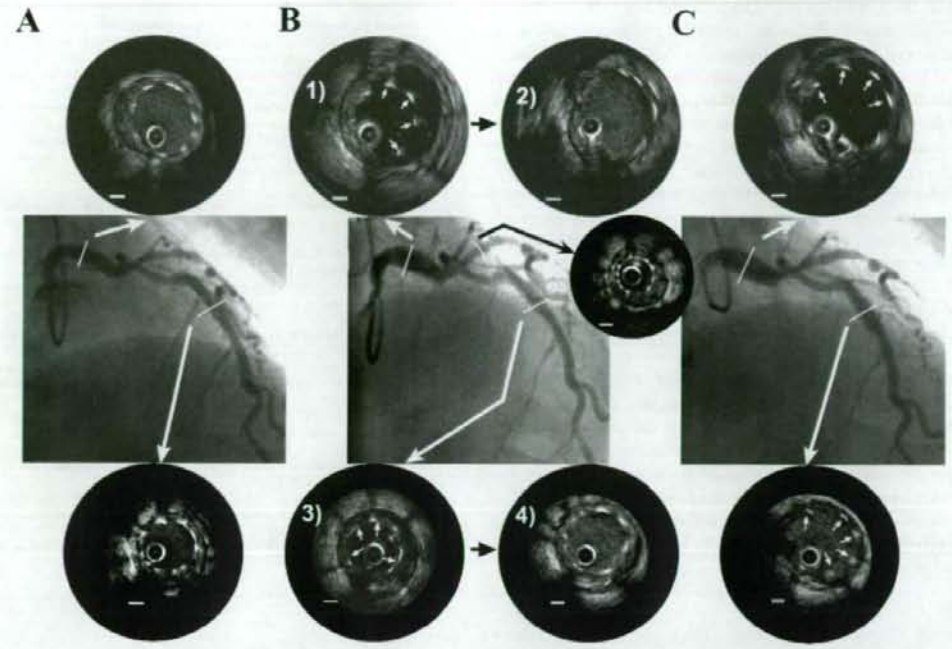

Figure 2. *Post-percutaneous coronary intervention angiography and intravascular ultrasound (IVUS) showed adequate expansion and appropriate stent apposition to the vessel wall* (**A**). *Three weeks after very late stent thrombosis, IVUS revealed significant positive remodeling in LM* (**B-1**), *LAD* (**B-3**), *and D1* (**B-5**). *Stent was adequately apposed to the vessel wall after re-intervention to the lesions* (**B-2, B-4**). *Three months following the re-intervention, further enlargement of the vessel as well as incomplete stent apposition (arrows) was observed in LM and LAD* (**C**). *Scale bar indicates 1mm in each IVUS image.*

Serial IVUS analyses in this present case allowed us to elucidate sequential changes in vascular dimensions. Vascular enlargement, with an external elastic membrane area nearly three times that of baseline, accompanied by severe ISA, was clearly visualized after thrombus dissolution. Even after thrombolysis and thrombectomy, the external elastic membrane and underlying pathology were not readily identifiable without the side-by-side comparison of baseline IVUS images. The possible relationship between ISA and late stent thrombosis should be determined through careful interpretation of serial image comparisons.

From a clinical viewpoint, this case poses several difficult questions. First, IVUS confirmed optimal stent deployment, including adequate expansion and stent apposition, at the time of initial stent implantation. Furthermore, this patient remained compliant with the dual antiplatelet regimen until the onset of stent thrombosis. While implantation of multiple stents might have contributed to this event, the patient received relatively adequate precautions to reduce the potential risk for stent thrombosis. In this case, the vessel enlargement presumably developed later than 9 months after stent implantation. Provided that late-acquired ISA may predispose

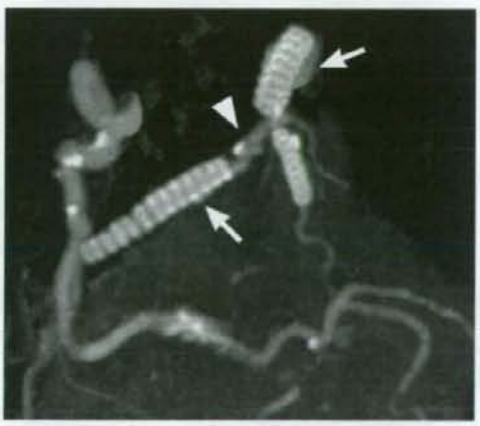

Figure 3. *Coronary computed tomography 4 months after late stent thrombosis showed aneurysmal change in stented segments as well as incomplete stent apposition (arrows), and stenosis in non-treated segment (arrow head). Lumen diameter in LM was approximately 9 mm. Scale bar indicates 1 cm.*

patients to a higher risk of stent thrombosis,[13] clinicians might require a more efficient and preferably less invasive measure to detect and diagnose it before serious clinical sequelae ensue.

In this patient, no abnormal reaction to either sirolimus or the SES was observed in the skin-patch and lymphocyte stimulation tests. Given the extent of the pathological changes, virtually limited to the stented segment, it may be difficult to detect such changes from systemic reactions, even if hypersensitivity was involved in this local pathology. In addition, 3 months after reintervention to improve stent strut apposition to the vessel wall, further positive vascular remodeling was observed. In a previous case report, untreated late-acquired ISA preceded subsequent late stent thrombosis.[13] Until the nature of this vascular pathology is further elucidated, the definitive treatment for such patients is not yet known.

In conclusion, we present a case of very late stent thrombosis occurring 2 years after SES implantation. Detailed serial IVUS analysis has shown that late-acquired ISA was presumably involved in the pathogenesis of this near-fatal clinical event. It remains to be clarified how best to identify the patients vulnerable to these vascular reactions and how to treat such lesions. Until we understand the nature of this critical complication sufficiently, the judicious choice of treatment indication and careful longer-term follow up may be warranted to ensure patient safety.

References

1. Fischman DL, Leon MB, Baim DS, et al. A randomized comparison of coronary-stent placement and balloon angioplasty in the treatment of coronary artery disease. Stent Restenosis Study Investigators. *N Engl J Med* 1994;331:496–501.
2. Bavry AA, Kumbhani DJ, Helton TJ, et al. Late thrombosis of drug-eluting stents: A meta-analysis of randomized clinical trials. *Am J Med* 2006;119:1056–1061.
3. McFadden EP, Stabile E, Regar E, et al. Late thrombosis in drug-eluting coronary stents after discontinuation of antiplatelet therapy. *Lancet* 2004;364:1519–1521.
4. Pfisterer M, Brunner-La Rocca HP, Buser PT, et al. Late clinical events after clopidogrel discontinuation may limit the benefit of drug-eluting stents: An observational study of drug-eluting versus bare-metal stents. *J Am Coll Cardiol* 2006;48:2584–2591.
5. Waksman R, Bhargava B, Mintz GS, et al. Late total occlusion after intracoronary brachytherapy for patients with in-stent restenosis. *J Am Coll Cardiol* 2000;36:65–68.
6. Liistro F, Colombo A. Late acute thrombosis after paclitaxel eluting stent implantation. Heart 2001;86:262–264.
7. Moreno R, Fernandez C, Hernandez R, et al. Drug-eluting stent thrombosis: results from a pooled analysis including 10 randomized studies. *J Am Coll Cardiol* 2005;45:954–959.
8. Ong AT, McFadden EP, Regar E, et al. Late angiographic stent thrombosis (LAST) events with drug-eluting stents. *J Am Coll Cardiol* 2005;45:2088–2092.
9. Virmani R, Guagliumi G, Farb A, et al. Localized hypersensitivity and late coronary thrombosis secondary to a sirolimus-eluting stent: Should we be cautious? *Circulation* 2004;109:701–705.
10. Joner M, Finn AV, Farb A, et al. Pathology of drug-eluting stents in humans: Delayed healing and late thrombotic risk. *J Am Coll Cardiol* 2006;48:193–202.
11. Ako J, Morino Y, Honda Y, et al. Late incomplete stent apposition after sirolimus-eluting stent implantation: A serial intravascular ultrasound analysis. *J Am Coll Cardiol* 2005;46:1002–1005.
12. Hong MK, Mintz GS, Lee CW, et al. Late stent malapposition after drug-eluting stent implantation: An intravascular ultrasound analysis with long-term follow-up. *Circulation* 2006;113:414–419.
13. Feres F, Costa JR Jr, Abizaid A. Very late thrombosis after drug-eluting stents. *Catheter Cardiovasc Interv* 2006;68:83–88.