CATHALOGUE

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CASE REPORT

Catheter Catastrophe: Facing Left Main Dissection in the Cath Lab

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Abstract

Background: Iatrogenic left main dissection is a serious complication that can arise during coronary interventions, significantly increasing the risk of myocardial infarction and mortality. Understanding the clinical presentation and management strategies for such complications is critical for improving patient outcomes. This case discusses an acute coronary syndrome patient diagnosed with Wellen's syndrome, emphasizing the importance of early recognition and effective intervention.

Case Presentation: A 62-year-old hypertensive female presented with a 3-day history of chest pain. The ECG demonstrated Wellen's pattern characterized by deep, symmetrical T wave inversions in the precordial leads. Baseline investigations indicated elevated troponin levels and echocardiographic findings of anterior wall hypokinesia with an ejection fraction (EF) of 48%. The patient was subsequently admitted to the cardiology ward for coronary angiography.

Results: Angiography revealed significant disease in the left anterior descending artery (LAD). During the angioplasty procedure, a simultaneous catheter-induced left main stem (LMS) dissection occurred, along with wire-induced distal stent edge dissection. Both complications were managed successfully.

Conclusion: Iatrogenic left main dissection is a catastrophic complication that, while preventable, cannot be entirely avoided. It requires urgent recognition and prompt management to minimize adverse outcomes.

Keywords

Left Main Dissection, Angioplasty, Acute Coronary Syndrome, Follow-Up

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Introduction

Iatrogenic left main dissection is a catastrophic complication that can rapidly lead to myocardial infarction and potentially fatal outcomes. This serious event, though preventable, cannot be completely avoided, underscoring the importance of urgent recognition and prompt intervention[1]. The incidence of left main dissection during percutaneous coronary interventions (PCI) ranges from 0.07% to 0.1%, highlighting its relative rarity but also the significant risk it poses when it occurs [2,3].

Effective management of this complication hinges on a combination of keen clinical judgment, skilled hands, and composed nerves. The rapid identification of dissection is crucial; delayed intervention can exacerbate myocardial damage and increase mortality risk[4,5]. Thus, a thorough understanding of the underlying mechanisms, potential risk factors, and immediate management strategies is essential for healthcare providers working in the catheterization laboratory[3].

In this case report, we detail a challenging instance of iatrogenic left main dissection, emphasizing the importance of technical proficiency and decision-making in mitigating adverse outcomes. By analyzing this case, we aim to shed light on best practices for prevention and management, contributing to improved patient safety in the Cath lab.

Case Presentation

We present a case of a 62-year-old female patient with a medical history significant for hypertension, who is non-diabetic. She presented with a chief complaint of chest pain that had persisted for the past three days. Upon evaluation in the chest pain unit, she was diagnosed with acute coronary syndrome (ACS). At the time of presentation, her vital signs were as follows: blood pressure measured 140/90 mmHg, and her heart rate was elevated at 110 beats per minute, indicating possible hemodynamic stress.

Given the urgency of her condition, a coronary angiography was performed within 24 hours of her initial assessment, following thorough informed consent from the patient.

Diagnostic Assessment

The diagnostic assessment included a thorough evaluation of cardiac enzymes, which showed markedly elevated troponin I levels indicative of ongoing myocardial injury. Additionally, a comprehensive echocardiographic assessment revealed anterior wall hypokinesia, consistent with ischemic damage, and an ejection fraction of 48%, pointing to reduced left ventricular function. Cardiac magnetic resonance imaging (MRI) was subsequently performed to further assess myocardial viability and fibrosis, which identified areas of late gadolinium enhancement in the anterior myocardium. This finding suggested myocardial scarring and provided insight into the extent of ischemic insult.

Baseline laboratory work also included renal function tests, confirming normal kidney function, which allowed for safe administration of contrast media during angiography. The patient's glycemic control was within normal limits, ruling out diabetic complications. This combination of detailed biochemical, echocardiographic, and advanced imaging findings contributed to a comprehensive understanding of the patient's cardiac status and informed the urgent need for coronary intervention.

Therapeutic Intervention

The procedure began with the engagement of the left coronary system using a 3.5 EBU guide catheter. A workhorse guidewire was successfully advanced into the left anterior descending artery (LAD), while a second wire was placed in the diagonal branch for support. The lesion in the LAD was pre-dilated with a 2.5 x 15 mm semi-compliant balloon at a pressure of 10 atm. Following this, a

2.75 x 30 mm drug-eluting stent (DES) was deployed in the LAD at the same pressure.

To address the left main stem (LMS) dissection, pre-dilatation was performed using a 2.75 x 15 mm non-compliant (NC) balloon, inflated at 18 and 20 atm. After the wires were removed, a final contrast injection revealed a spiral dissection of the LMS and distal stent edge dissection, resulting in TIMI 0 flow distal to the stent. After several attempts, the LAD was successfully rewired, and another wire was positioned in the circumflex artery. A 4 x 18 mm DES was then deployed in the LMS at 12 atm, followed by post-dilation with a 4.5 x 12 mm NC balloon at 20 atm. To cover the distal edge dissection in the LAD, an additional DES measuring 2.5 x 12 mm was overlapped with the distal edge of the previously deployed stent. This stent was post-dilated using a 2.75 x 15 mm balloon at pressures of 14 and 16 atm. Subsequent angiographic views confirmed the achievement of TIMI III flow in the LAD, although a spiral dissection was noted in the circumflex, which still exhibited TIMI III flow.

The angioplasty procedure was conducted under heparin cover, and the patient was placed on dual antiplatelet therapy, with tirofiban administered for 18 hours post-procedure to enhance antithrombotic protection.

Follow-Up and Outcomes

The patient was monitored over a one-year follow-up period. She was initiated on guideline-directed medical therapy (GDMT) aimed at managing ischemia and heart failure, with strict adherence to the treatment regimen.

Her compliance with the prescribed medications was confirmed at each follow-up appointment. The patient's symptoms, hemodynamic status, and echocardiographic parameters are summarized in the table below:

At each follow-up, the patient reported experiencing shortness of breath classified as New York Heart Association (NYHA) Class II. Her blood pressure remained stable, and there was a slight improvement in left ventricular size and ejection fraction over the course of the year. Notably, there were no thrombi detected in the left ventricle at any follow-up point.

Overall, the patient's clinical status demonstrated a steady and stable trajectory post-intervention, aligning with the treatment goals.

Table: Follow-Up Result

Follow up	Drugs	Symptoms	BP	LV Size	EF %	LMS flow	LV clot
01 month	Yes	SOB II	100/70	5.8	34	Not checked	No
06 month	Yes	SOB II	110/80	5.5	35	Not checked	No
01 year	Yes	SOB II	120/80	5.6	36	Not Checked	No

Discussion

Iatrogenic left main dissection is a catastrophic complication that can lead to rapid myocardial infarction (MI) and potentially fatal outcomes. This condition necessitates urgent recognition and prompt management to mitigate the risk of serious complications[2,6].

Prevention strategies are crucial, and the first step involves making every effort to engage the left main artery in a coaxial manner prior to any contrast injection. A coaxial approach reduces the likelihood of complications associated with improper positioning[4]. Recent studies emphasize that aggressive wiring techniques should be avoided, as they significantly increase the risk of dissection. Ensuring that the wire tip remains free and well-positioned throughout the procedure is crucial to minimizing trauma to the vessel walls[3,7].

In this case, the non-coaxial position of the guide catheter, coupled with forward movement of the guide tip during wire removal, contributed significantly to the dissection of the left main stem. This emphasizes the importance of maintaining

optimal catheter positioning and avoiding excessive manipulation during interventions.

Moreover, recognizing the signs of dissection early and implementing a structured approach to management are vital. This includes appropriate imaging to assess the extent of the dissection and timely intervention, which may involve stenting or surgical consultation[2,6].

By learning from such cases, we can enhance our procedural techniques and patient outcomes, thereby minimizing the occurrence of this serious complication in future interventions.

Conclusion

To minimize the risk of iatrogenic left main dissection during catheterization procedures, it is imperative to make every effort to engage the left main artery (LM) coaxially before administering any contrast injection, as this significantly reduces the risk of complications. Additionally, aggressive wiring techniques should be avoided, ensuring that the wire tip remains free within the vessel to prevent trauma and dissection. At the end of the procedure, the wire tip should be straightened and gently pulled back to minimize stress on the vessel walls. By adhering to these principles, healthcare providers can enhance patient safety and improve outcomes in the catheterization lab.

Learning points

- Maintain a Straight Wire Tip: Always keep the wire tip straight during any coronary intervention to reduce the risk of complications.
- Gentle Wire Withdrawal: Be gentle when pulling out the wire to prevent trauma to the vessel.
- Ensure Coaxial Positioning: Always position the guide catheter coaxially to enhance stability and minimize the risk of dissection.
- Stay Vigilant: Maintain a keen eye on both the wire and catheter throughout the procedure to ensure safe handling and optimal positioning.

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Figure/Video

Figure 1.1

Figure 1.2

Figure 1.3

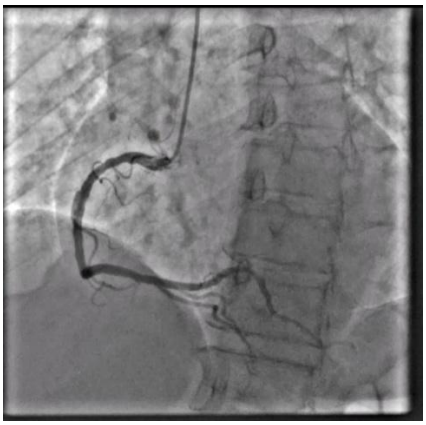

Figure 1.4

Figure 1: are coronary angiography cine images. LAO caudal view (Figure 1.1) showing disease in ostial circumflex, RAO cranial view (Figure 1.2) shows severe disease in Mid LAD and (Figure 1.4) a normal RCA.

Figure 2.1

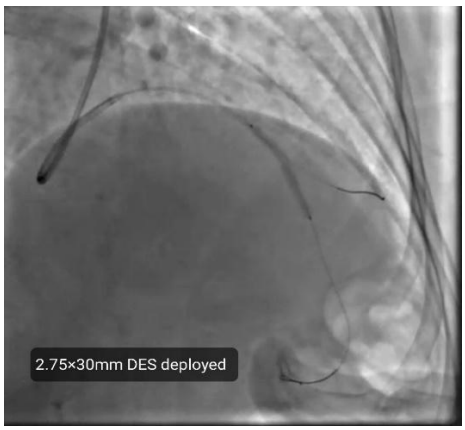

Figure 2.2

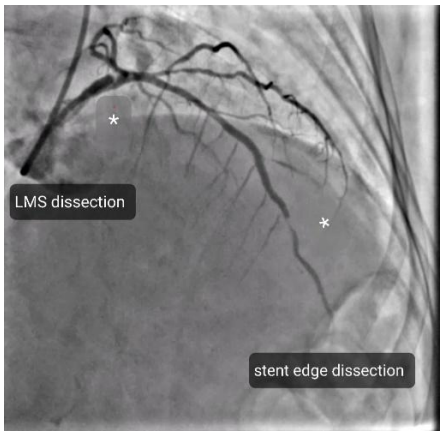

Figure 2.3

Figure 2.4

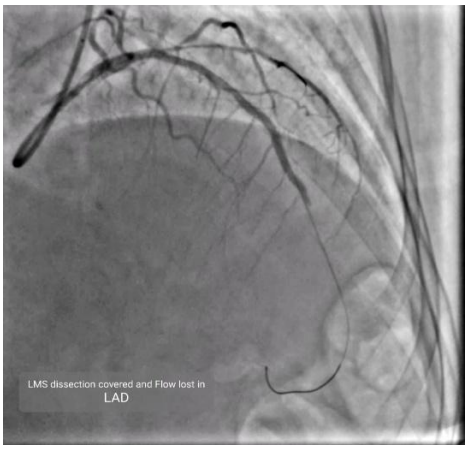

Figure 2.5

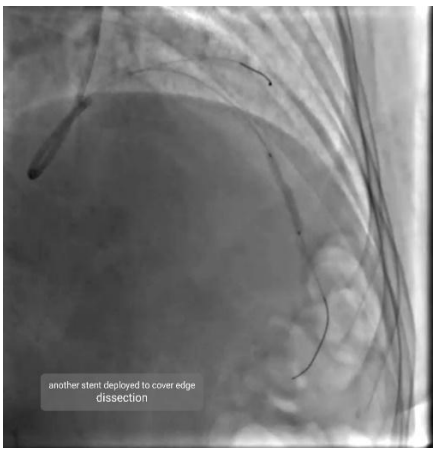

Figure 2.6

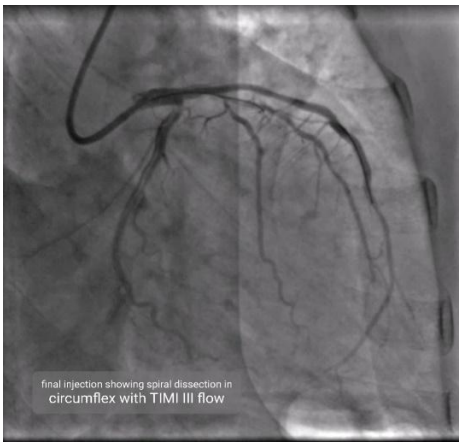

Figure 2.7 **Figure 2.8**

Figure 2:
Figure 2.1 cine image after pre-dilatation of mid LAD lesion.
Figure 2.2. DES deployment
Figure 2.3: Cine image taken after stent deployment and post dilatation. wire was removed. asterisk (*) Shows dissection in LMS and distal sent edge
Figure 2.4: vessel successfully rewired and LMS stent deployed first.
Figure 2.5: After stenting LMS, LMS dissection was secured but flow in distal is lost
Figure 2.6: DES deployed to cover distal stent edge in mid LAD
Figure 2.7: Final angiogram after post dilations.
Figure 2.8: RAO caudal view after end of procedure