CATHALOGUE

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CASE REPORT

Balloon-Related Complications in Coronary Angiography: Navigating the Perils of Aggressive Interventions

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Citation:
Junaid B. Balloon-Related Complications in Coronary Angiography: Navigating the Perils of Aggressive Interventions. Cathalogue. 2024; 2(1): 51-58.

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Funding:
The author(s) received no specific funding for this work.

Conflicts of Interests:
The authors have declared that no competing interests exist.

Received 07/01/2024
Accepted 22/02/2024
First Published 31/03/2024

Abstract

Background: In the realm of interventional cardiology, the pursuit of procedural perfection often confronts clinicians with the challenge of balancing efficacy with patient safety. This case report sheds light on the potential hazards of aggressive post-dilatation techniques in coronary angiography, emphasizing the imperative of recognizing and managing balloon-related complications promptly to ensure optimal patient outcomes.

Case Presentation: A 70-year-old female presented with Non-ST Segment Elevation Myocardial Infarction (NSTEMI) and triple vessel coronary artery disease (3VCAD), necessitating multi-vessel percutaneous coronary intervention (PCI). Despite successful intervention in the right coronary artery (RCA), complications arose during PCI to the left anterior descending artery (LAD), highlighting the risks associated with aggressive procedural approaches.

Management & Results: Following unsuccessful post-dilatation attempts in the LAD, the patient experienced severe chest pain and hemodynamic instability, necessitating emergent measures to avert catastrophic outcomes. Prompt recognition and management of balloon-related complications facilitated the stabilization of the patient, ultimately culminating in a trajectory of satisfactory recovery with resolution of symptoms.

Conclusion: This case underscores the importance of exercising caution in the pursuit of procedural perfection, particularly in the context of coronary interventions. Balancing the imperative of achieving optimal procedural outcomes with the paramount goal of ensuring patient safety is pivotal in navigating the complexities inherent to interventional cardiology practice. Embracing a philosophy that acknowledges the limitations of aggressive techniques and prioritizes patient well-being lays the foundation for enhanced clinical outcomes and improved quality of care.

Keywords

Coronary angiography, percutaneous coronary intervention, balloon-related complications, procedural safety.

Published by Pakistan Society of Interventional Cardiology

Introduction

Coronary angiography stands as the primary diagnostic tool for detecting atherosclerotic coronary artery disease (CAD) and assessing its extent. However, like any invasive procedure, it carries inherent risks, both patient-specific and procedure-related, ranging from minor short-term complications to severe, potentially life-threatening events. Fortunately, advancements in equipment design, peri-procedural care, and the expertise of diagnostic centers and operators have led to a significant reduction in associated risks since the procedure's inception[1,2].

In the pursuit of excellence, interventionists often find themselves striving for perfection in the intricate realm of coronary angiography procedures. However, it is vital to acknowledge that the relentless pursuit of perfection may sometimes blind us to the value of settling for good outcomes, particularly when weighed against the potential risks involved.

This case report serves as a poignant reminder of the lurking hazards associated with prioritizing aesthetic perfection in routine coronary angiography cases, illuminating how such pursuits can unwittingly jeopardize the lives of our patients.

Case Presentation

Our patient, a 70-year-old female, presented with a clinical picture suggestive of Non-ST Segment Elevation Myocardial Infarction (NSTEMI), characterized by ST depressions in the inferior leads on electrocardiogram (ECG). Despite these concerning findings, her left ventricular (LV) and renal functions remained within normal limits, albeit with elevated troponin I levels indicative of myocardial injury. Upon further investigation through coronary angiography, a sobering revelation emerged: she harbored triple vessel coronary artery disease (3VCAD), accompanied by fair LV systolic function as ascertained by echocardiography. Faced with this complex pathology, the decision was made to embark on a multi-vessel percutaneous coronary intervention (PCI) journey, with the first port of call being the culprit vessel, the right coronary artery (RCA).

Diagnostic Assessment

During the therapeutic intervention PCI to RCA, meticulous steps were taken to address the patient's coronary artery disease. The procedure commenced with the deployment of a 2.75x32 Promus stent in the RCA, followed by post-dilatation utilizing a 3.25mm non-compliant (NC) balloon. However, the subsequent PCI to the left anterior descending artery (LAD) encountered a significant challenge in traversing a calcified lesion.

Despite initial setbacks, a strategic approach involving the utilization of a smaller 2.5x9mm balloon, complemented by a BMW Buddy wire for added support, successfully pre-dilated the lesion. Yet, as the intervention progressed, it became evident that the stent in the proximal portion of the LAD remained under-expanded, necessitating further intervention to optimize outcomes.

Therapeutic Intervention

Subsequent attempts at post-dilatation using a 3.25x9mm NC balloon proved to be futile, precipitating a cascade of alarming events. The patient experienced a sudden onset of severe chest pain, accompanied by ST segment elevation on ECG and a precipitous drop in systolic blood pressure.

Recognizing the gravity of the situation, swift measures were undertaken to stabilize the patient's deteriorating condition. Cardiopulmonary resuscitation (CPR) was initiated promptly, while intravenous administration of adrenaline aimed to bolster cardiac function.

Faced with the imperative of salvaging the patient's life amidst her critical instability, the decision was made to remove the un-deflated balloon, albeit at the cost of precipitating a dissection in the proximal LAD. This complication was subsequently confirmed via injection through a diagnostic catheter. To mitigate the adverse consequences of the dissection, a 3x16mm Promus Premier stent was expeditiously deployed, aiming to restore coronary patency and avert further ischemic insult.

Follow-up and Outcomes

Following the intervention, vigilant monitoring and supportive measures facilitated the patient's hemodynamic stabilization. Notably, there was a notable alleviation of chest pain, accompanied by the restoration of blood pressure to within acceptable parameters.

Subsequent follow-up evaluations revealed a trajectory of favorable recovery, devoid of any major adverse events. This reassuring clinical course underscores the efficacy of the therapeutic interventions undertaken and augurs well for the patient's long-term prognosis.

Discussion

This compelling case serves as a poignant reminder of the inherent risks associated with the aggressive pursuit of procedural perfection in coronary interventions. The unforeseen complications encountered, particularly with regards to balloon-related issues, underscore the imperative of maintaining a vigilant stance and promptly addressing such challenges as they arise.

Moreover, the judicious utilization of adjunctive tools, such as buddy wires, emerges as a pivotal consideration in navigating the delicate balance between procedural efficacy and patient safety. This discussion underscores the pivotal role of clinical acumen and adaptability in navigating the complexities inherent to interventional cardiology.

Conclusion

This case offers invaluable insights into the nuanced interplay between procedural intricacies and patient outcomes in the realm of coronary interventions. The imperative of recognizing and respecting the inherent limitations of aggressive techniques cannot be overstated, as evidenced by the potential for adverse outcomes in their pursuit. Embracing a philosophy that prioritizes patient safety alongside procedural success is paramount, ensuring optimal outcomes and minimizing the likelihood of untoward events. This case serves as a poignant reminder that, in the dynamic landscape of interventional cardiology, the pursuit of excellence must be tempered by a judicious appreciation of the risks involved, ultimately guiding us towards safer and more efficacious patient care.

Learning points

- **Balloon Catheter Complications:** Repeated utilization of a balloon catheter during coronary interventions can predispose to the development of kinking, resulting in the formation of one-way valve-like defects within the catheter lumen. This phenomenon underscores the importance of meticulous catheter handling and the periodic assessment of catheter integrity throughout the intervention.

- **Recognition and Management of Balloon-Related Complications:** Prompt recognition and effective management of balloon-related complications are pivotal in safeguarding patient safety during coronary interventions. Vigilance for signs of catheter malfunction, coupled with a proactive approach to addressing any emergent issues, are paramount in averting adverse outcomes and optimizing patient care.

- **Balancing Procedural Success with Patient Safety:** The delicate balance between procedural success and patient safety lies at the crux of interventional cardiology practice. While the pursuit of optimal outcomes is inherently laudable, it must be tempered by a judicious appreciation of the potential risks and complications associated with aggressive procedural approaches. Hence, a cautious and discerning approach is warranted, wherein the quest for excellence is harmonized with a steadfast commitment to patient well-being.

- **Embracing Imperfection for Optimal Outcomes:** Acknowledging the inherent limitations of medical interventions, and embracing the reality that perfection is not always attainable, is pivotal in optimizing

patient outcomes. Striving for good outcomes, characterized by a balance between efficacy and safety, serves as a pragmatic approach to mitigating risks and enhancing overall patient care. This paradigm shift towards embracing imperfection fosters a culture of humility and adaptability, ultimately contributing to improved clinical outcomes and patient satisfaction.

References

1. Tavakol M, Ashraf S, Brener SJ. Risks and complications of coronary angiography: a comprehensive review. Glob J Health Sci. 2012 Jan 1;4(1):65-93. doi: 10.5539/gjhs.v4n1p65. PMID: 22980117; PMCID: PMC4777042.
2. Babu S. C, Piccorelli G. O, Shah P. M, et al. Incidence and results of arterial complications among 16,350 patients undergoing cardiac catheterization. J Vasc Surg. 1989;10(2):113–116..

Figure/Video

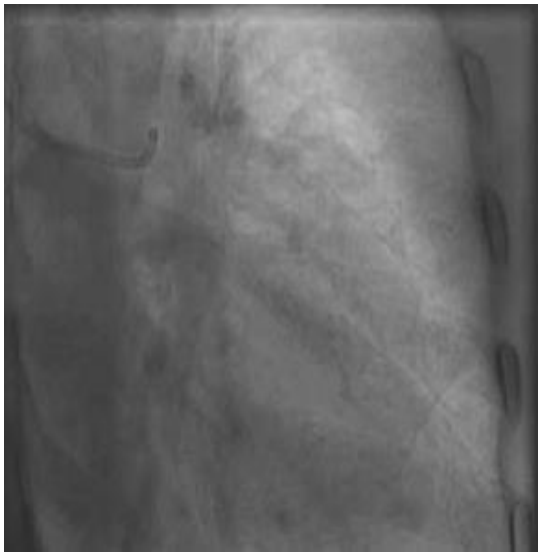

Figure 1: Moderate to severe disease in circumflex.

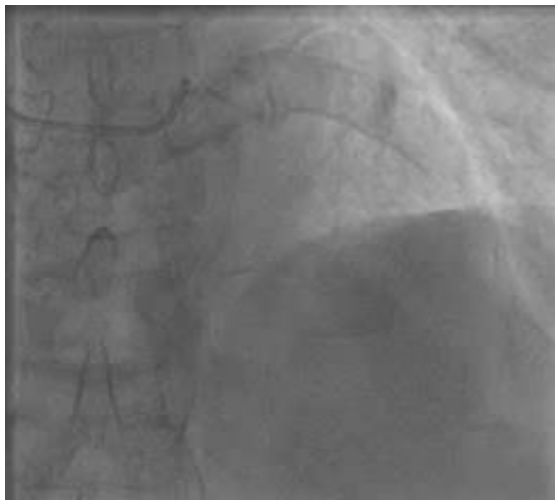

Figure 2: LAD was Calcified vessel with tight proximal stenosis

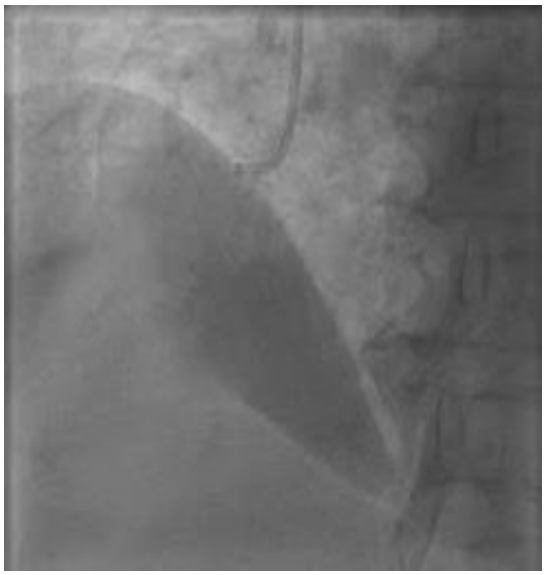

Figure 3: RCA had tight mid stenosis with sluggish distal flow

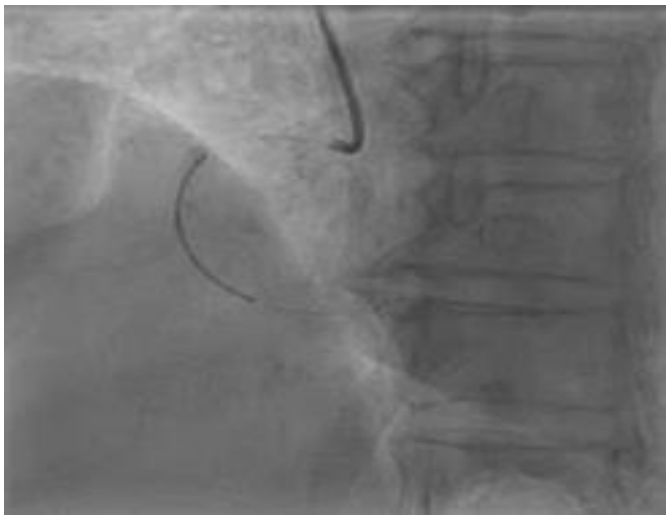

Figure 4: 2.75x32 Promus stent after Pre dilating

Figure 5: Post dilatation done with 3.25mm NC

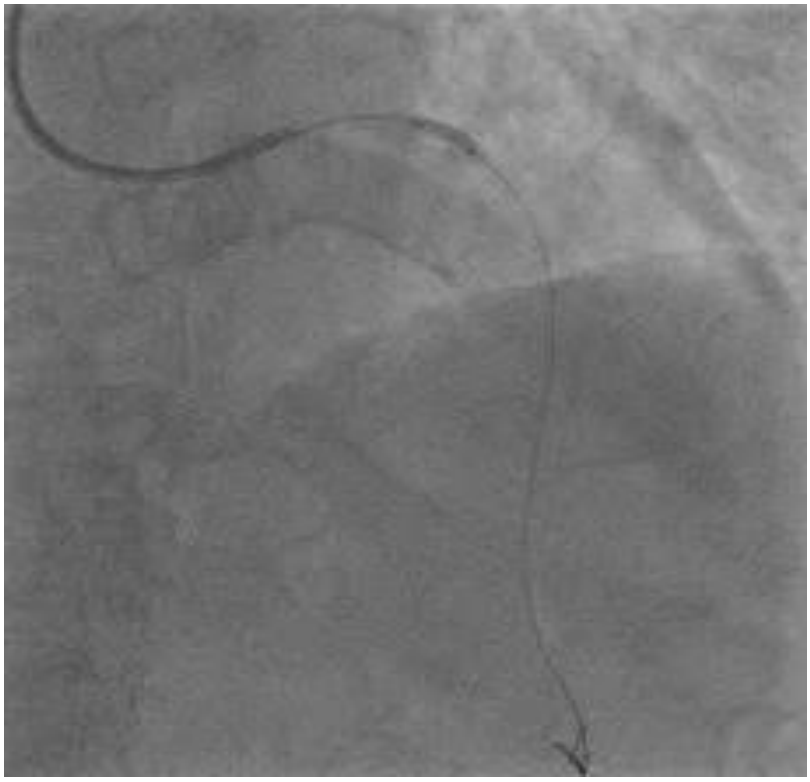

Figure 6: 2.5x9mm NC Balloon dilatation

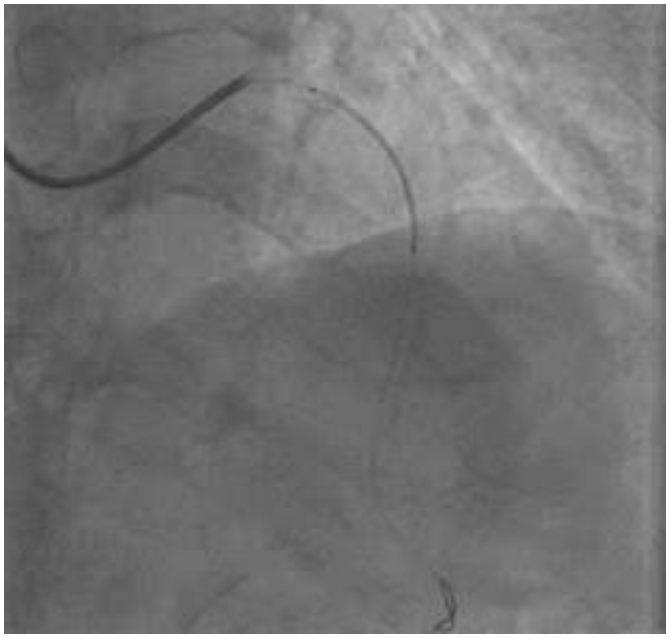

Figure 7: 2.75x32 Promus Element Tracked & buddy wire removed

Figure 8: Stent expanded at 14atm for 45seconds

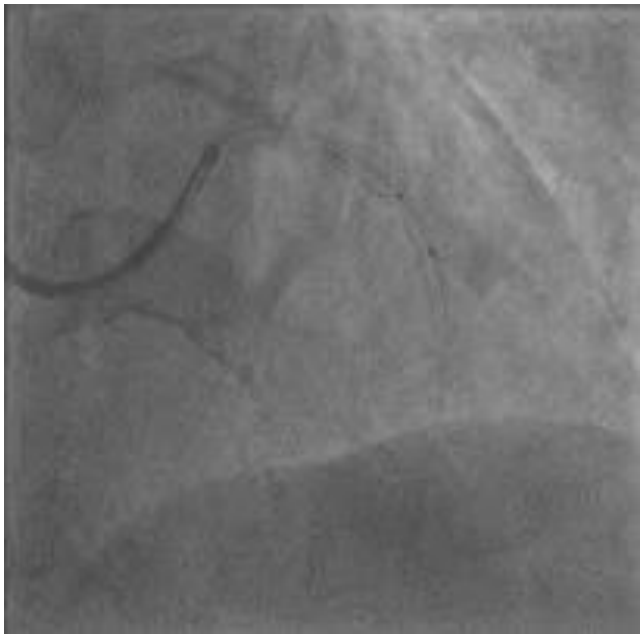

Figure 9: Same 3.25x9mm NC balloon at 16 to 18atms

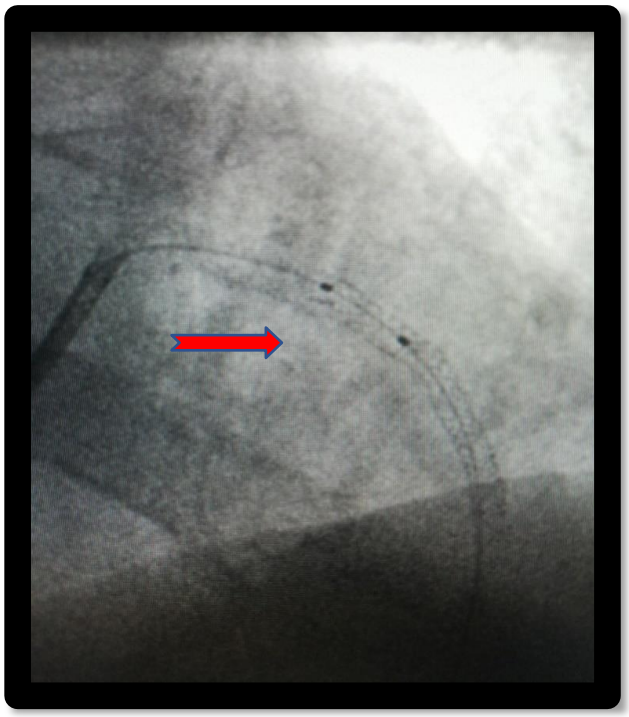

Figure 10: Stent boost with calcified Spurr visible

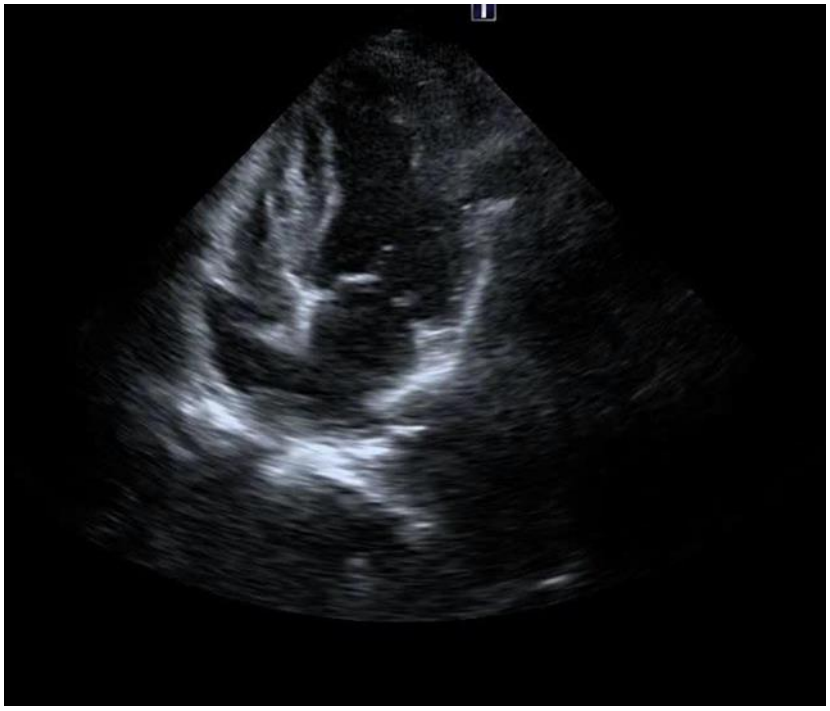

Figure 11: Post PCI Echocardiography