CATHALOGUE

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CASE REPORT

Advancements in the Management of Coronary Perforation: A Case Report Demonstrating Effective Strategies and Favorable Outcomes

Qazi Muhammad Tufail
Shaikh Zayed Hospital Lahore-Pakistan.

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Corresponding Author Email:
dr.qazi.cardio@gmail.com

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Abstract

Background: Coronary perforation, historically considered a perilous complication in interventional cardiology, has seen remarkable advancements in its management. Timely identification and intervention are pivotal in mitigating adverse outcomes associated with this complication.

Case Presentation: We present the case of a 63-year-old female with exertional angina and multiple comorbidities, who underwent coronary angiography revealing proximal chronic total occlusion in the right coronary artery and focal tight mid-stenosis in the left anterior descending artery. Post-dilatation in the latter resulted in grade III perforation, necessitating immediate intervention.

Management & Results: Prompt action was taken, including balloon tamponade and rapid deployment of a covered stent within the affected segment. This approach effectively sealed the perforation and restored distal flow, leading to favorable outcomes. The patient remained hemodynamically stable, with resolution of minimal pericardial effusion on serial echocardiograms.

Conclusion: This case highlights the transformative impact of advancements in the management of coronary perforation, emphasizing the importance of quick identification and decisive intervention. The utilization of covered stents offers a minimally invasive approach with favorable patient outcomes, underscoring the evolution in interventional cardiology practices.

Keywords

Coronary perforation, interventional cardiology, covered stents, management strategies, favorable outcomes.

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Introduction

Coronary perforation stands out as a dreaded complication in the realm of percutaneous coronary intervention (PCI), posing significant challenges in terms of management and prognostication[1]. Despite its clinical significance, there remains a gap in our understanding regarding the optimal strategies for managing this complication and predicting adverse outcomes for affected patients. Furthermore, while advances such as the adoption of polytetrafluoroethylene-covered stents hold promise in improving outcomes, their efficacy has yet to be rigorously scrutinized in the clinical setting[2].

The management of coronary perforation, once deemed a potentially fatal complication in interventional cardiology, has undergone significant advancements. Through this case report, we delve into the evolution of strategies aimed at effectively addressing coronary perforations, even those of type III severity. By highlighting the role of timely identification and appropriate management techniques, we illustrate how this once daunting complication can now be managed with favorable outcomes, thereby altering the landscape of interventional cardiology.

Case Presentation:

In the clinical narrative of a 63-year-old female, the intricacies of cardiovascular disease manifest against a backdrop of comorbidities, shaping the course of diagnostic and therapeutic endeavors.

The patient's chief complaint of exertional angina, graded as Canadian Cardiovascular Society (CCS) class II/III, serves as a poignant reminder of the insidious nature of coronary artery disease (CAD).

Her medical history, characterized by a triad of diabetes mellitus, hypertension, and dyslipidemia, underscores the multifaceted interplay of traditional risk factors in cardiovascular pathogenesis.

Clinical evaluation, a cornerstone in diagnostic formulation, unveils the echocardiographic finding of a hypokinetic inferior wall, signaling myocardial compromise, alongside an ejection fraction (LVEF) of 45%, indicative of impaired ventricular function.

Concurrently, electrocardiographic changes suggestive of ischemia add another layer of complexity to the diagnostic landscape, precipitating the need for urgent intervention.

Diagnostic Assessment:

The diagnostic odyssey unfolds with laboratory investigations, revealing elevated troponin levels—a sentinel marker of myocardial injury, affirming the clinical suspicion of acute coronary syndrome (ACS).

The pivotal role of coronary angiography comes to the fore, unraveling the intricate anatomy of coronary vasculature. Here, the revelation of a proximal chronic total occlusion (CTO) in the right coronary artery (RCA) and focal tight mid-stenosis in the left anterior descending artery (LAD) heralds a critical juncture in therapeutic decision-making, delineating the terrain for interventional strategies.

Therapeutic Intervention:

Navigating the treacherous terrain of obstructive coronary lesions, the therapeutic intervention demands a delicate balance between efficacy and safety. Successful crossing of the lesions, aided by balloon support and subsequent stenting in both the RCA and LAD, marks the culmination of procedural dexterity and technical finesse.

However, the euphoria of procedural success is tempered by the untoward complication of grade III perforation in the LAD, as evidenced by dye extravasation and myocardial blushing—a sobering reminder of the inherent risks in interventional procedures. Immediate action is taken to address the perforation, with balloon tamponade deployed in tandem with the rapid deployment of a covered stent (Papyrus 3x15mm), ingeniously positioned within the previous stent, effectively sealing the breach and restoring distal flow.

Anticoagulation, a cornerstone in the management of ACS, is meticulously managed with a targeted

activated clotting time (ACT) of 280 seconds, mitigating the risk of thrombotic complications.

Follow-up and Outcomes:

The ensuing period of vigilance unfolds in the corridors of the coronary care unit (CCU), where continuous monitoring offers a window into the patient's hemodynamic stability and ischemic burden.

Serial echocardiograms serve as a compass, guiding the trajectory of recovery, with resolution of minimal pericardial effusion serving as a testament to the efficacy of therapeutic maneuvers.

As the sands of time trickle by, the patient's clinical course unfolds with a semblance of serenity, devoid of further complications or ischemic sequelae. With each passing hour, the specter of uncertainty dissipates, paving the path towards a future of favorable outcomes and restored well-being.

Discussion

As per the 2021 guidelines from the American College of Cardiology/American Heart Association (ACC/AHA), for hemodynamically stable patients with ST-elevation myocardial infarction (STEMI) and multivessel disease, staged PCI following successful primary PCI is recommended to lower the risk of death or myocardial infarction (MI)[3]. In a study involving 6245 cases of coronary intervention, vessel perforation occurred in 0.8% of cases, predominantly in complex lesions such as chronic total occlusions (CTOs). Of these cases, 46% resulted in significant pericardial effusion, with a mortality rate of 12%[4].

In the dynamic arena of interventional cardiology, where the pursuit of revascularization is often fraught with challenges, the ability to anticipate and adeptly manage complications emerges as a defining trait of procedural excellence. The case at hand serves as a poignant testament to the critical importance of swift recognition and intervention in mitigating adverse outcomes, underscoring the pivotal role of procedural vigilance and clinical acumen. In confronting the specter of coronary perforation, clinicians are thrust into a high-stakes scenario where the margin for error is infinitesimal, necessitating a harmonious blend of technical proficiency and sound judgment.

The evolution of interventional techniques has ushered in a new era of therapeutic possibilities, characterized by innovative strategies aimed at navigating the complexities of coronary pathology. Central to this paradigm shift is the advent of covered stents, a technological marvel that has revolutionized the management of coronary perforations.

By offering a minimally invasive approach to address perforations, covered stents not only serve as a lifeline in moments of crisis but also herald a paradigmatic shift in the narrative surrounding this once formidable complication. Their deployment epitomizes the marriage of innovation and pragmatism, affording clinicians a versatile tool to navigate the labyrinthine corridors of coronary vasculature with confidence and precision.

Conclusion

In the crucible of interventional cardiology, where the stakes are high and the margin for error is narrow, the management of complications assumes paramount importance. Through the lens of this case, we glean invaluable insights into the essence of procedural excellence—swift recognition, decisive action, and unwavering commitment to patient well-being. Indeed, coronary perforation, once regarded as a harbinger of doom, can be effectively tamed with timely intervention and judicious use of advanced techniques. As we traverse the ever-evolving landscape of cardiovascular therapeutics, let us remain steadfast in our pursuit of excellence, guided by the principles of vigilance, preparedness, and innovation.

Learning points

- Interventional cardiologists must remain ever-vigilant and prepared to address complications that may arise during procedures, employing a

multifaceted approach to mitigate risks and optimize patient outcomes.

- Quick identification and decisive action are paramount in averting catastrophic consequences associated with complications such as coronary perforation. Through prompt recognition and intervention, clinicians can effectively navigate challenging clinical scenarios and safeguard patient well-being.

- The advent of covered stents represents a watershed moment in the management of coronary perforations, offering a safe and effective means of sealing breaches in the coronary vasculature. By harnessing the potential of this innovative technology, clinicians can navigate the complexities of interventional procedures with confidence, ushering in a new era of therapeutic possibilities and improved patient outcomes.

References

1. Javaid A, Buch AN, Satler LF, Kent KM, Suddath WO, Lindsay J Jr, Pichard AD, Waksman R. Management and outcomes of coronary artery perforation during percutaneous coronary intervention. Am J Cardiol. 2006 Oct 1;98(7):911-4. doi: 10.1016/j.amjcard.2006.04.032. Epub 2006 Aug 7. PMID: 16996872.
2. Shimony A, Zahger D, Van Straten M, Shalev A, Gilutz H, Ilia R, Cafri C. Incidence, risk factors, management and outcomes of coronary artery perforation during percutaneous coronary intervention. Am J Cardiol. 2009 Dec 15;104(12):1674-7. doi: 10.1016/j.amjcard.2009.07.048. PMID: 19962473.
3. Kiernan TJ, Yan BP, Ruggiero N, Eisenberg JD, Bernal J, Cubeddu RJ, Witzke C, Don C, Cruz-Gonzalez I, Rosenfield K, Pomersantev E, Palacios I. Coronary artery perforations in the contemporary interventional era. J Interv Cardiol. 2009 Aug;22(4):350-3. doi: 10.1111/j.1540-8183.2009.00469.x. PMID: 19453819.
4. Mehta RH, Lopes RD, Ballotta A, Frigiola A, Sketch MH Jr, Bossone E, Bates ER. Percutaneous coronary intervention or coronary artery bypass surgery for cardiogenic shock and multivessel coronary artery disease? Am Heart J. 2010 Jan;159(1):141-7. doi: 10.1016/j.ahj.2009.10.035. PMID: 20102880.

Figure/Video

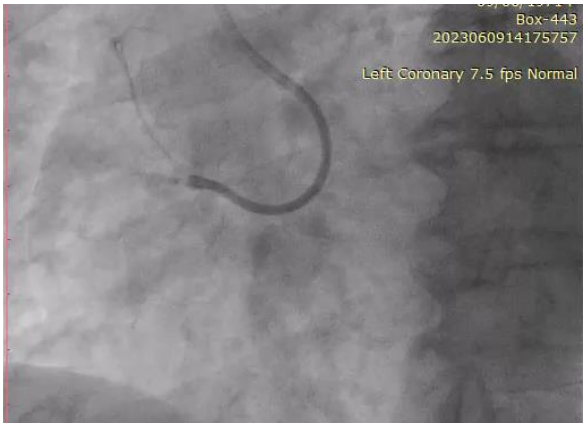


Figure 1: Right system engaged with XB RCA guider, Showed total proximal occlusion

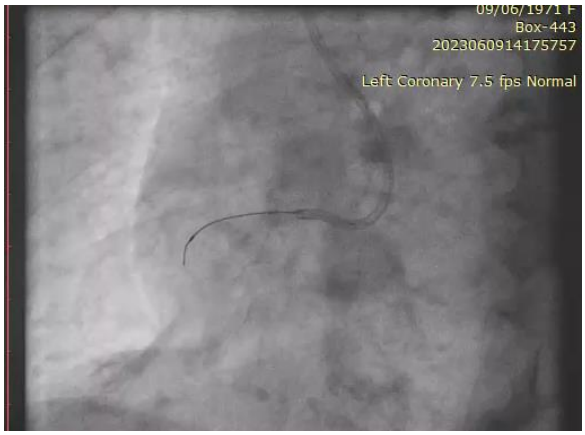


Figure 2: Crossed lesion with Pilot 50 PTCA wire with balloon support

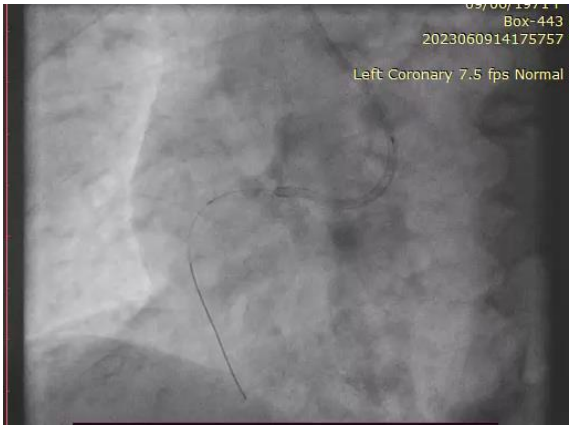
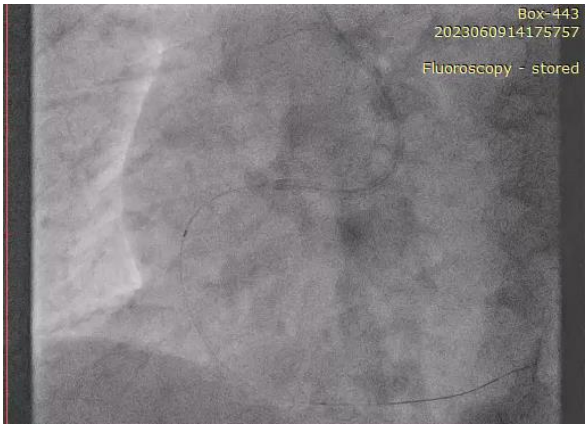


Figure 3: Check injection showed good sized vessel ,with long segment of tight stenosis in ostio-proximal part.



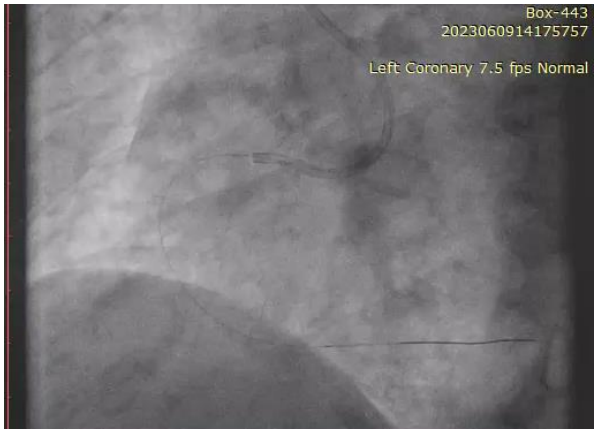


Figure 4 & 5: Pre-dilatation with 1.5X 15mm balloon

Figure 6 & 7: Stented with 3X48 mm DES

Figure 8 & 9: Post Dilated With 3.25x15mm NC

Figure 10: Left system engaged with XB3, showed tight mid stenosis in LAD

Figure 11: Lesion crossed with pilot 50 Wire

Figure 12: Stented with 3x24mm DES

Figure 13: Check injection : mid part of stent looked under-deployed

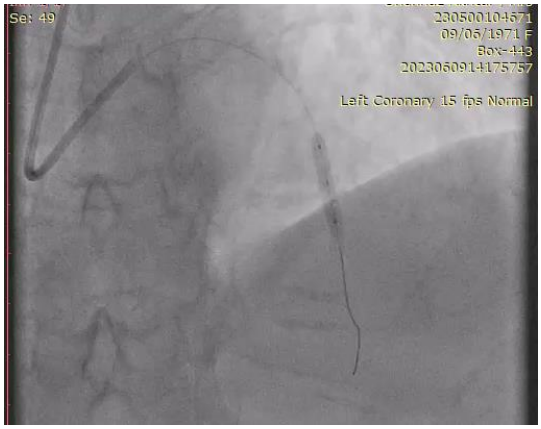


Figure 14 & 15: Post-dilatation with 3.25x15 mm NC

Figure 16: Check injection showed dye extravasation with myocardial blushing (Grade III perforation)

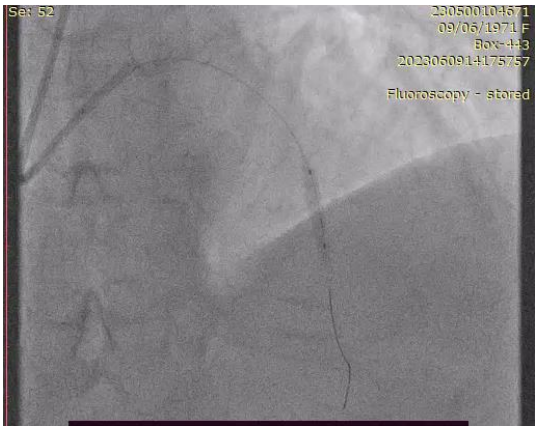


Figure 17: Balloon tamponade with same NC ballon immediately

Figure 18: Perforation site was sealed with no extravasation of dye.