



“SKS is not dead” - A Case Report Of Dual Stenting Technique in the Management of a Complex Coronary Bifurcation Lesion During ST Elevation Myocardial Infarction

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Abstract

Introduction: Cardiac interventions in the setting of a ST-elevation myocardial infarction (STEMI) often require complex decision-making, especially when confronted with coronary bifurcation lesions. Although provisional stenting is the first choice regarding revascularization, bailout or upfront two stents may be required.

Case presentation: We present the case of a 53-year-old male patient with a history of arterial hypertension and type 2 diabetes who presented to our emergency department with an ST-elevation myocardial infarction associated with inferior and posterior wall involvement. The patient's coronary angiogram revealed a thrombotic occlusion in the second segment of the right coronary artery. A dual stenting technique was employed using simultaneous kissing stents to address this complex coronary bifurcation lesion. Six months follow up with coronary angiography and optical coherence tomography demonstrated functional neo carina with no malapposition and successful endothelialization of two stents.

Conclusions: In our case, the simultaneous kissing stents approach was deemed appropriate due to the presence of a thrombotic bifurcation lesion involving both the posterior descending artery and retro posterior branch, while minimizing the risk of side branch compromise.

Keywords

bifurcation lesion, dual stenting technique, myocardial infarction, STEMI

Rezumat

Introducere: Intervențiile percutanate la pacienții cu infarct miocardic cu supradenivelare de segment ST sunt proceduri complexe, care necesită o abordare integrativă, mai ales în condițiile leziunilor de bifurcație. Deși tehnica provisional stenting a devenit abordarea standard la ora actuală, implantarea simultană a două stenturi poate fi necesară per primam sau ca și bail-out.

Prezentarea cazului: Prezentăm cazul unui pacient de 53 de ani cu istoric de hipertensiune arterială și diabet zaharat tip 2, admis în unitatea de primire urgențe a clinicii noastre cu diagnosticul de infarct miocardic acut cu supradenivelare de segment ST în teritoriul infero-posterior. Coronarografia de urgență a relevat ocluzia trombotică a arterei coronare drepte în segmentul 2. Această leziune complexă a fost revascularizată prin tehnica simultaneous kissing stents. Reevaluarea pacientului la 6 luni prin coronarografie și tomografie de coerență optică a obiectivat neo carina funcțională, fără malapoziție, cu endotelizarea completă a celor două stenturi. **Concluzii:** În cazul pacientului nostru, tehnica simultaneous kissing stents a fost considerată adecvată datorită prezenței trombului la nivelul unei leziuni de bifurcație care a implicat artera descendentă posterioară și retroventriculară posterioară, concomitent cu reducerea riscului de compromitere a ramurii vasculare.

Cuvinte cheie

leziune de bifurcație, tehnică dual stenting, infarct miocardic, STEMI

Introduction

The management of complex coronary bifurcation lesions during an ST segment elevation myocardial infarction represents a significant challenge for interventional cardiologists. The choice of stenting technique is crucial, and it should aim to restore optimal coronary perfusion, reduce procedural complications,

and improve clinical outcomes. This case report discusses the use of simultaneous kissing stents in a patient with a thrombotic occlusion in the RCA and associated stenosis in the mid-LAD during STEMI.

Case Presentation

A 53-year-old male patient with a history of arterial hypertension and type 2 diabetes presented to our emergency department within 7 hours of severe chest pain onset. The patient was hemodynamically stable, with an unremarkable clinical examination. His presenting

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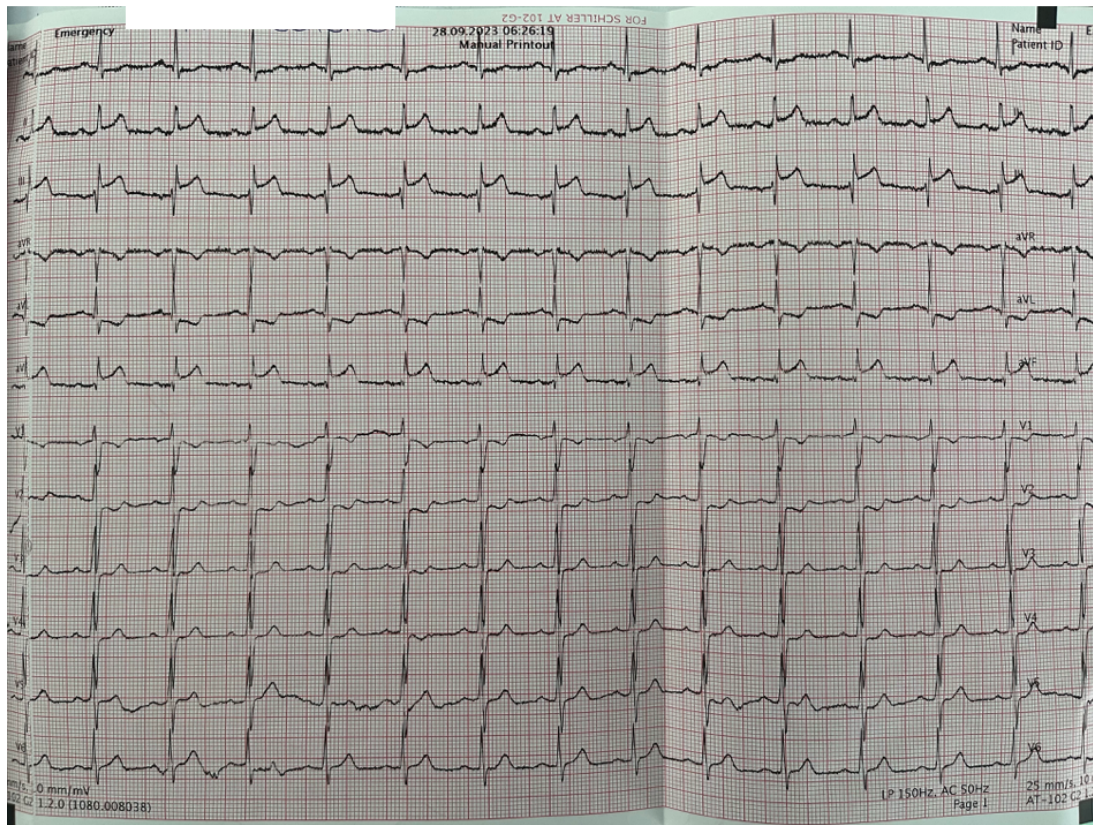


Figure 1 - Presenting electrocardiogram: ST elevation in D2,D3, aVF and ST depression in V1-V2, D1,aVL.

electrocardiogram (ECG) showed ST elevation in inferior and posterior leads (Figure 1).

Given the presentation of ST elevation myocardial infarction (STEMI), the patient was urgently taken to the catheterisation lab. Right femoral artery access was obtained, and coronary angiography revealed a thrombotic occlusion in the second segment of the right coronary artery (RCA), along with a 50% stenosis in the mid-left anterior descending artery (LAD).

After identifying the thrombotic occlusion in the RCA, wire crossing was successfully achieved using a workhorse guide wire. Upon advancing the wire, a thrombotic lesion was observed at the level of the crux cordis, Medina type 1,1,1. Balloon dilatation prior to stent implantation was avoided due to the large thrombotic material. At this time during the procedure, the patient developed signs of hemodynamic instability. A simultaneous kissing stents (SKS) technique was employed. Two drug-eluting stents, 3.5/12 mm and 3.0/12 mm, were simultaneously inflated in the distal RCA to the posterior descending artery and the retro posterior branch, respectively (Figure 2). Post-procedure angiography confirmed excellent result with Thrombolysis in Myocardial Infarction (TIMI) 3 flow (Figure 2).

The patient experienced immediate relief from chest pain after the procedure. Subsequent ECG showed resolution of ST-segment elevation, and his cardiac ultrasound revealed inferior wall motion abnormalities with a mildly reduced left ventricular ejection fraction of 45% with no significant valvular disease. Cardiac biomarkers

demonstrated significant myocardial injury (initial high sensitivity troponin 5316 pg/ml, creatine kinase 1771 mg/dl, and creatine kinase -MB 151 mg/dl) with complete resolution within 72 hours.

The patient's hospital course was uneventful, and he was discharged on dual anti platelet therapy, statin, beta-blocker, and angiotensin-converting enzyme inhibitor. He was advised to participate in cardiac rehabilitation and follow up with his cardiologist regularly.

At 6-month follow-up, his ECG showed normal sinus rhythm, his cardiac ultrasound revealed mild hypokinesia of the apical inferior wall with 50% left ventricular ejection fraction, and coronary angiography, using optical coherence tomography (OCT), revealed an optimal result of the stented bifurcation of the distal RCA and demonstrated functional neo carina with no malapposition and successful endothelialization of two stents (Figure 3).

Discussion

Cardiac interventions in the setting of a ST-elevation myocardial infarction (STEMI) often require complex decision-making, especially when confronted with coronary bifurcation lesions. Four common strategies for treating such lesions are provisional stenting, simultaneous kissing stents, double kissing crush, and the Culotte technique. Each approach should be chosen based on patient-specific factors and lesion characteristics. We discuss the rationale

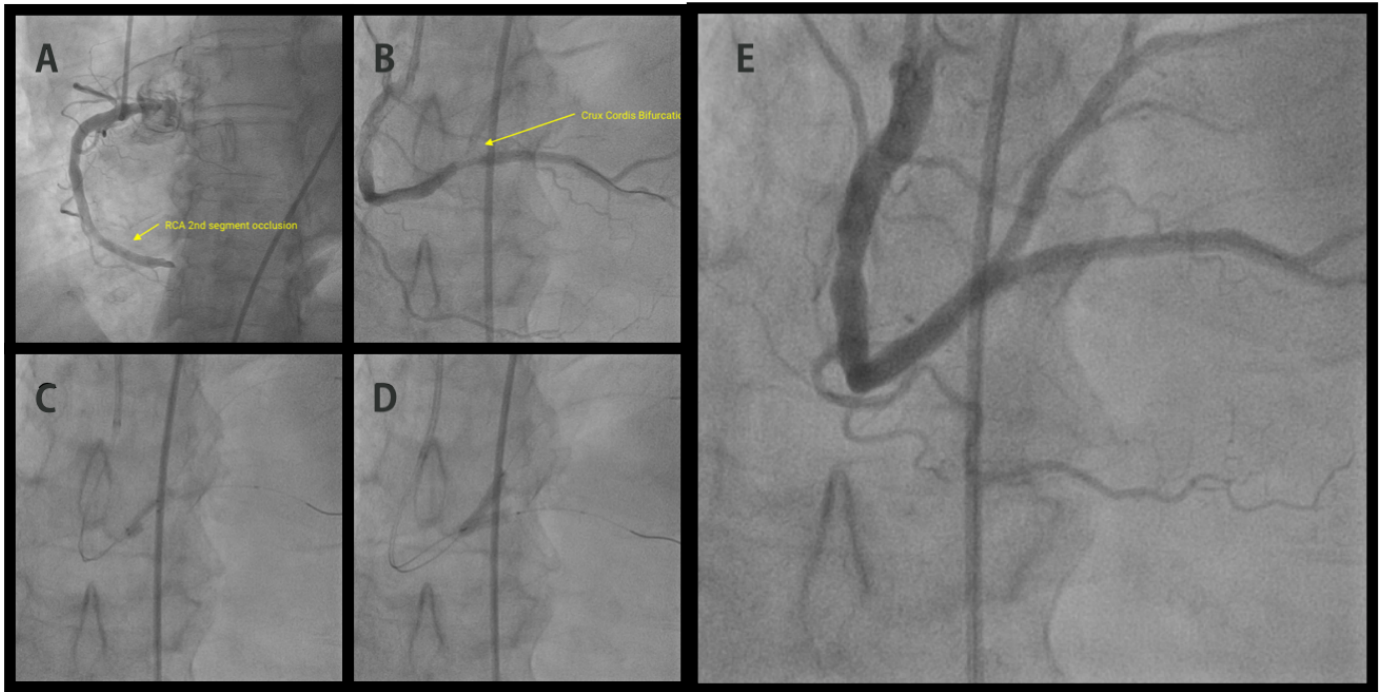


Figure 2 - A. Second segment of the right coronary artery occluded by thrombus. B. Bifurcation lesion of the crux cordis after workhorse guide wire crossing. C. Simultaneous kissing stents of the retropericardial branch and posterior descending artery. D. Balloon inflation of the 2 stents. E. Final result showing good peripheral perfusion. .

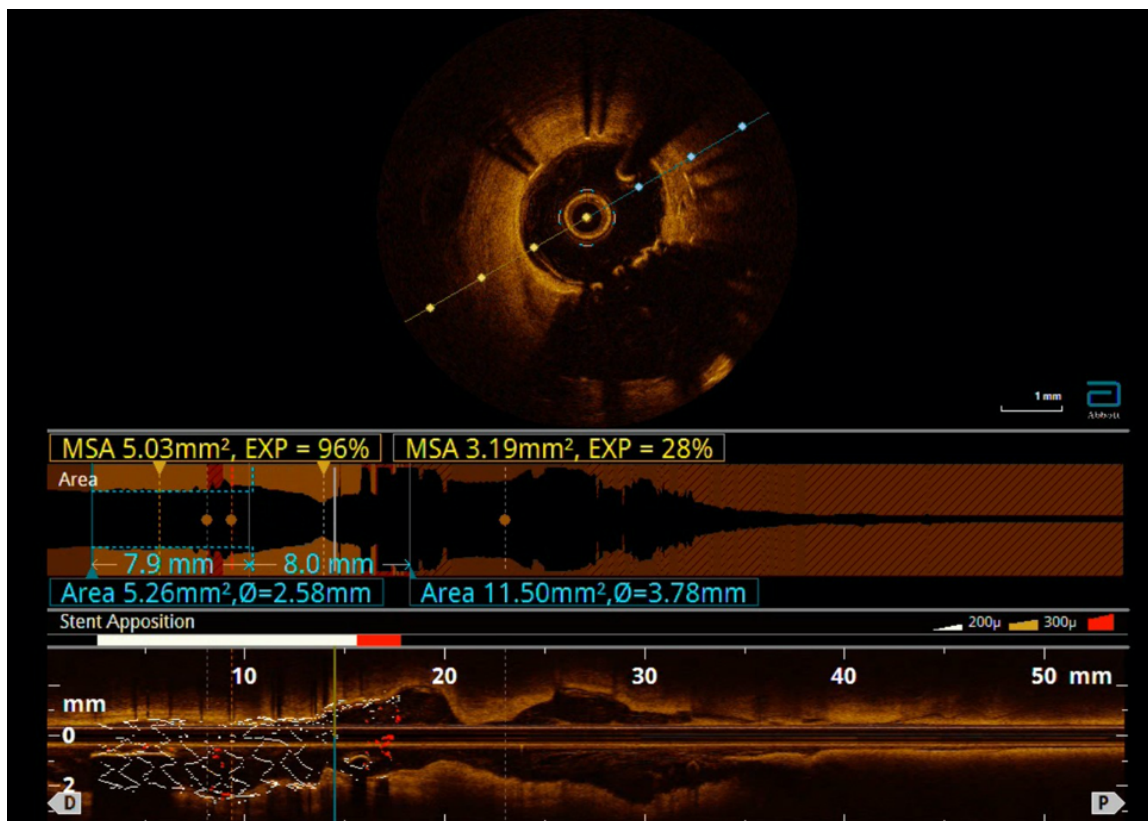


Figure 3 - Optical coherence tomography (OCT) demonstrated functional neo carina with no malapposition and successful endothelialization of two stents.

behind this choice, the procedural details, and the patient's clinical outcomes. [1]

1. Provisional stenting, widely used, is a simpler technique that is less time consuming and minimizes the use of stents and subsequently the risk of restenosis. It allows for the assessment of side branch stenting based on post-dilatation results. [2] However, this method may not provide immediate revascularization of the side branch, and there may be a need for additional procedures should the side branch be compromised during main vessel stenting. [3][4]
2. The SKS technique has the advantage of immediate revascularization of both the main vessel and the side branch. It is well-suited for cases with significant stenosis and/or occlusion in both branches, but the side branch may be distorted or crushed during deployment. Therefore, appropriate stent sizing and positioning is necessary in order to avoid malapposition and restenosis. [2]
3. The direct kissing crush technique addresses both branches in a staged manner, thus allowing for precise placement of the stents in each branch. It may be suitable when provisional stenting alone is insufficient. Potential downsides include the requirement of multiple steps, which increase procedure duration and contrast exposure. There is a risk of stent distortion, crushing, and malapposition during the crush step. The main limitation of this procedure is the risk of incomplete revascularization if any step is unsuccessful. [3]
4. The Culotte technique offers the advantage of a two-stent strategy with good side branch access. It is effective if used in addressing complex lesions with significant involvement of both (usually) equally sized branches and can achieve good stent apposition and coverage. This technique is more complex, with a risk of stent deformation, crushing, and malapposition during deployment. [5]

In the situation of a STEMI patient with a coronary bifurcation lesion, the choice of strategy should be guided not only by lesion

complexity, but also anatomy, operator expertise, and the patient's overall clinical status. SKS may provide immediate revascularization of both branches in complex lesions. Ultimately, the decision should be made on a case-by-case basis, considering the trade-offs between the procedural complexity and immediate revascularization. [6][7]

Conclusion

In this case, the dual stenting technique using simultaneous kissing stents proved to be an appropriate and effective approach for the management of a complex coronary bifurcation lesion during STEMI. The choice of stenting technique should always be tailored to the individual patient's anatomy and lesion characteristics, with the goal of optimizing coronary perfusion and minimizing complications.

Conflicts of interest

None to declare.

Consent

The authors confirm that informed written consent was obtained for the submission and publication of this case report, including the accompanying text and images as per COPE guidelines.

Funding

There was no funding for this work.

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