Coronary evagination after self-apposing stent deployment: a rare but possible event. A clinical case at 4-year follow-up

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SOUHRN

Kontext: Evaginace (vychlípení) koronární tepny je abnormalita spojená – bez ohledu na (ne)přítomnost ischemické choroby srdeční (ICHS) – s nepříznivým dlouhodobým výsledným stavem. Patogeneze evaginace koronární tepny není zcela objasněna; za prediktory zvětšení koronární tepny působením mechanismů, jako jsou dlouhodobě probíhající zánět, suboptimální endotelizace a pozitivní remodelace cév, jsou považovány intrakoronární manipulace a perkutánní koronární intervence (PCI). Častější příčinou remodelace cév jsou některé typy stentů, například samoexpandibilní stenty.
Popis případu: Popisujeme případ 79leté ženy, která podstoupila perkutánní koronární intervenci pro námahovou anginu pectoris a jíž jsme implantovali samoexpandibilní stent v mírně ektatickém segmentu r. circumflexus levé koronární tepny a klasický stent pro léčbu jiné léze s dobrými výsledky. O čtyři roky později prokázalo koronarografické vyšetření aneurysma obklopující dříve implantovaný samoexpandibilní stent; nicméně průtok koronárními tepnami byl normální, takže nebylo zapotřebí žádné další intervence.
Závěry: Pokud je nám známo, náš článek popisuje jako první úlohu implantace samoexpandibilního stentu při vzniku evaginace; popis případu z klinické praxe může být užitečný v tom smyslu, že upozorňuje na možnost této situace u pacientů po PCI, jimž byl implantován tento typ stentu.

Keywords:
Coronary angiography
Coronary evagination
Self-apposing stent

ABSTRACT

Background: Coronary evagination is a coronary abnormality that has been associated with poor long-term outcomes irrespective of the presence of concomitant coronary artery disease (CAD). Its pathogenesis is still not well understood; intracoronary manipulation and percutaneous coronary intervention (PCI) are considered predictors of coronary enlargement through mechanism such as prolonged inflammation, suboptimal endothelialization and vessel positive remodeling. Some stent platforms, like self-apposing stents, seem to be more involved, causing more vessel remodeling.
Case presentation: We report the case of a 79-year-old woman who underwent percutaneous coronary intervention (PCI) because of effort angina pectoris; we used a self-apposing stent in a slightly ectatic segment of left circumflex artery and a conventional stent to treat another lesion, with good results. Four years later, a coronary angiography showed an aneurysm surrounding previously implanted self-apposing stent platform; anyway, the coronary flow was normal, so no further intervention was required.
Conclusions: To the best of our knowledge, this is the first paper considering the implication of self-apposing stent properties in evagination generation; this clinical case can be useful to pay attention to patients who underwent percutaneous coronary intervention and received this type of stent.

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Background

Coronary abnormalities (CA) such as aneurysms and evaginations have been associated with poor long-term outcomes irrespective of the presence of concomitant coronary artery disease (CAD).[1]

Although CA pathogenesis is still not well understood, intracoronary manipulation and percutaneous coronary intervention (PCI) are considered predictors of coronary enlargement.[1,2] A few studies tried to demonstrate the correlation between specific stent platform and coronary evaginations, concluding as early-generation drug-eluting stents (DES) can be a factor. Hence, delayed arterial healing with evidence of prolonged inflammation may occur following early-DES platform, leading to suboptimal endothelialization, vessel positive remodeling and struts malapposition.[3]

The Stentys Xposition was a self-apposing sirolimus eluting stent that was designed to limit strut malapposition to the intima, representing a valid alternative to common-use stents in dedicated scenarios.[4] We present a rare case of coronary evagination progression after Stentys deployment at a 4-year follow up.

Case report

A 79-year-old woman was referred to our institution due to effort angina pectoris, grade 3 according to Canadian Cardiovascular Society (CCS 3). In her clinical history, there was hypertension, dyslipidemia, and type-2 diabetes in pharmacological treatment and a previous single episode of atrial fibrillation.

An electrocardiogram (ECG) showed sinus rhythm with diffused repolarization abnormalities (flat and negative T waves) while a transthoracic echocardiography (TTE) showed lateral wall hypokinesia with mildly depressed ejection fraction. Myocardial markers were negative (HS-troponin 1.5 ng/L); other blood exams, including blood count, renal function, electrolytes were normal, except BNP, slightly increased (546 pg/dL).

A coronary angiography was performed and the patient underwent left circumflex artery (LCx) and left anterior descending artery (LAD) percutaneous coronary intervention (PCI) with the deployment of a self-apposing stent and a conventional stent, respectively. In particular, after LCx lesion preparation with a semi-compliant 2.5 mm balloon, a 3.0–3.5/22 mm STENTYS Xposition S self-Apposing stent was implanted along a slightly ectatic segment, with good result.

Four years later, because of episodes of chest pain and dyspnea during ordinary physical activity without significant changes at ECG and TTE, the patient was admitted to our center in order to undergo coronary angiography. Neither de novo stenosis nor in-stent restenosis were detected, however, a coronary evagination surrounding the borders of the previously implanted Stentys platform was depicted (Fig. 1). Intravascular ultrasound and optical coherence tomography were unfortunately unavailable during the procedure time. Considering the TIMI grade 3 flow, i.e. a normal coronary perfusion with the flow that fills the distal coronary bed completely, and the absence of new lesions, no further intervention was required. The patient was discharged the day after with optimal medical therapy.

Discussion

Coronary evagination is a coronary abnormality whose pathogenesis can be divided in non-iatrogenic (CAD,

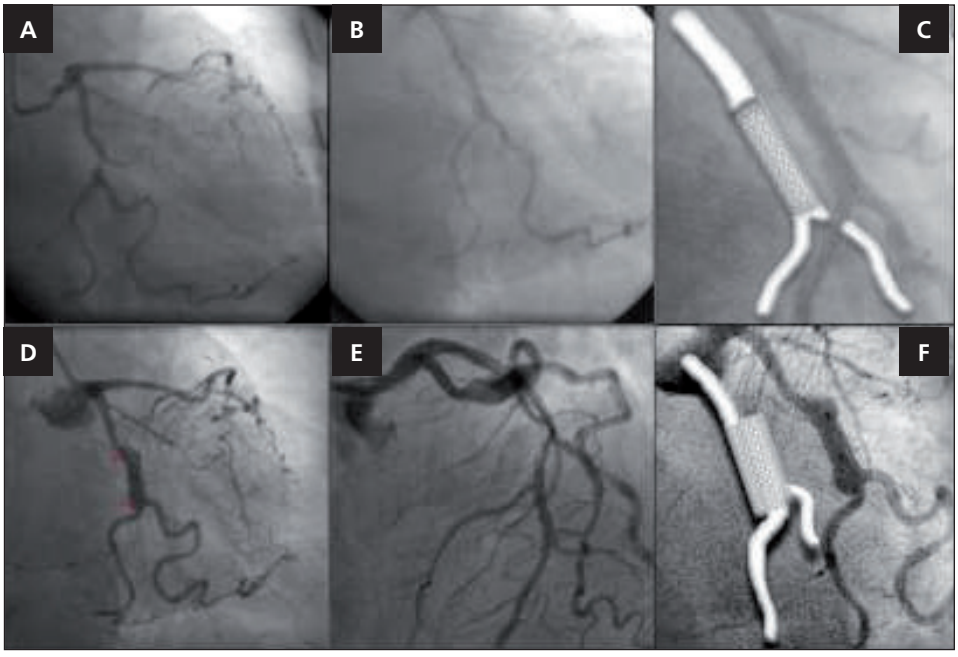

Fig. 1 – (A) Coronary angiography showing severe lesion into left circumflex artery. (B, C) Final result after PCI and self-apposing stent implantation. (D–F) Four-year follow up coronary angiography showing a long aneurysmatic segment into left circumflex artery.

vasculitis, connective tissue diseases and so on) and iatrogenic.[1,5–7]

Despite plenty of studies and researches, vessel remodeling mechanisms in post-PCI scenario are not completely clear yet, although multiple factors are apparently involved. Firstly, device-related factors, including drug, stent material, design, and the interaction with adjunctive therapy such as coronary atherectomy may play a role. Secondly, patient or lesion features, including coronary risk factors, preexistent vessel remodeling, plaque characteristics, local inflammatory activity, and shear stress. Lastly, procedure-related factors, such as deep vessel wall cutting due to cutting balloon therapy, can also lead to subsequent vessel dilatation.[2]

Some DES platforms were related to vessel remodeling caused by delayed arterial healing with evidence of prolonged inflammation, resulting in incomplete reendothelialization and acquired malapposition.[3] Pre-clinical and human post-mortem findings evidenced that the inflammatory response following DES implantation is related mostly with sirolimus eluting stent (SES) and paclitaxel eluting stent (PES); SES induces marked granulomatous adventitial inflammation and fibrosis and thus positive remodeling, while PES exhibits extensive fibrin deposition and medial smooth muscle cell necrosis. Instead, zotarolimus eluting stent (ZES) and everolimus eluting stent (EES) show only low levels of inflammation and fibrin deposition,[8–12] so some authors consider SES and PES causing more vessel remodeling than ZES and EES.[13]

Both drugs and polymers of DES have been suspected as triggers for evagination formation. Radu et al. conducted an intravascular imaging-based study using early-generation SES that evidenced vessel manipulation at baseline and the polymer, rather than the drug, potential causes of vessel remodeling.[3]

Our case shows a coronary evagination at 4-year follow up following Stentys Xposition S implantation. The Stentys Xposition S coronary stent was a self-apposing, sirolimus-eluting stent, which is no longer available. It was designed to improve strut apposition to the vessel wall, representing an alternative to traditional stents in dedicated scenarios such us significant mismatch in diameter from proximal to distal segments of the target vessel, true bifurcation lesions needing 2-stent treatment, acute coronary syndrome with high thrombotic burden, ectatic vessel and saphenous venous graft PCI. Thanks to the elastic and shape memory properties of nitinol, the struts appose to the vessel wall with a low chronic outward force; after deployment, the platform enlarges overtime as far as the struts reach the intima.[4] The coronary evagination depicted in our case may be the result of multiple factors, in which, among device features, the chronic outward force exerted by the Stentys could be pivotal.

Even taking into consideration self-apposing stents are no longer on the market and the stent cohort is very small when compared to the total amount of patients receiving DES, we believe our finding is worth outlining. In fact, coronary abnormalities have been associated with an increased risk of cardiovascular adverse events[3,14] and poor long-term outcomes irrespective of the presence of concomitant CAD.[1,15,16]

Conclusions

To the best of our knowledge, this is the first paper considering the implication of self-apposing stent properties in evagination generation; this clinical case can be useful to pay attention to patients who underwent percutaneous coronary intervention and received this type of stent.

Conflict of interest
None.

Funding body
None.

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