

Subacute Thrombosis After Stents Implantation in a Patient with Two Adjacent Coronary Artery Aneurysms

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Coronary artery aneurysm is an uncommon disease. When it is associated with significantly obstructive coronary artery disease, percutaneous transluminal coronary angioplasty with graft-coated stent implantation usually provides favorable results. Non-coated stents may have the potential risk of thromboembolism. We present a patient with unstable angina who received elective balloon angioplasty and non-coated stent implantations in two adjacent aneurysms. Two episodes of subacute stent thrombosis occurred subsequently at the two different aneurysmal lesions respectively, which were resolved by repeat balloon angioplasty. Post-procedural intravenous heparin infusion is strongly suggested to prevent the development of stent thrombosis. Long-term oral warfarin is also suggested for prophylaxis of recurrent thromboembolic events. (*Chang Gung Med J* 2003;26:277-82)

Key words: Coronary aneurysm, stents, coronary thrombosis, angioplasty.

Coronary artery aneurysm is an uncommon disease, which has been increasingly recognized since the advent of coronary angiography.⁽¹⁻⁴⁾ When it is associated with significantly obstructive coronary artery disease, percutaneous transluminal coronary angioplasty with graft-coated stent implantation usually provides favorable results. Non-coated stents have the potential risk of thromboembolism. We present a patient with unstable angina who received an elective percutaneous transluminal coronary angioplasty and non-coated stent implantations at two stenotic lesions, which were adjacent to two coronary aneurysms. The patient developed two episodes of subacute stent thrombosis at these two different aneurysmal lesions respectively, which were resolved by repeat balloon angioplasty and prolonged anticoagulant therapy.

CASE REPORT

A 78-year-old man complained of typical exer-

tional chest tightness that was relieved by rest for 5 years. Treadmill exercise electrocardiogram showed horizontal ST-T segments depression by 1 mm in precordial leads from V3 to V6. He received 100 mg aspirin once a day, half piece of 10 mg propranolol three times a day, and 10 mg isosorbide dinitrate four times a day regularly at our outpatient clinic and was asymptomatic for 5 years. Risk factors of coronary artery disease included diabetes mellitus and smoking. He had no history of coronary intervention. He was admitted for cardiac catheterization on January 30, 2002 due to crescendo angina for 6 months. On admission, physical examination showed no abnormal findings. The vital signs included body temperature, 36°C; heart rate, 66 beats per minute; respiratory rate, 15 cycles per minute; and blood pressure, 130/70 mmHg. The electrocardiogram, chest X-ray film, and other laboratory examination results were all unremarkable. He continued 100 mg aspirin once a day, 10 mg propranolol four times a day, 10 mg isosorbide dinitrate four times a day, and received

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four tablets of 75 mg clopidogrel before cardiac catheterization and then one tablet a day thereafter.

The coronary angiography revealed two critical stenoses with two adjacent aneurysms at the proximal left anterior descending artery (Fig. 1A). The left circumflex artery was normal. The right coronary artery was small and almost totally occluded from the proximal segment, with grade 1/3 collateral from the left coronary arteries. Percutaneous transluminal coronary angioplasty and two non-coated stents (Tristar 2.5×23 mm proximally and Tristar 2.5×28 mm distally) were implanted in the proximal lesions of the left anterior descending artery without any immediate complications. High-pressured (14 atmospheres) balloon inflation was used. Intravenous bolus heparin 10000 IU was given before the balloon angioplasty to keep the activated clotting time more than 300 seconds during the whole procedure. After balloon angioplasty and stent implantation, the distal aneurysm was not visible but the proximal one was still visible (Fig. 1B). No thrombus, coronary dissection, or other vascular complications were detected on angiography. A post-procedural intravenous heparin infusion was given for 1 day and the activated partial thromboplastin time (APTT) was checked every 6 hours to be kept between 1.5 and 2 times of the normal control. After the procedure, the actual

APTT value was around 1.24 to 1.54 times of the initial value. The patient suffered from four episodes of chest tightness with occasional ST-T segments changes on his electrocardiogram within 2 days after the procedure. The chest discomfort and electrocardiogram changes subsided spontaneously or by using sublingual nitroglycerin. However, the patient developed severe chest pain with new ST-T segments depression on electrocardiogram 3 days after stent implantation. Emergent coronary angiography was performed and revealed a thrombus formation located at the site distal to the first aneurysm with TIMI I antegrade flow distally (Fig. 2A). Balloon angioplasty at the distal aneurysmal site was performed immediately and successful revascularization was achieved (Fig. 2B). Intravenous heparin infusion was continued after the procedure. Early the next morning after the emergency balloon angioplasty, the patient suddenly felt severe chest pain again with new ST-T segments elevation on electrocardiogram. The last APTT was only 1.06 times of the normal control even under the infusion of heparin. Emergent coronary angiography was performed again. It showed a big thrombus at the proximal aneurysmal lesion with total occlusion of the left anterior descending artery (Fig. 3A). Repeat balloon angioplasty at the proximal aneurysmal site was per-

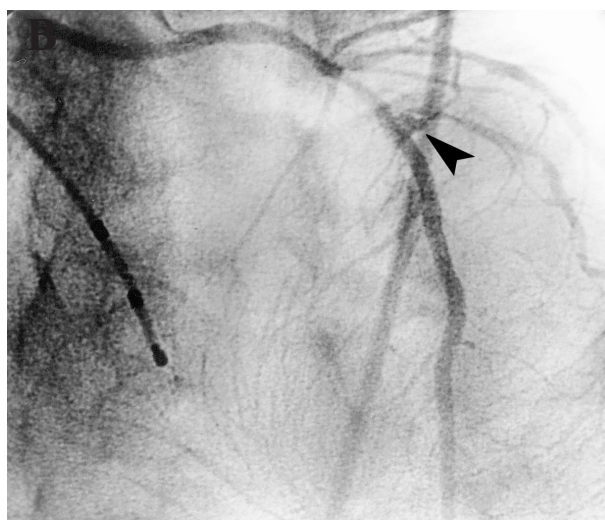
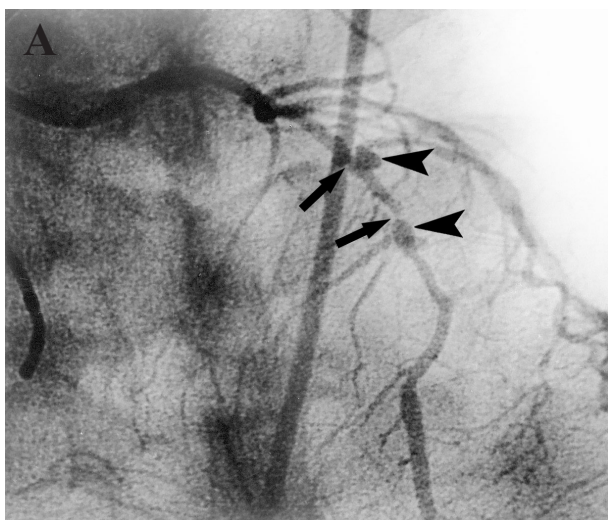


Fig. 1 The coronary angiography showed two critical stenoses (arrow) with two adjacent coronary artery aneurysms (arrowhead) at the proximal left anterior descending artery before stenting (left anterior oblique and cranial view). (B) The vessel was dilated after stenting. The distal aneurysm was not visible and the proximal one was still visible (arrowhead).

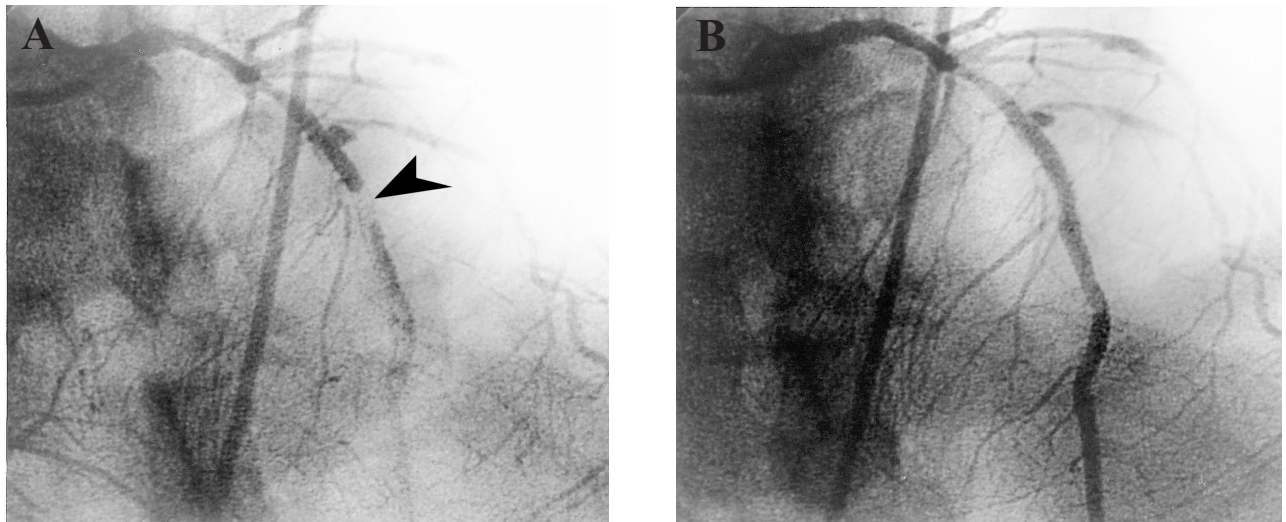


Fig. 2 (A) A thrombus (arrowhead) at the distal aneurysmal site with TIMI I flow of left anterior descending artery. (B) The thrombus disappeared and recanalization of the vessel was achieved after balloon angioplasty.

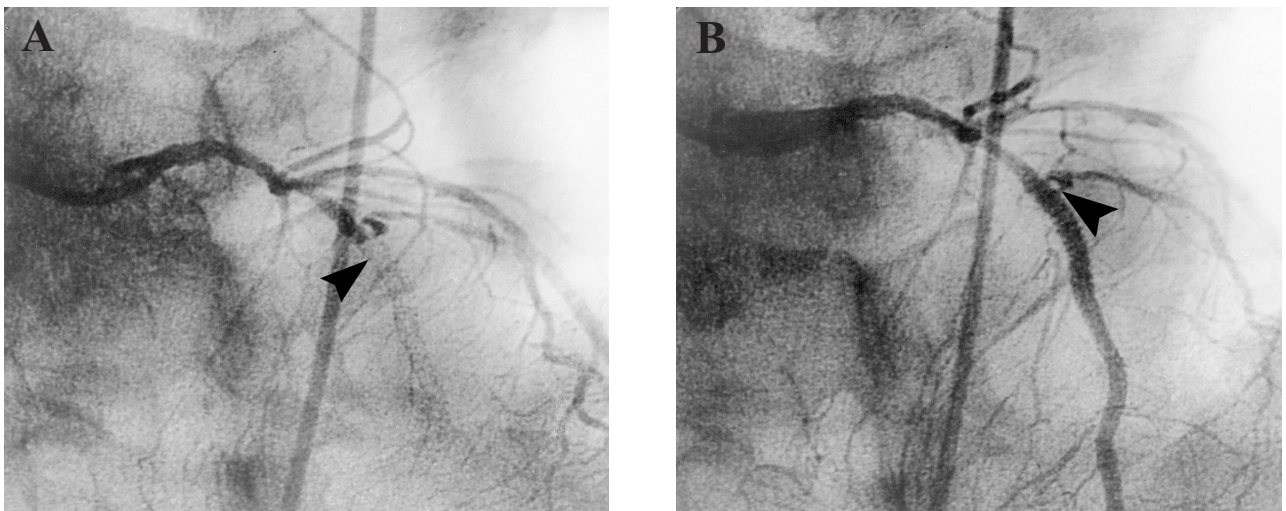


Fig. 3 (A) A big thrombus (arrowhead) at the proximal aneurysmal site with total occlusion of the left anterior descending artery. (B) Re-patent of the vessel after balloon angioplasty. A residual thrombus was still visible in the proximal aneurysm (arrowhead).

formed and successful revascularization was achieved again (Fig. 3B). A higher dose of heparin was given to keep the APTT value between 2 and 2.5 times of the normal control to prevent the reformation of a thrombus. The APTT values were all kept in the therapeutic range (from 2.04 to 2.71 times of normal control) throughout the following day. The heparin was discontinued 1 day after the second bal-

loon angioplasty and was then replaced by low molecular weight heparin (fraxiparine) 5700 IU/0.6 ml subcutaneously every 12 hours. Oral warfarin was prescribed on the second day after the second balloon angioplasty to keep the international normalized ratio between 2 and 3. No more chest pain occurred after the second repeat balloon angioplasty. The patient was discharged 4 days after the second bal-

loon angioplasty without any discomfort. As of this writing, the patient receives regular follow-up and remains asymptomatic at our outpatient clinic with the prescription of 100 mg aspirin once a day, 75 mg clopidogrel once a day for 1 month, half piece of 5 mg warfarin once a day, and 10 mg propranolol twice a day.

DISCUSSION

Coronary artery aneurysm was first reported by Morgagni in 1761. It was defined as coronary artery dilatation which exceeded the diameter of normal adjacent segments or the patient's largest coronary vessel by 1.5 times.⁽⁵⁾ It is an uncommon disease, but has been increasingly recognized since the advent of coronary angiography. The incidence varies from 0.5% to 5.3% of all aneurysms. Coronary aneurysm is most frequently found in male and in the right coronary artery. The known etiologies are listed in Table 1. Over 50% of cases are caused by atherosclerotic changes. The most common clinical manifestation is myocardial ischemia, including angina pectoris or myocardial infarction. Coronary angiography is the gold standard for diagnosis. Transesophageal echocardiography is useful for diagnosis of proximal aneurysms.⁽⁶⁾ Contrast-enhanced computed tomography (CT) scan and mag-

netic resonance imaging (MRI) may be useful to follow up the size of the aneurysm. The natural history of coronary artery aneurysm is not well understood. Most patients with coronary aneurysms are asymptomatic and the aneurysms are diagnosed using coronary angiography incidentally when patients are suggested of having myocardial ischemia. The coronary aneurysms may result in adverse events of thrombosis, distal embolization, vasospasm, and rupture. Standard treatment for coronary aneurysms remains unclear. The strategy of treatment for a coronary aneurysm depends on whether it is associated with obstructive coronary artery disease. Myocardial revascularization is indicated when patients have drug-refractory angina and coexistent significant coronary artery stenosis. Coronary angioplasty with coated-stent of venous or polytetrafluoroethylene (PTFE) graft has been reported to achieve satisfactory results.⁽⁷⁻¹⁴⁾ However, it is not suitable for bifurcated lesions. Surgical intervention may be indicated in a patient with a large aneurysm⁽¹⁵⁾ or a complicated coronary artery disease that cannot be treated with angioplasty or medical therapy appropriately. Medical therapy consists of anti-platelet and anticoagulant agents,⁽¹⁶⁾ although the latter is still controversial.

In recent years, coronary artery stenting has played an important role in the management of coronary artery aneurysms. Several researchers have reported in the literature that the aneurysm can be obliterated effectively using venous or PTFE graft-coated stent implantation. The major disadvantage of the graft-coated stent is that the side branches around the stented site are sacrificed. The other disadvantages are the larger profile and less flexibility than a conventional stent, which results in difficult manipulation in extremely tortuous coronary arteries. In our case, there were two adjacent aneurysms near the two tightly stenotic lesions of the left anterior descending artery. In addition, there were also several dominant diagonal and septal branches nearby. A graft-coated stent implantation would have occluded these important side branches; therefore, conventional non-coated stents were used. A potential risk of this strategy was the lack of a stent adhering closely to the vessel wall at the aneurysmal site, which may be a nidus for stent thrombus formation. In our case, two subsequent episodes of stent thrombosis occurred at these two aneurysmal sites respectively.

Table 1. Etiology of Coronary Artery Aneurysm

Atherosclerosis
Percutaneous coronary intervention
Conventional/cutting balloon angioplasty
Directional atherectomy
Laser angioplasty
Kawasaki disease
Congenital
Dissection
Post-trauma
Mycotic
Arteritis
Polyarteritis nodosa
Takayasu's arteritis
Syphilis
Systemic lupus erythematosus
Connective tissue disorders
Marfan's syndrome
Ehlers-Danlos syndrome
Metastatic tumor

Both were under inadequate anticoagulant status initially, and no more thrombus formation occurred after adequate anticoagulant status was maintained using intravenous heparin infusion. Interestingly, although the distal aneurysm was totally obliterated by the non-coated stent, the first attack of the thrombosis occurred closer to the distal aneurysm, rather than closer to the proximal residual one. The reason may be that the distal aneurysm was incompletely obliterated, which may be detected by intravascular ultrasonography. Hennesdorf et al.,⁽¹⁷⁾ reported one case with a different result. Their patient had no stent thrombosis after the non-coated Palmaz-Schatz stent implantation without use of heparin after the procedure.

In conclusion, treatment of the coronary artery stenosis associated with aneurysms with stent implantation should be performed very carefully. A graft-coated stent is preferred if there are no contraindications. When a coated stent is not suitable, a non-coated stent may be used. We recommend giving an effective intravenous heparin infusion after stenting to prevent subacute stent thrombosis. This is especially important when the aneurysm is not completely obliterated after stenting, or there are multiple aneurysms at or adjacent to the treated lesions. The effect of oral warfarin in such patients has not been well established, which may be useful when concerning the thromboembolic nature of the residual aneurysm.

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相鄰的二處冠狀動脈瘤在經過冠狀動脈支架置放術後造成的 亞急性血栓阻塞

許碩麟 謝宜璋 溫明賢

冠狀動脈瘤是一種不常見的疾病。當它合併顯著的冠狀動脈阻塞或狹窄時，施行經皮冠狀動脈氣球擴張術並輔以移植物包被的冠狀動脈支架置放術通常可以達到良好的結果。若置放無移植物包被的冠狀動脈支架則可能有發生血栓阻塞的潛在危險。我們報告了一個非穩定型心絞痛的病人，其二個相鄰的冠狀動脈瘤在接受了經皮冠狀動脈氣球擴張術並輔以無移植物包被的冠狀動脈支架置放術之後，前後二次分別在此二個不同的冠狀動脈瘤發生亞急性的冠狀動脈支架血栓阻塞，須重覆地施行冠狀動脈氣球擴張術才得以使血管再度暢通。術後並繼續給予靜脈肝素注射成功地防止了支架內血栓的再形成。出院後病患仍繼續服用口服抗凝血劑以預防血栓的再發生。(長庚醫誌 2003;26:277-82)

關鍵字：冠狀動脈瘤，冠狀動脈支架，冠狀動脈血栓，氣球擴張術。