Acute myocardial infarction caused by thrombotic occlusion at a stent site two years after conventional stent implantation

T Hayashi, A Kimura, K Ishikawa

Two cases of acute myocardial infarction caused by thrombotic occlusion at the conventional stented site two years after stenting are described. Late thrombotic stent occlusion may be caused by atherosclerotic regression, sustained inflammatory reaction, and inhibition of proliferation of neointima. Cardiologists must be aware of the potential for late thrombosis following even conventional stent implantation.

CASE REPORT 1
A 38 year old woman was referred to our university hospital because of acute myocardial infarction. Coronary angiography showed complete occlusion of the proximal left anterior descending artery where a stent had been placed 27 months earlier to treat her angina pectoris (fig 1A). Notably, angiography performed on day 198 after stent placement had shown no restenosis at the stented site and ticlopidine had been withdrawn; aspirin was continued. Angioscopy performed before coronary revascularisation showed exposed stent struts and a substantial amount of mixed thrombus in the culprit lesion (fig 2B). Intravascular ultrasound showed incomplete adhesion of the stent to the vessel wall (fig 2C). A new stent was partially superposed on the previous stent in the thrombotic occlusion area of the right coronary artery segment and the culprit coronary artery was successfully reperfused (fig 2D).

DISCUSSION
There have been numerous studies of early acute or subacute thrombotic complications after stent implantation. With the exception of thrombosis after brachytherapy or implantation of a drug eluting stent, however, less attention has been paid to late stent thrombosis, as clinical studies have shown that thrombotic occlusion of conventional stents develops within 14 days after stenting but rarely thereafter. Nevertheless, we encountered two such cases.

For over three years, Kimura and colleagues followed up with coronary angiography patients who had undergone stent implantation. They found that late improvement in luminal diameter occurred between six months and three years after stent implantation. Similarly, Asakura and colleagues used angioscopy to investigate neointimal coverage of stents and observed that the neointima became thicker for six months after stent implantation and then thinned, becoming transparent within three years. Histological findings showed this regression to be characterised by atrophic changes in smooth muscle cells, decreased cell density, and fibrotic maturation of intimal hyperplasia. It has also been suggested that apoptosis may contribute to such neointimal thinning.

Coronary occlusion in the two patients described here may have been caused by regression of the neointima covering their stents, as thrombus formation is a likely response to exposure to a metallic foreign body. Moreover, in the second patient, who was taking an adrenocortical steroid for the treatment of rheumatoid arthritis, the occlusion may have developed as a result of attenuated healing, which is a known side effect of steroid treatment and may lead to excessive inhibition of neointimal proliferation. It thus appears that long term follow up after stent implantation, keeping in mind the possibility of late stent thrombosis, is necessary even with conventional stent implantation.

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Figure 1  (A) Coronary angiogram showing complete occlusion in the proximal left anterior descending artery segment, where a stent had been placed 27 months earlier.  (B) A stent strut (black arrow) and a substantial amount of white and mixed thrombi can be seen in another angiographic image.  (C) Intravascular sonography shows the presence of gaps between stent struts (white arrowhead) and the vessel wall (black arrowhead).  (D) Conventional balloon angioplasty successfully opened the occluded lesion.

Figure 2  (A) Coronary angiogram showing a right coronary artery occluded in the mid segment, where a stent had been placed 31 months earlier.  (B) Stent struts (black arrows) and a substantial amount of mixed thrombus can be seen in another angiographic image.  GW, guidewire.  (C) Intravascular sonography shows a malapposed stent (white arrowheads) in the culprit lesion.  (D) The culprit coronary artery was successfully reperfused with a new stent superposed on the previous stent.
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