CATHALOGUE

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CASE REPORT

Accidental stent deployment in aorta.

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Abstract

Introduction: Unintentional stent migration into the aorta during percutaneous coronary intervention (PCI) presents an uncommon yet demanding scenario. This case report delves into a complex situation where such an incident occurred.

Case Presentation: A patient presented a distinct case involving inadvertent stent migration into the aorta during a complex PCI. To address the issue, the MINICRUSH technique was employed. The case's complexities underscored the need for a strategic approach, and the significance of precise procedural execution was apparent. The procedural intricacies and challenges of managing iatrogenic aorto-ostial coronary lesions are detailed.

Management & Results: The patient's condition was effectively managed using the MINICRUSH technique. This involved strategic stent crushing in the mid left anterior descending artery (LAD)/diagonal 1 (D1) segment, successfully resolving the complication. The execution of the MINICRUSH approach demonstrated its efficacy in tackling complex challenges arising from stent migration into the aorta. The accurate positioning of the stent played a crucial role in achieving optimal clinical outcomes.

Conclusion: This report highlights the successful use of the MINICRUSH technique to manage inadvertent stent migration into the aorta during complex PCI, emphasizing precise procedural execution and stent placement's significance.

Keywords

Stent, Stent Dislocation, PTCA Complications, Aorto-Ostial, Geographic Miss.

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Introduction

Stent dislodgment during percutaneous angioplasty, although rare, can give rise to potentially severe cardiovascular complications, including ischemia, myocardial infarction, and stroke. These consequences often result from heightened risks of coronary perforation and dissection. Concurrently, iatrogenic aorto-ostial coronary lesions present a unique set of clinical complexities due to their extensive impact on myocardial territories. The management of such lesions poses challenges, as procedural success rates and clinical outcomes are typically lower when compared to non-ostial lesions.

Case Presentation

A 50-year-old male presented with class 3 angina despite effective medical therapy and a positive stress test. Catheterization revealed a normal left main artery but significant mid LAD (left anterior descending artery) stenosis (80%) along with severe ostio-proximal disease (75-80%) in a major diagonal (D1) branch (Figure 01). Additionally, a large obtuse marginal (OM) artery displayed 85-90% stenosis in its proximal to mid segment (Figure 02). Mild to moderate disease was observed in the right coronary artery. Following patient consultation, the decision was made to proceed with a MINICRUSH TECHNIQUE for bifurcation stenting in the LAD/D1 area.

Engaging the left main with a 7 Fr XB 3.5 guiding catheter, a BMW wire™ was threaded down the LAD and another into the D1 branch. Both lesions were pre-dilated using a 2.5 x 15mm SC balloon at 12 atmospheres in the LAD and D1, respectively. Subsequently, the first diagonal was stented using a 2.5 x 18mm DES (xience xpedition), while concurrently maintaining the main-vessel LAD stent (DES 2.75 x 48) in place across the D1 (Figure 03).

However, during the deployment of the LAD stent, an inadvertent backward pull by the assistant while holding the balloon catheter and wire, under 8 atm dilation pressure, led to the stent migrating into the left main and then into the aorta (Figure 04). At this juncture, a portion of the stent was partially deployed in the left main and the aorta, with the distal part of the stent compressing the proximal D1 stent. Despite this complication, the patient remained hemodynamically stable, experiencing angina, and showing good TIMI 3 flow in all vessels.

Diagnostic Assessment

In light of the intricate circumstances, an immediate consultation with the cardiac surgery team was convened to deliberate over potential interventions such as coronary artery bypass grafting (CABG), involving a left internal mammary artery (LIMA) graft to the LAD and a saphenous vein graft (SVG) to the OM artery, alongside the consideration of trimming the portion of the stent extending into the aorta. Alternatively, the option to proceed with the MINICRUSH procedure, encompassing the completion of the initial strategy on the LAD/D1, involving the placement of an additional stent to address the remaining mid LAD lesion, was considered. The patient's stability and angiographic findings were taken into account during these discussions. Throughout the procedure, the patient remained stable. After comprehensive discussions involving the patient, the catheterization team, and the cardiac surgery team, a collaborative decision was reached:

- To proceed with the completion of the MINICRUSH procedure on the LAD and D1, involving the addition of another stent to cover the outstanding mid LAD disease.
- To address the OM disease at a later point if the patient experiences symptomatic concerns.

This decision was made with the patient's well-being at the forefront, ensuring that the chosen approach aligns with the patient's condition and clinical considerations.

Therapeutic Intervention

To address the situation, a meticulous approach was adopted. The diagonal artery was recrossed with a coronary wire, followed by a simultaneous kissing balloon inflation technique employing an NC 3.5 x 10 mm balloon in the LAD and an NC 2.75 x 15 mm balloon in D1 (FIGURE 05). A drug-eluting stent of size 2.75 x 23 mm was employed to cover

the mid LAD lesion. This stent was strategically overlapped with the existing proximal stent (FIGURE 06). Ensuring optimal placement of the left main stem stent, a 4.5 x 15 mm non-compliant balloon was used for proximal optimization. For the major OM lesion, a medical treatment plan was determined as the appropriate course of action. This comprehensive strategy aimed to effectively manage the intricate scenario and optimize the patient's outcomes.

Follow-Up and Outcomes

Six-month follow-up angiography was conducted, revealing stable conditions. However, challenges persisted while engaging the left main stem (LMS) for imaging due to the presence of the aortic stent, as depicted in (Figure 07). Despite these technical limitations, the patient remained asymptomatic and continued to demonstrate commendable functional activity. Subsequent to the follow-up assessment, the patient's well-being and positive progress were evident.

Discussion

This clinical case initially involved a planned LAD/D1 MINICRUSH procedure that evolved into a more intricate intervention due to a challenging aorto-ostial left main stem lesion. This lesion presented with a notable extension of the stent into the aorta, introducing complexities that are common in aorto-ostial interventions. These procedures are characterized by intricate technical aspects and are compounded by the potential interference from respiratory and cardiac motion, complicating the precise positioning of the stent. The accuracy of stent deployment is of paramount importance to ensure favorable outcomes and to minimize potential adverse consequences.

One of the primary challenges encountered in aorto-ostial interventions is pressure dampening and the accurate delineation of the true ostium[1-3]. To address this, employing a "nonaggressive" guide, like a JR4 catheter, is advised to prevent excessive vessel intubation. An alternative approach involves the use of the "floating wire" technique, wherein two guidewires are positioned—one in the target vessel and another in the aorta. This second guidewire acts as a reference point for the true ostium and helps prevent the catheter from being deeply inserted. Alternatively, utilizing a dedicated device such as Ostial ProTM can assist in achieving this demarcation.

Precise positioning of the stent to minimize distal geographic miss is another crucial aspect of aorto-ostial interventions. Identifying the optimal fluoroscopic projections that clearly visualize the ostium is important. Commonly employed views include the steep left anterior oblique (LAO) projection for the right coronary artery (RCA) and the LAO caudal & anterior-posterior (AP) cranial views for the left main artery. Understanding the stent's edge relative to radiopaque markers is essential. Most drug-eluting stent platforms position the stent just inside the radiopaque markers, except for the XienceTM platform that centers the stent on the marker. Techniques like collimation, high frame rate cine, or stent boost can enhance visualization if needed.

The Szabo technique can help mitigate distal geographic miss[3]. It involves loading the stent onto the target vessel wire and threading a second anchor wire through the proximal stent strut from the aorta. This prevents excessive distal migration during stent advancement. Deploying the stent at low pressure, withdrawing the anchor wire, and then inflating the stent at high pressure is the sequence. Care must be taken to avoid stent deformation or dislodgement. Additionally, when positioning the balloon/stent proximally is challenging due to "flush" guide engagement, a strategy involves deploying the balloon/stent at low pressure slightly within the guide. This ensures lesion coverage, using the stenosis's resistance to anchor the device, followed by unsheathing and full deployment at high pressure.

Managing motion during stent placement, especially in cases involving an ostial RCA lesion and a transradial approach, demands attention[4-6]. Instructing the patient to hold their breath helps counteract respiratory motion. For excessive

cardiac motion during RCA interventions, intracoronary adenosine (50-100 mcg) can be administered to induce temporary asystole, allowing for precise stent positioning. The choice of stent length is important to prevent stent loss during deployment, favoring longer stents over very short (8mm) ones.

Incorporating intravascular ultrasound (IVUS) into the procedure offers valuable insights[7]. Pre-stenting IVUS aids in identifying lesions that require more aggressive preparation and contributes to accurate stent sizing. Post-stenting IVUS helps in identifying incomplete stent coverage, under-expansion, or excessive stent struts extending into the aorta. This information guides subsequent interventions, such as post-dilation or the placement of an additional stent, which have been associated with reduced major adverse cardiac events.

For optimal stent deployment, flaring the ostium is also important. Post-dilation using a larger balloon can enhance stent expansion and flare the aortic portion of the stent, contributing to its stability. Alternatively, a dedicated system like the FlashTM Ostial system, comprising a high-pressure coronary-size balloon and a larger low-pressure anchoring balloon, can effectively flare the stent struts slightly protruding from the ostium. This facilitates future angiography and interventions.

Conclusion

In conclusion, aorto-ostial interventions require meticulous planning and execution due to their inherent complexities. The strategies outlined above provide a systematic approach to address the challenges posed by these interventions, enhancing the likelihood of successful outcomes.

Learning Points

- Management of aorto-ostial coronary lesions remains intricate, and procedural success rates are often lower compared to non-ostial lesions.
- The limitations of angiography for guiding complex interventions underscore the importance of evolving techniques and technologies.
- Precise stent positioning significantly influences the clinical outcomes of aorto-ostial interventions.
- A collaborative approach between interventional cardiologists and cardiac surgeons is crucial in determining the optimal management strategy for complex cases.

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Figure/Video

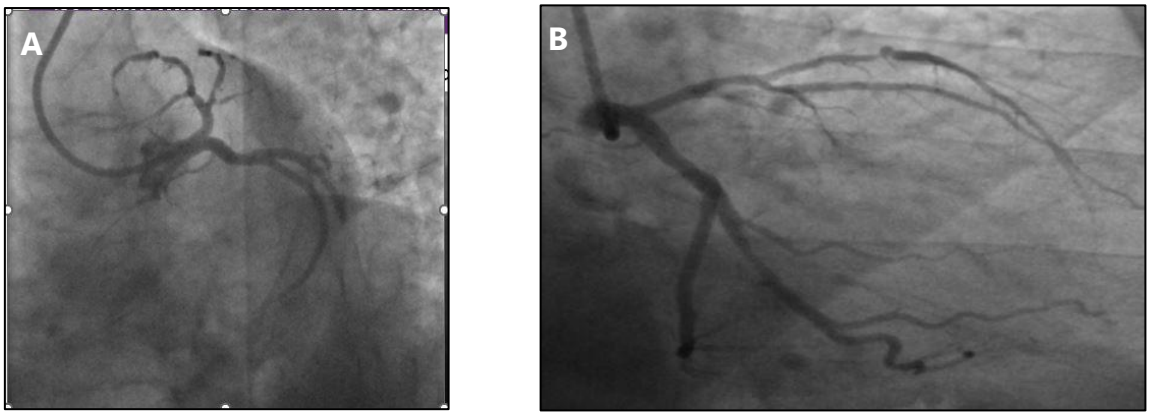

Figure 1 a, b: Significant lesions in mid LAD, large first diagonal and major OM.

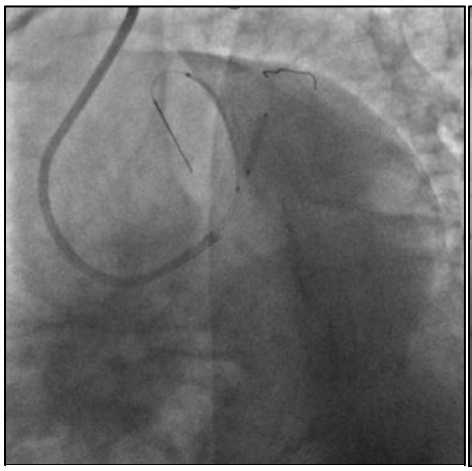

Figure 2: Bifurcation stenting of LAD and first diagonal

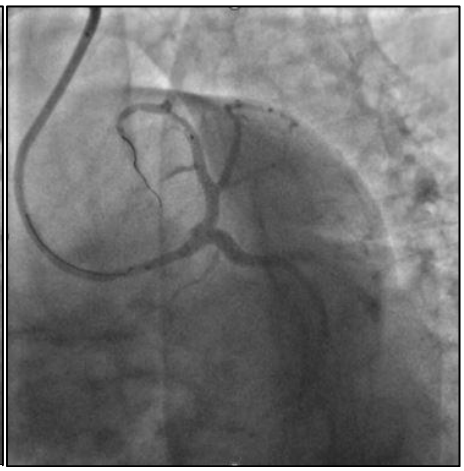

Figure 3: Stent was pulled back in LMS and aorta.

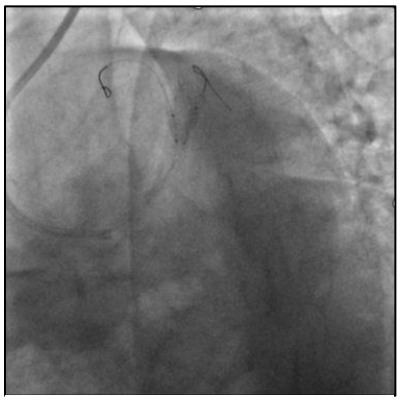

Figure 4: Complete the mini crush procedure on LAD and D1.

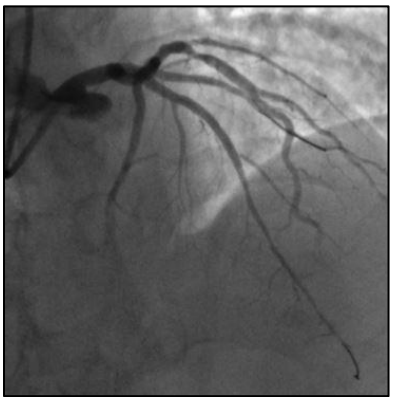

Figure 5: Mid LAD lesion was cover with 2.75x23mm drug eluting stent, overlapped with proximal stent.

Figure 6: Check angiography was done after 6 months.

Supplementary Materials

Supplementary Videos: