

Recanalization of an Occluded Major Side Branch after Stenting with Intracoronary Adenosine

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SUMMARY

Adenosine is a powerful direct coronary vasodilator with a very short half-life that has been shown to be effective in avoiding and reversing no reflow. We report an immediate successful recanalization of an occluded major side branch after stenting with acute intracoronary adenosine administration. The beneficial effect of adenosine may imply that the side branch occlusion (SBO) in this case could be due to spasm or distal embolization of the atherosclerotic debris ending up with no flow.

We believe that adenosine could be helpful in at least some cases of SBO and therefore may be worth attempting. (Jpn Heart J 2002; 43: 43-48)

Key words: Side branch occlusion, Adenosine

SIDE branch occlusion (SBO) is a challenging problem during interventional procedures.¹⁻⁵⁾ Although occlusion of branches smaller than 2 mm has been reported to be of little clinical importance this may lead to angina or myocardial infarction. Side branches with ostial lesions were observed to be occluded more than ones without any lesion. Plaque shift, plaque embolization, spasm, thrombus formation, design of the stent struts, and high pressure balloon predilation (>10 atm) are reported to be the mechanisms responsible for SBO.^{6,7)}

Adenosine is a naturally occurring vasodilator that has been shown to be effective in avoiding and reversing no reflow.⁸⁻¹⁰⁾ We present a case in which successful immediate recanalization of an occluded major side branch after stenting was obtained with acute intracoronary adenosine administration. The beneficial effect of adenosine may imply that the SBO in this case could be due to spasm or distal embolization of the atherosclerotic debris ending up with no flow.

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CASE REPORT

A 67-year-old Turkish male was admitted to the emergency room complaining of chest pain. He was known to be a cardiac patient since 1982 with several episodes of acute coronary syndromes that were followed by medical therapy. ECG at admission revealed a chronic anteroseptal myocardial infarction (MI) and ST depression in the inferolateral derivations. He was diagnosed with another acute ischemic attack and hospitalized due to a diagnosis of unstable angina. He is hyperlipidemic with a positive family history and smoking. His physical exam was normal except for the absence of tibialis posterior and dorsalis pedis artery pulses on the left side. He was put on standard heparin, nitroglycerin, aspirin and beta blocker therapy. Although the pain subsided within a few hours of hospitalization the patient continued to experience pain on exertion. Echocardiogram revealed an apical aneurysm with an organized thrombus. Ejection fraction was calculated to be 46%. On the 3rd day angiography was performed. The left anterior descending (LAD) artery was totally occluded in the proximal portion. However, a right coronary artery (RCA) injection revealed a pre-branch stenosis (Type A) at the posterior descending artery-posterolateral artery (PDA-PLA) bifurcation and retrograde filling of LAD was also observed (Figure 1). We then decided to look for viability in the anterior region in order to determine a procedure for

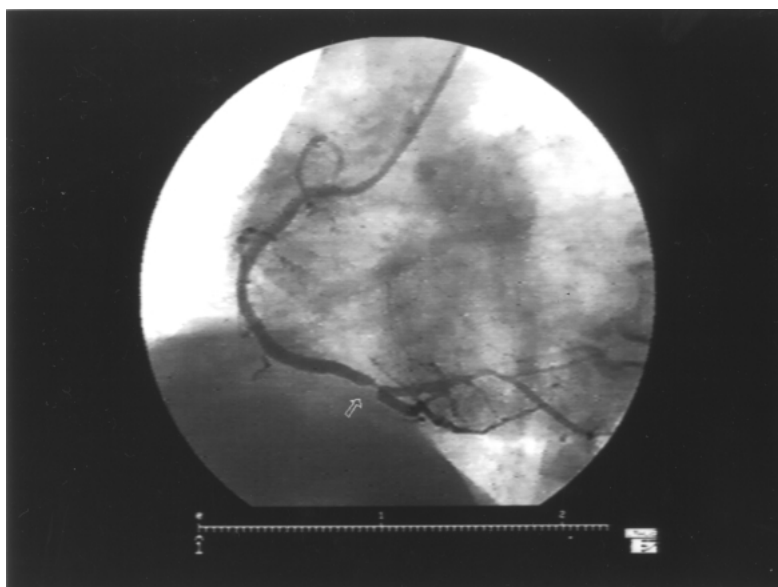


Figure 1. Type A bifurcation lesion in distal right coronary artery.

revascularization. Thallium 201 SPECT revealed a fixed defect in the antero-septal region with reversible ischemia in the septal wall. As there was no viable myocardium in the antero-septal region we decided to dilate the severe stenosis in distal RCA. He was put on ticlopidine 48 hours before the procedure.

After placement of a 7 French Judkins right guiding catheter, 2 wires (ACS High Torque Traverse 0.014 inch, Guidant/ACS, Sunnyvale, CA. USA) were inserted into the distal beds of the 2 branches. Stenting was accomplished with an ACS Tetra 3.5/8 mm stent (Guidant/ACS) with the direct stenting approach at high pressure (14 atm) (Figure 2). After stent deployment a control angiogram revealed total occlusion of the PLA with the patient experiencing angina and ST elevation (Figure 3). A third wire was used to recross the struts of the stent but this was not successful. As intracoronary nitroglycerin (600 μ g) has not been proven to be effective for the recanalisation, we decided to give intracoronary adenosine and injected 40 μ g followed by a saline flush. The control angiogram revealed fully patent PLA with a TIMI 3 flow (Figure 4). The angina subsided and ST segments were normalized. The patient was then transferred back to our coronary care unit and discharged 2 days later. His in-hospital course was uneventful.

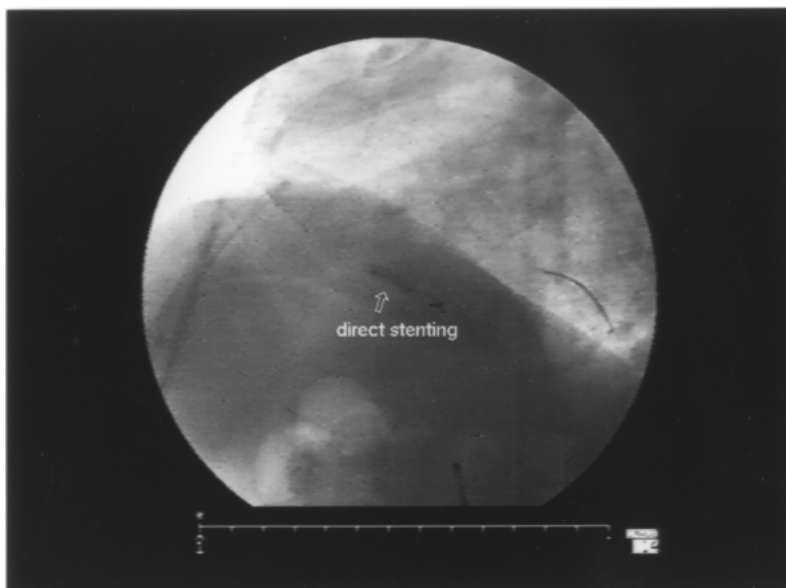


Figure 2. Direct stent implantation after double wire crossing.

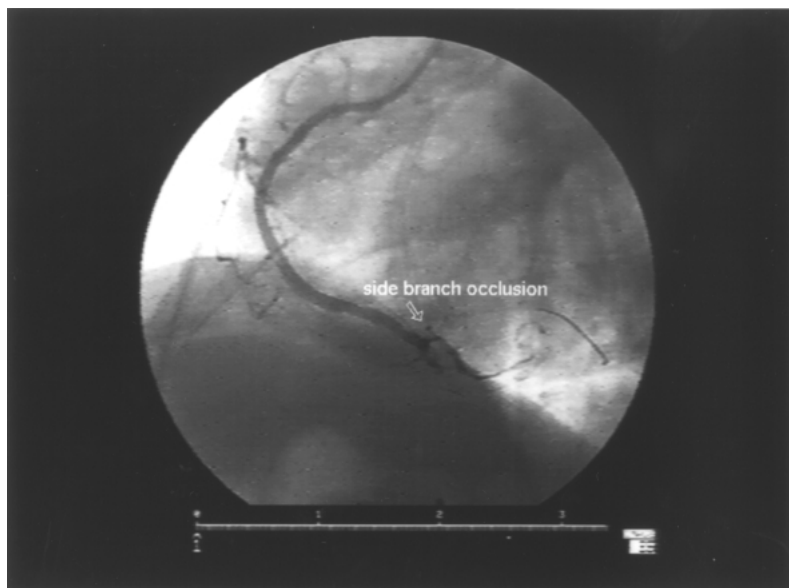


Figure 3. Side branch occlusion after stenting.

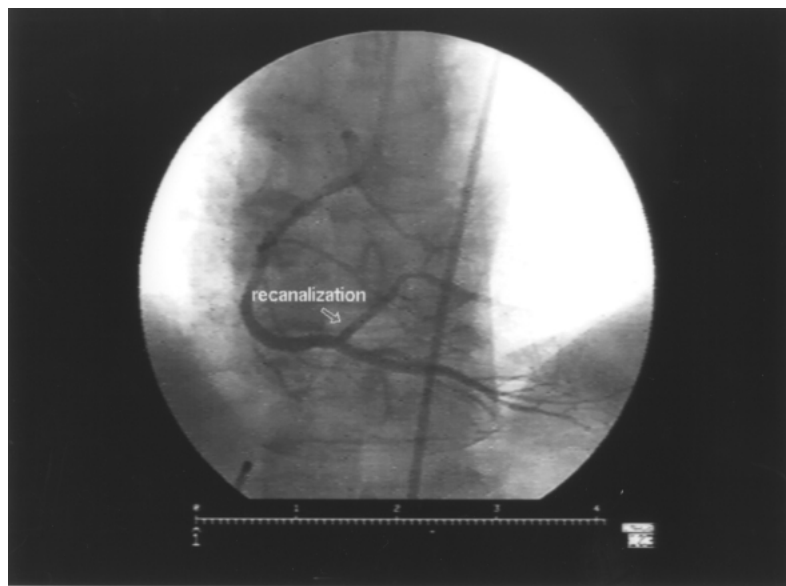


Figure 4. Recanalization of the occluded side branch after intracoronary adenosine.

DISCUSSION

Stenting has become the mainstay of therapy for coronary lesions in the last several years. An important potential complication of stenting is side branch occlusion (SBO) due to mechanical obstruction or thrombosis.^{3,4,11,12)} Depending on the design, stents usually cover 10% to 20% of the vessel surface area. Bifurcation lesions are still a major problem for the interventionalist. SBO, which complicates the procedure, could be quite troublesome. Although side branch protection with an extra guide wire has been accomplished, the incidence of SBO is quite high ranging between 12% to 41%.^{3,13-15)} There is also the risk of inability to cross the stent struts after the occlusion, as was the case in our patient, or entrapment of the balloon in these struts. Although a variety of techniques have been proposed for protection of the side branch, such as kissing balloons, T-stenting, Y-stenting, and culotte techniques, SBO is still an important problem.¹⁶⁻¹⁹⁾

Adenosine, a powerful direct coronary vasodilator with a very short half-life, has several potential beneficial roles during percutaneous interventions. Macrodebris or thrombus distal embolization during stenting in the presence of a side branch may lead to SBO by initiating distal vasoconstriction. By improving this microvascular endothelial dysfunction and vasoconstriction adenosine may be beneficial in recanalisation of the occluded side branch.⁸⁻¹⁰⁾ The only documented acute spontaneous recanalisation of an occluded side branch in the literature was by Najm, *et al.* The authors reported a reversible occlusion of the septal branch after angioplasty of the LAD artery and they documented spontaneous recanalisation only two hours after the procedure. The authors speculated that spasm was the mechanism responsible for the occlusion.²⁰⁾ We also believe that spasm (either of the main artery or distal vessel due to embolism) was the mechanism responsible in our case, which responded promptly to acute intracoronary adenosine administration. Although SBO after stent placement has been reported in many studies, these reports also revealed that the majority regained their patency in the 6th month of control.^{1,2,21)} However, acute recanalisation was not investigated systematically in any of the reports.

We have reported successful recanalization of an occluded major side branch with intracoronary adenosine administration. The beneficial effect of adenosine may imply that the SBO in this case could be due to spasm or distal embolization of the atherosclerotic debris resulting in no flow. We believe that adenosine could be helpful in at least some cases of SBO, depending on the etiology and therefore may be worth attempting. Many reports have described a spontaneous late reversal of SBO after an intervention. This spontaneous recanalisation in the long term could also be due to reversal of the spasm. However, none of the studies utilized adenosine in this setting.

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