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Letter to the Editor

Use of intracoronary imaging in ST Elevation Myocardial Infarction with coronary artery aneurysm and very late stent thrombosis

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The use of Optical Coherence Tomography (OCT)-guided percutaneous coronary intervention (PCI) has been described in ST-Elevation Myocardial Infarction (STEMI) involving relatively simple culprit lesions [1]. Coronary artery aneurysms have a reported incidence of up to 4.9% among coronary angiograms performed and may present clinically as STEMI either from thrombus formation or embolic phenomena [2]. There has been limited experience described regarding the use of OCT in STEMI with an aneurysm in the infarct related artery (IRA). We present a case which illustrates the use of OCT in a STEMI case due to very late stent thrombosis (VLST) occurring in the IRA with a preexisting aneurysm.

A 46-year old gentleman with significant cardiovascular risk factors of diabetes mellitus, hyperlipidemia and family history of ischaemic heart disease had prior revascularization with a 5.0 × 12 mm drug eluting stent (DES) (Taxus Liberte™ stent; Boston Scientific, MA, USA) in the mid-right coronary artery (RCA) for a non-STEMI 13 months prior to presentation. He presented to our institution with inferior STEMI and an emergency coronary angiogram was performed which showed that the IRA was the RCA. The previously stented segment of the RCA was completely occluded up to the aneurysmal segment with TIMI 0 flow (Fig. 1A–C). A large amount of thrombus was present and aspiration thrombectomy using Thrombuster™ (Kaneka Medix Corporation, Osaka, Japan) and Angiojet™ (Boston Scientific, MA, USA) was performed (Fig. 1D–E). On-line OCT analysis involving preprocedural sizing and device landing zone assessment was performed. Residual thrombus was seen and there was a disruption of the intimal layer suggestive of neointimal plaque rupture within and extending proximal to the stented segment. Features of atherosclerosis such as fibroatheroma were seen in the vessel just distal to the aneurysmal segment (Fig. 2A–D). There was minimal presence of thrombus in the aneurysmal segment itself. Predilation was performed with a 3.0 × 15 mm balloon. A 4.0 × 33 mm Xience Prime™ (Abbott Vascular, Santa Clara, CA, USA) and a 4.0 × 23 mm Xience V™ were deployed in an overlapping manner with good angiographic result (Fig. 1F). OCT performed post-stent deployment showed that both the proximal and distal stents were well expanded and well apposed with no vascular injury (Fig. 2E–H). The proximal stent was well implanted at the transition zone between the aneurysm and normal sized vessel as seen in a 3-dimensional reconstruction (QAngioOCT software; Medis specials, Leiden, The Netherlands) (Fig. 2I).

An aneurysm of the coronary artery is a localized dilatation of the vessel that is larger than the diameter of adjacent normal segments by 50%. Atherosclerosis is the commonest cause. Other causes include infection and connective tissue disorders. The RCA is the most frequently affected vessel [2]. They may be asymptomatic or produce symptoms such as angina, myocardial infarction, sudden rupture or congestive cardiac failure as a result of fistula formation.

VLST, defined by Academic Research Consortium as occurring more than 1 year after stent implantation, can cause either partial or complete occlusion of the stented segment and associated with myocardial infarct [3]. It is a rare but potentially life threatening complication after coronary stent implantation [4]. First-generation paclitaxel eluting DES such as the Taxus Liberte™ was among the main devices associated with this complication, with an annual incidence rate of late and VLST of 0.2–0.6% [5,6]. Multiple factors may predispose to VLST. In this case, patient and device factors such as diabetes mellitus [7] and polymer present in paclitaxel eluting stents [4,8] may have contributed to the cause. In addition, part of the healing process after stent implantation — the neoatherosclerotic process within the previously stented segment with subsequent plaque rupture may be a contributory factor [9]. Possible findings seen on OCT included intraluminal thrombus, neointimal disruption suggestive of plaque rupture, dissection flaps and cavities.

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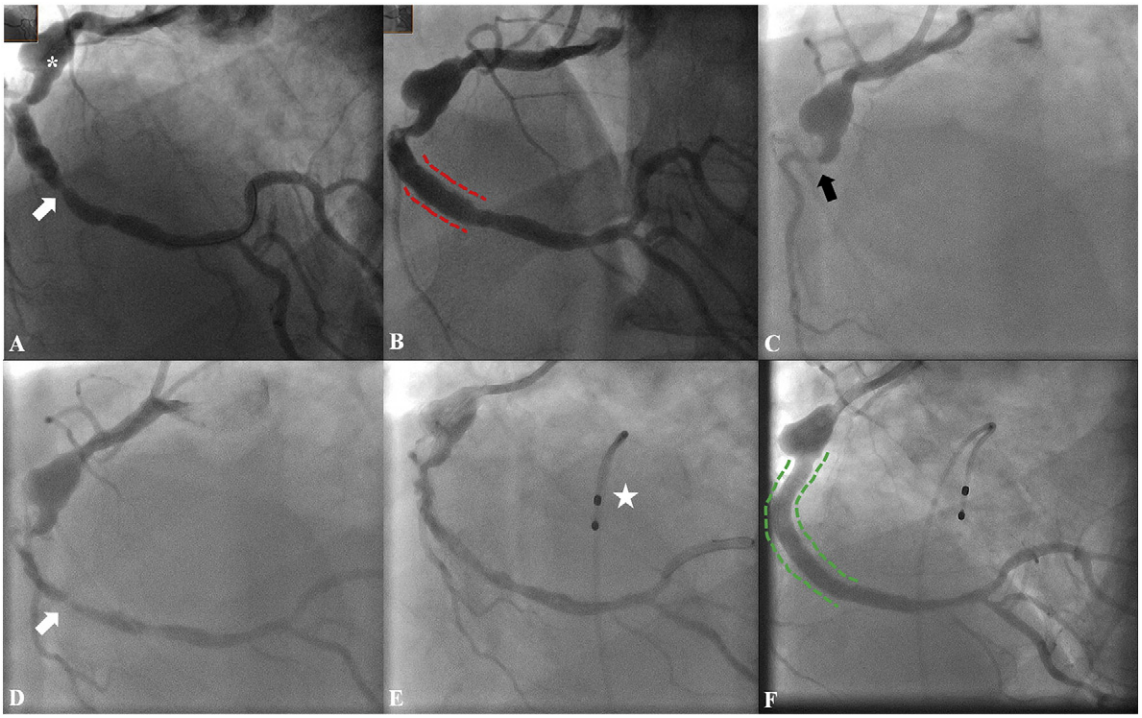

Fig. 1. Angiogram of the right coronary artery (RCA). Panel A. Baseline angiogram showing the RCA aneurysm (*) on initial presentation with a stenotic lesion affecting the mid-segment (white arrow). Panel B. Baseline angiogram showing the RCA after the 5.0 × 12 mm Taxus Liberte™ (dashed line) was deployed. Panel C. Angiogram showing a total thrombotic occlusion of the stented segment of the RCA 13 months after implantation for a NSTEMI. Panel D. Angiogram following recanalization of the vessel after wiring of the vessel with the thrombosed segment still visible as a haziness within the stented region (white arrow). Panel E. Angiogram following the culprit vessel after successful mechanical thrombectomy and predilation using Thrombuster™, Angiojet™ and 3.5 mm balloon respectively. The patient developed ventricular tachycardia likely secondary to successful reperfusion. As he became unstable, overdrive pacing was performed via a temporary transvenous pacing wire placed in the right ventricle (white star). Panel F. Angiogram post procedure with a 4.0 × 33 mm Xience Prime™ and a 4.0 × 23 mm Xience V™ stents deployed in overlapping manner (dashed line) in the RCA with good angiographic result. RCA — right coronary artery. NSTEMI — Non-ST Elevation Myocardial Infarct.

Basic tenets in the management of VLST include rapid restoration of blood flow by removing thrombotic material usually with the aid of mechanical devices, dilating the thrombosed segment and correction of any predisposing mechanical factors such as stent underexpansion. Gp IIb/IIIa inhibitors may be indicated if there is a large amount of thrombus present. Though the additional benefit of aspiration thrombectomy has been recently questioned with recent data [10], there may still remain a role in cases with large thrombotic burden. Adequate clearance of thrombus enables restoration of antegrade flow, facilitates intraprocedural imaging and may improve myocardial perfusion [1].

Online OCT analysis facilitates preprocedural sizing of the lumen prior to stent placement. In this case, angiographic assessment alone may be inaccurate due to the presence of an aneurysm proximal to the occlusion. Intracoronary imaging allows for more accurate and reliable intraluminal measurements such as lumen size, tapering and lesion length. Images acquired with the superior resolution of OCT can also help to clarify the cause of VLST in this case. One might also consider embolization from the aneurysm into the DES as a cause or progression of a lesion in-between the aneurysm and the DES. The differential amount of thrombus detected in the stented segment relative to the aneurysmal segment would support the hypothesis of VLST rather than embolization from the aneurysm into the DES per se. Intracoronary imaging such as intravascular ultrasound (IVUS) and OCT can also provide information about the likely patho-mechanism of the event which may include causes such as stent underexpansion, late acquired malapposition due to positive remodeling and neoatherosclerotic changes within stented segments (such as fibroatheromas and plaque rupture). Post-deployment, OCT may further guide PCI by assessing stent expansion and apposition highlighting the need for further intervention if required. Therefore, an approach based on the use of multimodal imaging technologies may be used in the setting of VLST. To our knowledge, this is the first reported case which illustrates how OCT can improve diagnosis and procedural outcomes in a case of STEMI due to VLST occurring in an IRA that has a preexisting aneurysm.

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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