with the preoperative results in 2018); (e) electrocardiograph (ECG) taken on the second day of hospital admission in 2024.

appearance of the medial intima.[2] While OCT offers higher spatial resolution, clearly showing vessel wall structure.[3]

Six years later, the patient underwent CAG and IVUS, showing a clear double-lumen. The stent was outside the true lumen, where blood flowed unobstructed. Two potential reasons are hypothesized: (1) There exists a communication between the true lumen and the false lumen. It is speculated that there are microchannels between the true lumen and the false lumen in this patient, allowing blood flow to pass through. After stent implantation, blood flow from the false lumen flows into the true lumen through these microchannels, gradually restoring blood flow in the true lumen and ultimately resulting in a patent state. Reviewing previous literature, SCAD can be classified based on the presence or absence of a connection (i.e., a "fenestration") between the true lumen and the false lumen on OCT images, into fenestrated and non-fenestrated types. Fenestrated SCAD has extensive or limited communication between the true lumen and the false lumen, while non-fenestrated SCAD does not show such communication. The length of dissection in fenestrated SCAD is significantly longer on OCT imaging. Although fenestrated and non-fenestrated SCAD may be considered distinct clinical entities, Jackson et al[4] suggested in their study that they could be different manifestations of the same pathological process. (2) Later-stage dislocation of stents toward the distal end of blood vessels. Coronary stent dislocation is a rare complication. When the stent is displaced, the blood flow at the original dissection opening will be redirected to form a shunt between the true lumen and the false lumen. This shunt effect facilitates the gradual restoration of blood flow filling in the true lumen. Over time, the blood flow conditions within the true lumen significantly improve, ultimately achieving a fully patent state.[5]

CONCLUSIONS

This case report's strength is its rarity and long-term follow-up of spontaneous RCA dissection. The spontaneous reopening of the true lumen 6 years post-stent in the false lumen is unreported. It offers valuable data, aiding understanding of spontaneous coronary artery dissection and PCI's long-term effects. Reopening may relate to fenestrated SCAD and hemodynamic changes, but further

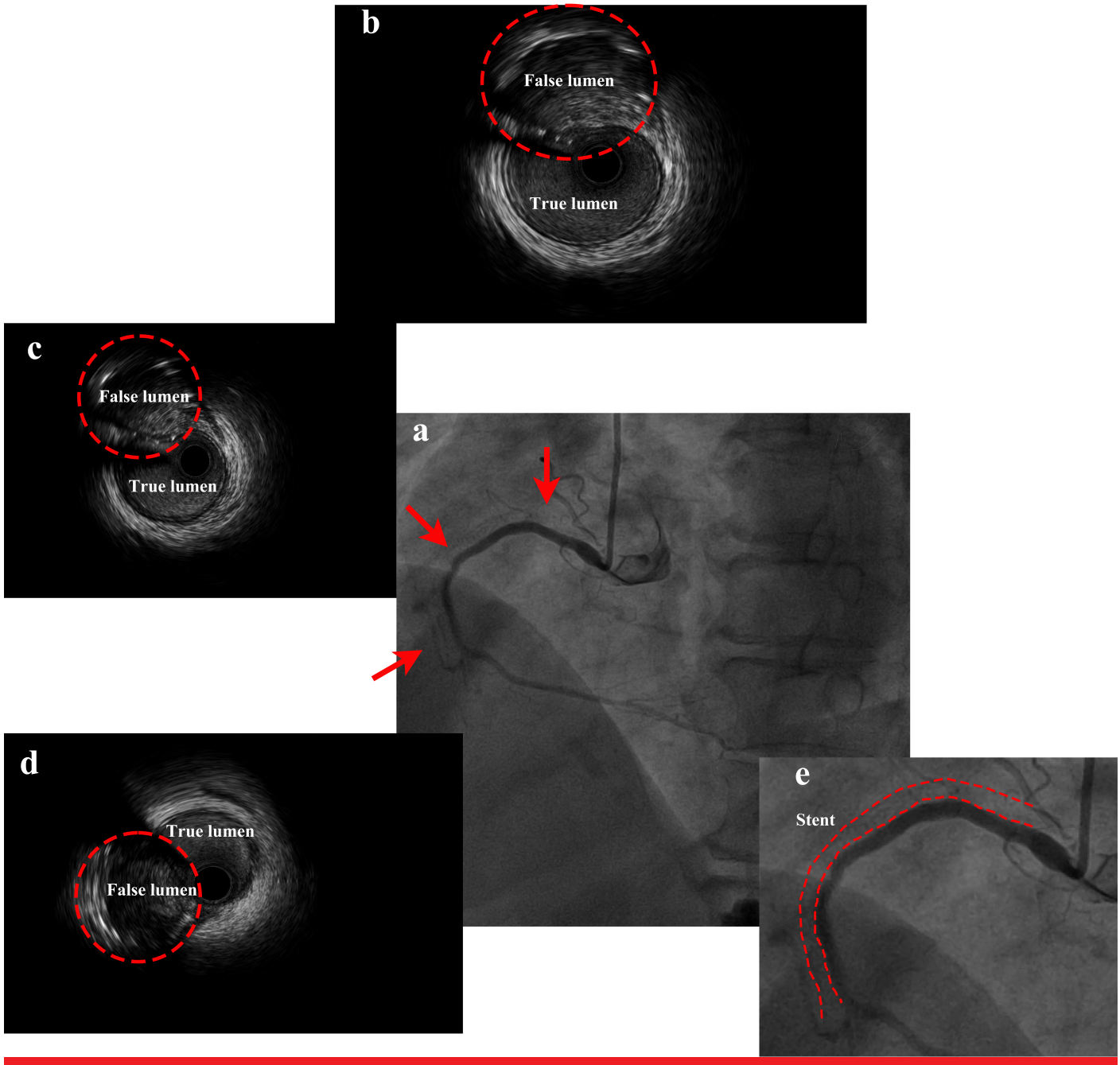

Figure 2. (a) Right coronary artery view in 2024 coronary angiography (e: in the proximal, middle, and middle-distal segments, a stent shadow is observed accompanying the vessel); (b) 2024 intravascular ultrasound imaging of the right coronary artery demonstrates the proximal segment; (c) 2024 intravascular ultrasound imaging of the right coronary artery demonstrates the middle segment; (d), 2024 intravascular ultrasound imaging of the right coronary artery demonstrates the middle-distal segment.

research is needed. As a single case, it does not establish universality or mechanism.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Informed Consent: The patient was treated in accordance with the Declaration of Helsinki and provided written informed consent for all treatment and procedures and for publication of this case report.

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