A case of “very” very late stent thrombosis: More than 12 years after DES

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Abstract

A rare but possibly catastrophic consequence of drug-eluting stents (DES) is very late stent thrombosis. We report a case of 74-year-old male who sustained a ST elevation myocardial infarction (STEMI) 12 years after initial Paclitaxel eluting stent implantation (PES). This is the longest time between stent placement and the development of an acute coronary event due to very late stent thrombosis that we are aware of. The implications for prognosis and therapy are significant because they highlight the uncertainty around the recommended duration of antiplatelet medication in patients with DES. Clinicians face challenges in treating those patients particularly when competing medical conditions demand the discontinuation of antiplatelet therapy. VLST is concerning since the underlying pathophysiology is unknown, and the best preventive treatments and duration of antiplatelet medication after stent implantation are unknown.

Keywords: Coronary artery disease, drug-eluting stents, neoatherosclerosis, neointima, paclitaxel eluting stent, very late stent thrombosis

Introduction

Stent thrombosis is a rare but clinically significant complication of stent placement. The annual incidence of VLST (very late stent thrombosis) varies between 0.4 and 0.6%.[1]

Stent thrombosis can develop acutely (within 24 h), subacutely (between 1 and 30 days), late (1–12 months), or very late (beyond one year) after stent implantation, according to Academic Research Consortium criteria and classification.[2-3] VLST occurred more commonly with 1st generation DES than with bare-metal stents (BMS), with the majority of VLST occurring within 1–4 years of stent placement.[9] It is the duty of the primary physician to diagnose ACS at the earliest and instill prompt medical treatment with the advice of early coronary intervention, most importantly any chest discomfort should not be ignored even in case of post angioplasty patients, even 5 years after first-generation DES implantation, the risk of stent thrombosis persists. And, as our patient discovered, it can happen even after 12 years after stent implantation. These startling findings emphasize the importance of maintaining long-term clinical vigilance in these patients.

Case Report

A 74-year-old gentleman presented at our hospital with an Inferior wall STEMI. In 2007, patient had undergone triple vessel stenting following acute coronary syndrome, the details of which are as under. LCX was directly stented with a 2.5 × 15 mm TAXCOR stent and was post dilated at 14 ATM for 20 s with a 2.5 × 8 NC balloon. LAD was also directly stented with 2.5 × 15 mm TAXCOR (Paclitaxel eluting) stent and was post dilated at 14 ATM for 20 s with a 2.5 × 8 NC balloon. Ramus was pre-dilated, followed by stenting with 2.5 × 18 mm Bx Sonic (bare metal) stent and was dilated at 10 ATM for 20 s post-dilated 2.75 × 8 mm NC balloon up to 16 ATM.
The current presentation was of chest tightness associated with sweating of 5 h duration. ECG showed acute inferior wall ST-elevation myocardial infarction. There was no history of diabetes or hypertension and other comorbidities. His BMI was 25 kg/m².

2D-ECHO showed inferior wall hypokinesia with EF 45%.

His coronary angiogram at this admission revealed total thrombotic occlusion in the LCX stent [Figure 1]. Other stents were patent with minor late loss. The patient underwent primary coronary intervention, after wiring thrombosuction was done. Stent boost of previous LCX stent revealed adequate expansion. This was followed by pre-dilatation with 2.5 × 12 mm NC balloon at 12 ATM and then 3.0 × 32 mm Resolute Onyx stent [Figure 2] was deployed at 10 ATM. The stent was post-dilated with 3.25 × 12 mm NC balloon up to 22 atm. TIMI 3 flow restored with no residual stenosis [Figure 3]. On follow-up at 18 months, he is doing well, with good effort tolerance and no angina.

**Discussion**

After 5 years of stent placement, VLST is extremely infrequent. When stent thrombosis occurs after 5 years, a new name called very or extreme very late stent thrombosis (VVLST) has been proposed. The first case was reported in 2009. The second case was reported in 2011. Kaliyadan reported between 2008 and 2013, a case series of seven individuals with VVLST was published, with the time between stent implantation and VVLST ranging from 5.6 to 7.1 years. A report of very late stent thrombosis at 9.5 years after stent implantation was recently published.

Although there is a case report of stent thrombosis even after 17 years it was with BMS not with DES. Alicia Prieto-Lobato recently published a case series of 4 cases with higher than expected incidence of stent thrombosis suffering from COVID-19.

Our patient sustained an inferior wall STEMI as a result of VVLST 12 years after implantation. To our knowledge, this is by far the longest reported interval between DES insertion and the development of acute coronary event subsequent to stent thrombosis. Accordingly, this case is both unique and a cause for alarm. It once again raises the important question regarding the duration of optimal dual antiplatelet therapy, especially in patients with older generation stents.

The other causes like lesion type, patient factors, and procedural characteristics (particularly inadequate expansion) have been associated with early and late stent thrombosis. However, the specific risk factors for VLST are less well defined.

Currently, smoking, having a longer stent, and having a longer lesion have been identified as risk factors. Patients with DES who developed VLST had a higher number of stents per lesion and stent overlap. Discontinuation of antiplatelet medication is also a possible risk factor, albeit this has not been proven.
The most important angiographic correlates of stent thrombosis include LAD location, presence of thrombus, final in-stent diameter, type C lesions.

Several studies have reported a steady increase in cumulative incidence of late and very late stent thrombosis following first-generation DES.

The crucial aspects of the underlying pathophysiology relate to a combination of delayed arterial healing, ongoing vessel inflammation, neoatherosclerosis, and late stent mal-apposition. Insufficient expansion of the stent struts might also contribute to VLST.

In our patient, most of the above risk factors were not present except that he discontinued Clopidogrel long back (one year after DES implantation), it was first-generation DES and possibly inadequate apposition of stent struts. The multivessel disease is itself a risk factor, which this patient had. Stent boost revealed adequate expansion of the stent but the stent appeared to be undersized compared to the reference vessel diameter, probably resulting in inadequate apposition of struts to the vessel wall.

The primary cause of stent thrombosis is incomplete endothelization of stent struts. Late stent mal-apposition due to delayed positive remodeling, strut penetration into a necrotic core, prolonged vascular inflammation, and hypersensitivity to the metal components are among the other reasons.\textsuperscript{14,15}

In our patient, there was a large thrombus burden confirmed by large thrombotic material aspirated by thrombosuction. Although the exact pathophysiologic mechanism of VLST is difficult to elucidate but most likely it was related to rupture of neoatherosclerotic plaque in an under-sized stent.

**Conclusion**

Very late stent thrombosis though infrequent can be encountered even after 10 years of stent deployment. But it is important to diagnose as early as possible as in our case and salvage the patient at right time. As discussed earlier multiple factors are contributing to stent thrombosis but as far as our current knowledge early discontinuation of anti-platelet plays the most important role. So, if a patient is not at high risk of bleeding both anti-platelet can be continued for a longer period especially with multi-vessel PCI with long stents.

**Key points**

- Any chest discomfort should not be ignored even in case of post angioplasty patients because it could be acute coronary syndrome.
- It is the duty of the physician to diagnose acute coronary event at earliest and refer for PCI at earliest.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Ethical approval**

This retrospective case review was exempted from the ethics committee/IRB approval.

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**Conflicts of interest**

There are no conflicts of interest

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