OMCR

Oxford Medical Case Reports, 2015;9, 317–319

doi: 10.1093/omcr/omv050
Case Report

CASE REPORT

Complete stent fracture 1 year after LIMA PCI due to LIMA and subclavian artery dissection

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Abstract

Stent platforms are prone to fracture while incidental data are demonstrating a potential unfavorable outcome. Predisposing factors usually involve long lesions and tortuous vessels requiring more than one stent. This issue is magnified when it involves a periprocedural iatrogenic left internal mammary artery (LIMA) and subclavian artery dissection. In such complex clinical scenarios, the risk of potential complications including stent fractures is thought to be higher, though there is no data to determine the prognosis or to outline the outcomes of any management option. We present a case of complete stent fracture 1 year after LIMA percutaneous coronary intervention due to LIMA and subclavian artery dissection highlighting the circumstantial evidence in the literature that guided our management decisions.

INTRODUCTION

The outburst of drug-eluting stent (DES) development and utilization for the majority of the percutaneous coronary intervention (PCI) has put into notice stent fractures, a not so common PCI complication. From the first report of a DES fracture in 2004 to this day, several studies report its incident between 1 and 8%. In autopsy studies, however, the incidence of the stent fracture rises up to nearly 30%, which is significantly larger than the one observed in the clinical practice [1].

Left internal mammary artery (LIMA) periprocedural iatrogenic dissection implicating the left subclavian artery is a rare yet significant complication. In such a complex intervention scenario, there is no data regarding the prognostic factors and the appropriate management option [2, 3].

Furthermore, although stent fractures are sometimes accidentally discovered during catheterization, they are frequently accompanied by a poor outcome due to the concomitant stent thrombosis or restenosis [4, 5].

CASE REPORT

A 76-year-old male patient with previous history of triple coronary artery bypass graft (CABG) surgery [LIMA to left anterior descending artery (LAD), saphenous vein graft (SVG) to obtuse marginal (OM2), SVG to first diagonal (D1)] presented with episodes of angina pectoris. His coronary angiogram showed that all grafts were patent yet there was a significant stenotic lesion at the LIMA to LAD anastomosis (Fig. 1a) for which he received a 2.5 × 8 mm second-generation DES (Fig. 1b). During PCI, a dissection occurred at the proximal segment of the left subclavian artery involving the ostium and the proximal segment of the LIMA (Fig. 2a). In order to cover the LIMA dissection, two overlapping second-generation DES 3.0 × 24 mm distally and 3.0 × 12 mm proximally were placed accordingly (Fig. 2b). Conversely, the dissection of the left subclavian did not receive any intervention since the patient was asymptomatic and hemodynamically stable.

One-year later due to relapsed effort angina, the patient underwent a new coronary angiogram, revealing that all grafts

Received: June 18, 2015. **Revised:** July 15, 2015. **Accepted:** July 21, 2015

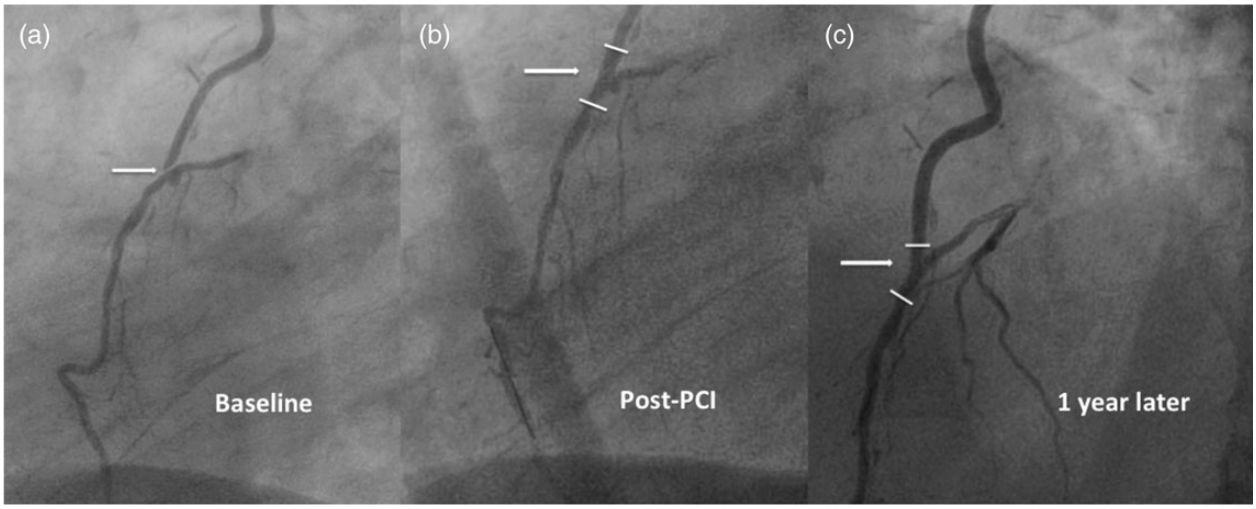

Figure 1: (**a**) Original stenosis at the LIMA-LAD anastomosis site. (**b**) Final result after stent placement. (**c**) One year after PCI stent at the LIMA-LAD anastomosis site remains patent.

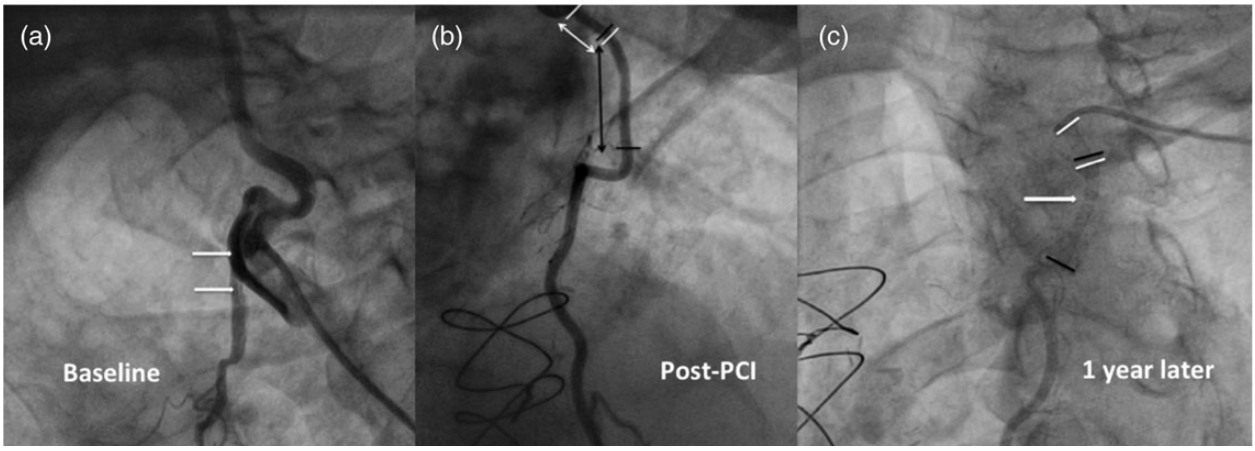

Figure 2: (**a**) Subclavian artery dissection (staining contrast) and LIMA dissection during PCI. (**b**) Final result after two overlapping stents placement at the ostium and the proximal part of the LIMA covering the dissection. (**c**) Angiographic appearance of type V stent fracture at the mid portion of the distal stent 1 year after PCI. (White and black lines are indicating the proximal and distal stent edges.)

including the stent at the LIMA to LAD anastomosis were patent (Fig. 1c); however, there was a new stenotic lesion at the proximal segment of the left circumflex artery, for which a DES was successfully inserted. Interestingly, there were findings of angulation and horizontal angiographic fracture of the stents at the LIMA ostium and its proximal part, but with nonsignificant restenosis (Figs 2c and 3).

DISCUSSION

Our patient required LIMA graft PCI to counter a significant stenotic lesion at the site of insertion to LAD. This procedure was complicated by a dissection of the left subclavian artery at the proximal segment around the ostium of LIMA, which extended to its proximal segment [6].

Although LIMA appears to have an excellent patency rate, atherosclerotic stenotic lesions develop at the site of anastomosis requiring access through a very long and tortuous vessel. Other lesions seldom occur in the proximal part and they are mainly post-CABG complications relating to kinking from mobilization of the artery. Besides the length and the tortuosity of the graft, the angulated position of the LIMA ostium within the subclavian artery along with several anatomical considerations across the subclavian itself, including atherosclerosis, makes the navigation of the catheters as well as the deliverability of the devices an important matter of concern when an intervention via the LIMA is required [6].

Dissection of the left subclavian artery involving the ostium and the proximal part of the LIMA during PCI might also happen, as it was the case of our patient. Percutaneous intervention of the subclavian artery dissection was not performed since the dissection did not expand angiographically and there was not any clinical manifestation of left upper limb, cardiac or brain ischemia. However, there are several reports of percutaneous interventions to treat such dissection, including anterograde or retrograde access of the dissection site through the femoral, axillary and left brachial artery, respectively [7, 8].

Established prognostic factors for stent fractures include long lesions, extensive tortuosity and overlapping stents along with right coronary artery location. The vast majority of the fractures are mainly related to the first-generation sirolimus-eluting Cypher stents and less with paclitaxel-eluting Taxus ones [4, 9,

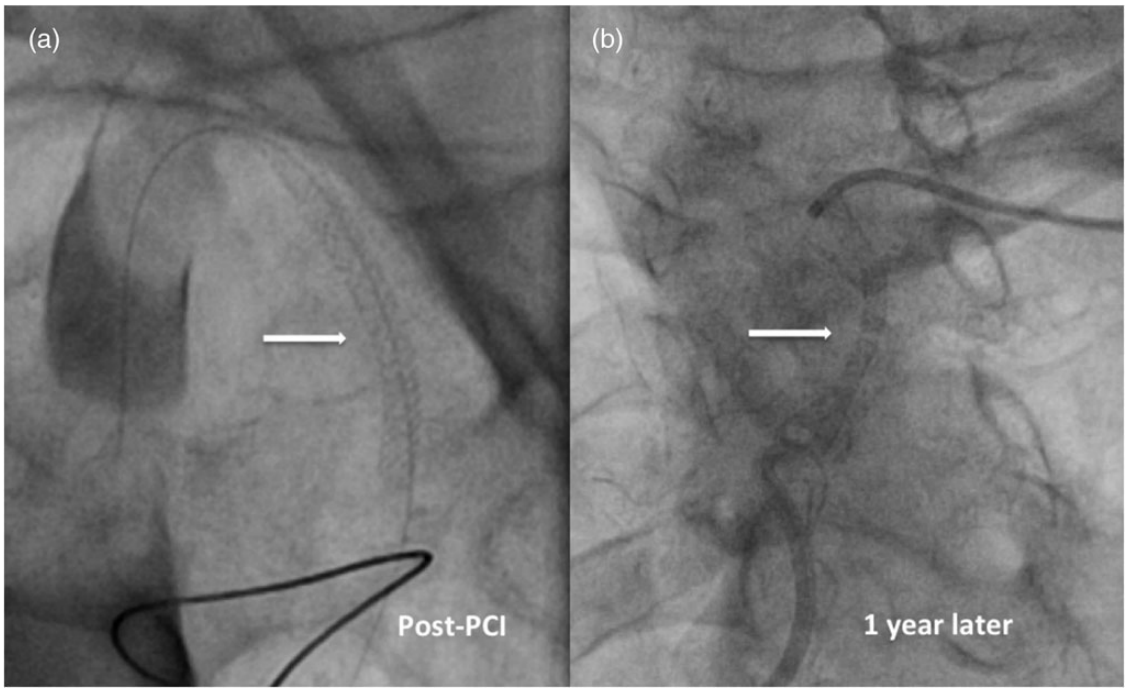

Figure 3: (**a**) Fluoroscopic image without contrast of the un-fractured stent shortly after implantation. (**b**) Fluoroscopic image without contrast of the fractured stent 1 year after implantation. White arrows are indicating the exact point of fracture.

10]. Of all the aforementioned factors, only the long length was present in our case. However, the implanted more flexible second-generation platforms within the LIMA were subjected to considerable mechanical deformation forces, resulting presumably in inhomogeneous struts expansion leading to the development of the fracture. Unfortunately, a major limitation was that intravascular ultrasound-optical coherence tomography invasive imaging technology was not available in our catheterization laboratory; therefore, we were unable to determine the details of stent apposition or any strut missing.

To date, five categories of stent fractures have been recognized. By correlating the X-ray images with pathology slides, it has been demonstrated that in grade V fractures characterized by complete transverse dislocation of the metallic skeleton, similar to this case, there has been a significant rate of potentially harmful histologic findings compared with those without fracture, including stent restenosis and thrombosis [1]. Nevertheless, on the follow-up angiography, the stents embedded in the proximal LIMA had a slight axial dislocation and a horizontal fracture, yet there was only a mild restenosis, which did not require any kind of intervention. Based on these facts the therapeutic plan was to electively evaluate this patient after 6 months with the prospect for a new stent placement if necessary.

In conclusion, iatrogenic LIMA dissection is a rare complication requiring immediate revascularization since the anterior wall is presumably supplied by the graft. In case the dissection extends towards the subclavian artery, the intention to treat solely depends on the hemodynamic stability and the clinical symptoms of the patient. Stent fractures might always be suspected after intervention in such long stented areas with overlapping stents within tortuous vessels.

CONFLICT OF INTEREST STATEMENT

None declared.

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