Case Report

A case of very late stent thrombosis at high altitude

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Very late stent thrombosis is a rare but serious threat to the safety of drug eluting stents. We describe a case of very late stent thrombosis, 18 months after placement of a drug eluting stent, which occurred in a 32-year-old female while climbing the Aconcagua during the Dutch Heart Expedition.

The patient, a 32-year-old female, had suffered a small inferior wall myocardial infarction on September 12, 2005. Coronary angiography showed 3-vessel disease. During the same procedure Percutaneous Coronary Intervention (PCI) was performed in one stage on all three lesions with placement of a Cypher stent in the Right Coronary Artery (RCA, 3.5 mm diameter, 33 length, culprit), and a Taxus stent in the Left Anterior Descending (LAD, 2.25 mm diameter, 12 mm length) and Circumflex (CX, 2.50 mm diameter, 24 mm length) artery. It was clear that the RCA was the culprit lesion with a 76% diameter stenosis as measured by quantitative coronary angiography (QCA), whereas the LAD and CX were not severely stenosed (QCA: 42 and 48% diameter stenosis, respectively, Fig. 1). The procedure was successful and the patient was discharged with an ejection fraction of 55% and treatment with Clopidogrel for one year.

In October 2006, the patient was selected as a member of the Dutch Heart Expedition 2007. This expedition was meant to show that low risk infarct patients can safely perform exercise at high altitude and may be able to try and reach the summit of the Aconcagua, the highest peak of the South American continent (6962 m).

She successfully participated in the six-month training period and performed an uneventful bicycle exercise test in November without any signs of ischemia reaching a VO₂ max of 32 ml/kg. At the start of the expedition she was taking aspirin, a statin (Atorvastatin 10 mg) and low dose Angiotensin Converting Enzyme (ACE) inhibition (Ramipril 5 mg), together with oral contraceptive medication. She had stopped taking Clopidogrel one year after the PCI procedure in September 2006.

The first week of the expedition was meant to acclimatise in a region away from Aconcagua and during this week she climbed to an altitude of 4800 m without any problems. On day 12 of the expedition, after a two-day rest at base camp, the patient stopped climbing at an altitude of 4600 m because of dizziness and chest pain. Echocardiography back in base camp showed anterior and apical akinesia. She was urgently evacuated by helicopter and later by ambulance to the cardiac centre in Mendoza (Hospital Español), where angiography, performed 10 hours after the onset of symptoms revealed thrombosis of the Taxus stent in the LAD (Fig. 2). Successful angioplasty was performed without placement of extra stents. Maximum CKmb was 430 IU/l. She was discharged on day 5 with aspirin, Clopidogrel, a statin (Atorvastatin 20 mg) and an ACE inhibitor (Ramipril 5 mg). Oral contraceptives were stopped.

The occurrence of very late stent thrombosis in this patient is probably due to a combination of risk factors for thrombosis and lack of complete endothelialization of the stent struts 18 months after placement of the Paclitaxel eluting stent. Many reports have described the occurrence of thrombosis related to high altitude; however, most often this was venous thrombosis in legs, arms or sagittal sinus (1). Only few describe an increased risk of arterial thrombosis. Mild hypoxia by itself has not been shown to be thrombogenic in healthy individuals (2, 3) but resulted in elevated parameters of coagulation in patients at risk for venous thrombosis (Factor V Leiden mutation or oral contraceptive users) (4). Not only hypoxia but vigorous exercise can also trigger acute myocardial infarction, even in well trained persons (5).

In our particular patient it is probably the combination of genetic susceptibility (Coronary artery disease at a very young age), the use of oral contraception, vigorous exercise, some dehydration and mild hypoxia that induced thrombosis of the drug eluting stent. Should we therefore discourage alpinism for patients with a history of coronary artery disease? The serious complication in our patient might not have occurred if Clopidogrel had not been discontinued, oral contraceptives had been stopped before the expedition, or if a bare metal stent instead of a drug eluting stent had been placed. In addition; there was no indication for revascularization of the LAD in 2005. The most recent guidelines state that revascularization of the LAD without objective evidence of ischemia can even be harmful (class III indication) (6).
This case report shows that high altitude (in combination with other risk factors for thrombosis) might have triggered late arterial thrombosis 18 months after placement of a drug eluting stent. This case also shows that placement of drug eluting stents should only be considered in patients with a good indication for revascularization who are at high risk for restenosis.

**Figure 1:** Quantitative coronary angio-graphy (QCA) of the CX (A) and LAD (B) during the index PCI procedure on Sept. 12, 2005

**Figure 2:** Angiogram of LCA on Sept. 12, 2005 (A) before PCI, with mild stenosis of the LAD (→) and the LCA on March 6, 2007 (B), showing stent thrombosis of the Taxus stent.

## References