

Simultaneous kissing stent technique for bifurcation lesion in a saphenous Y-graft

Y safen greft bifürkasyon lezyon için simultane 'kissing stent' tekniği

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Summary– Coronary artery bifurcation disease of a saphenous vein graft (SVG) is extremely rare. SVG disease remains a challenging lesion to treat because of increased morbidity and mortality with repeated coronary artery bypass graft (CABG) surgery, a high rate of periprocedural complications, and in-stent restenosis or occlusion requiring repeat revascularization with percutaneous coronary intervention. Presently described is use of the simultaneous kissing stent technique to treat inverted Y SVG bifurcation disease in a patient with a prior CABG and new-onset acute coronary syndrome.

Özet– Safen venöz greftte (SVG) koroner arter bifürkasyon hastalığı oldukça nadirdir. Safen venöz greftte hastalığı, tekrarlayan koroner arter baypas greft cerrahisi (KABG) ile artan morbidite ve mortalite, yüksek prosedürel komplikasyon oranları ve stent restenozu veya perkütan koroner girişimle tekrar revaskülarizasyon gerektiren oklüzyon nedeniyle tedavide zorlu bir lezyon olmaya devam etmektedir. Burada, KABG öyküsü olan ve akut koroner sendrom tanısı alan bir hastada ters Y SVG bifürkasyon hastalığında simultane 'kissing stent' tekniği kullanılan bir olgu bildirdik.

Coronary artery bifurcation disease (CABD) of native coronary arteries is not uncommonly found in daily practice, and is very challenging due to the poor prognosis in comparison with non-bifurcated lesions.^[1,2] However, CABD is extremely rare in a saphenous venous graft (SVG). SVG disease remains a challenging lesion to treat because of increased morbidity and mortality with repeat coronary artery bypass graft surgery (CABG), a high rate of periprocedural complications, and in-stent restenosis or occlusion requiring revascularization with percutaneous coronary intervention (PCI). Presently described is a patient with a prior CABG and new-onset acute coronary syndrome who was successfully revascularized for an inverted Y SVG bifurcation lesion using the simultaneous kissing

Abbreviations:

CABD	Coronary artery bifurcation disease
CABG	Coronary artery bypass graft
LAD	Left anterior descending
LIMA	Left internal mammary artery
OM	Obtuse marginal
PCI	Percutaneous coronary intervention
SVG	Saphenous vein graft

stent technique. This case demonstrates the feasibility of performing the simultaneous kissing stent technique to treat a SVG bifurcation lesion.

CASE REPORT

A 75-year-old female patient presented at the emergency department with retrosternal chest pain. She had a medical history of hypertension, type-2 diabetes mellitus, quadruple vessel coronary artery bypass surgery 12 years prior (left internal mammary artery [LIMA] to left anterior descending coronary artery [LAD]), inverted Y saphenous vein graft (SVG) to the diagonal artery and first obtuse marginal artery (OM), SVG to the right coronary artery (RCA), and a VVI pacemaker for atrioventricular block. Her blood pressure was 110/70 mm Hg and her heart rate was 120 beats per minute. A 12-lead electrocardiogram showed atrial fibrillation and ST-segment depression and T-wave changes. Echocardiography revealed

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moderately reduced left ventricular systolic function, a left ventricle ejection fraction of 35%, and mildly aortic, mitral, and tricuspid valve regurgitation. The troponin level was 3.81 ng/mL (cut off: 0.01–0.04). After treatment with 300 mg acetylsalicylic acid, 180 mg ticagrelor, and 7500 IU unfractionated heparin intravenous bolus, the patient was transferred to the catheterization laboratory and selective coronary angiography was performed via the right femoral artery. Significant involvement of the native vessels with patent LIMA to LAD bypass, SVG to RCA total occlusion, and critical bifurcation stenosis in the Y-graft to the diagonal and OM arteries were observed (Fig. 1a and Video 1*). The venous graft branch supplying the diagonal artery was completely occluded. Approximately 70% stenosis was seen in the venous graft branch supplying the OM artery.

Considering the serious clinical condition of the patient, the difficulty in reconstructing CABG, and

the diffuse disease of native coronary arteries, revascularization of the SVG lesion was performed by PCI. First, 2 guidewires were positioned distal to the lesions (Fig. 1b and Video 2*). An intracoronary aspiration thrombectomy was performed on the SVG to the diagonal artery. Everolimus-eluting stents 3.0x18 mm in size were implanted in the SVG to the diagonal artery and the SVG to the OM using the simultaneous kissing stent technique (Fig. 1c and Video 4*). While both stents were inflated and implanted at the same time, no deterioration in the hemodynamics of the patient was observed. The result at the site of bifurcation was satisfactory, with a Thrombolysis in Myocardial Infarction flow score of III into the periphery of both branches (Fig. 1d and Video 4*). Most authors suggest the use of embolic protection devices for interventions performed in SVG; however, this option was not available in our catheterization laboratory when the procedure was performed. The patient was subsequently discharged successfully.

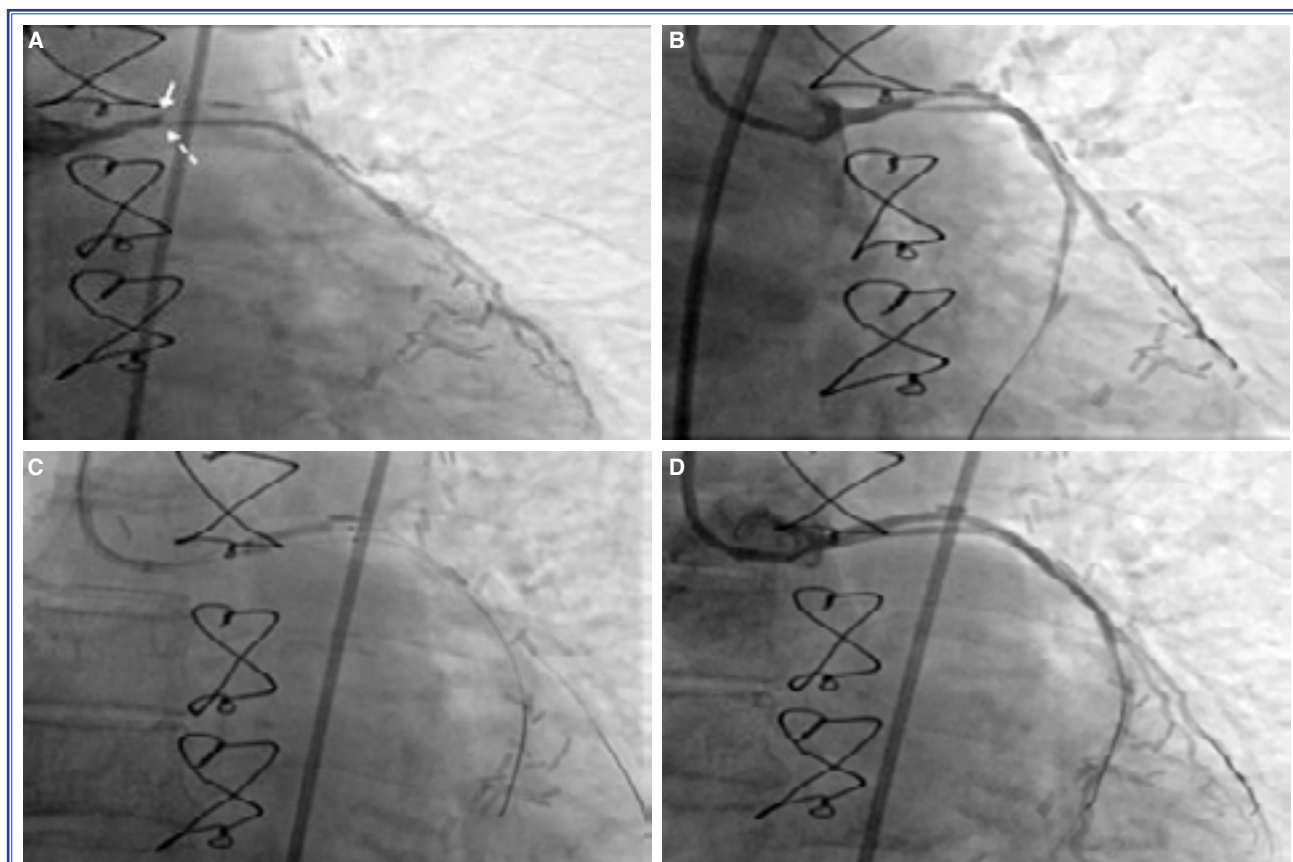


Figure 2. (A) Saphenous vein graft (SVG) to the diagonal artery was completely occluded (arrow) and 70% stenosis was detected in the SVG to the obtuse marginal artery (arrow head). (B) Two wires were positioned distal to the lesions. (C) Stents were implanted in the saphenous vein graft (SVG) to the diagonal artery and the SVG to the obtuse marginal artery with the simultaneous kissing stenting technique. (D) Thrombolysis in Myocardial Infarction flow grade III in the periphery of both branches.

DISCUSSION

It is not uncommon for clinicians in practice to encounter CABD of a native artery, but this condition is extremely rare in SVG. CABD has remained a difficult lesion to treat because it has poorer outcomes, lower procedural success and a higher complication rate than less complex diseases that require PCI. In general, PCI of SVGs results in higher rates of mortality, periprocedural myocardial infarction, and restenosis when compared with native vessel PCI.^[3] Many strategies have been proposed for the treatment of bifurcation lesions in native coronary vessels; however, due to the low incidence, there are no available data concerning treatment of bifurcation lesions in saphenous vein Y-grafts in the literature.^[2,4]

Successful percutaneous intervention has been reported for Y-graft bifurcation lesions with the Crush technique.^[4-6] We applied the simultaneous kissing stent technique in our case. The simultaneous kissing stent technique involves the delivery and implantation of 2 stents together. One stent is advanced in the side branch, the other in the main branch, and the 2 stents touch each other, forming a proximal carina. Ideally, the angle between the 2 branches should be less than 90°. The main advantage of simultaneous kissing stents is that access to both branches is never lost. In addition, when a final kissing inflation is performed there is no need to re-cross either stent.^[7,8] Treatment of a bifurcation lesion with this technique results in a more proximal new carina and a double-barrel lumen in the proximal main branch. This technique usually requires final kissing balloon inflation for proper apposition of the stent struts and to form the new carina. The inflation may cause dissection of the proximal main branch. In the event of a friable SVG, a double-barrel lumen may prevent treatment of the dissected area with a new stent.

In conclusion, we have demonstrated that the application of the simultaneous kissing stent technique for saphenous vein Y-graft bifurcation lesion with acute coronary syndrome is feasible and can provide a satisfactory angiographic result and a favorable clinical outcome.

**Supplementary video file associated with this article can be found in the online version of the journal.*

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REFERENCES

1. Liu G, Ke X, Huang ZB, Wang LC, Huang ZN, Guo Y, et al. Final kissing balloon inflation for coronary bifurcation lesions treated with single-stent technique: A meta-analysis. Herz 2017. [Epub ahead of print] [CrossRef]
2. Iakovou I, Ge L, Colombo A. Contemporary stent treatment of coronary bifurcations. J Am Coll Cardiol 2005;46:1446-55.
3. Eeckhout E, Serruys PW, Wijns W, Vahanian A, van Sambeek M, De Palma R. Percutaneous Interventional Cardiovascular Medicine, vol 2. In: The PCR-EAPCI Textbook. Europa Edition. Toulouse, France; 2012. p. 455-75.
4. Chan RS, Duong MH, Kaplan AV. Percutaneous coronary intervention in two occluded arms of a saphenous 'Y'-graft: the importance of protecting both of your arms. Catheter Cardiovasc Interv 2007;70:374-8. [CrossRef]
5. Karalis I, Kochiadakis G, Igoumenidis N, Skalidis E, Chrysostomakis S, Vardas P. The "crush" technique as a therapeutic approach for a bifurcation lesion in a saphenous venous graft. Hellenic J Cardiol 2010;51:368-73.
6. Chen KJ, Lee WL, Liu TJ, Chang WC, Wang KY, Su CS. "DK Crush" Technique for a Tightly Stenosed Conjoined SVG Lesion in a Patient with Acute Coronary Syndrome and Cardiogenic Shock. Acta Cardiol Sin 2015;31:253-6.
7. Colombo A, Gaglione A, Nakamura S, Finci L. "Kissing" stents for bifurcational coronary lesion. Cathet Cardiovasc Diagn 1993;30:327-30. [CrossRef]
8. Sharma SK, Choudhury A, Lee J, Kim MC, Fisher E, Steinhilber AM, et al. Simultaneous kissing stents (SKS) technique for treating bifurcation lesions in medium-to-large size coronary arteries. Am J Cardiol 2004;94:913-7. [CrossRef]

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