CATHALOGUE

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CASE REPORT

Effective Interventional Strategies for Bifurcating Lesions in Acute coronary syndrome (ACS): Insights into the Jailed ballon stent kissing technique (J-BSKT) Approach

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Citation:
Muneeba K, Nouman K, Tariq F. Effective Interventional Strategies for Bifurcating Lesions in Acute coronary syndrome (ACS): Insights into the Jailed ballon stent kissing technique (J-BSKT) Approach. Cathalogue. 2024; 2(3):104-109.

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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 09/04/2024
Accepted 25/07/2024
First Published 30/09/2024

Abstract

Background: Percutaneous coronary intervention (PCI) for bifurcation lesions is a challenging aspect of coronary intervention. The Jailed Balloon Stent Kissing Technique (J-BSKT) is one approach for managing bifurcation lesions, though it remains a controversial technique with limited data, particularly in the context of Acute Coronary Syndrome (ACS). This case discusses the use of J-BSKT in a Non-ST Elevation Myocardial Infarction (NSTEMI) and highlights its complications.

Case Presentation: A patient with Non-ST Elevation Acute Coronary Syndrome (NSTE-ACS) presented with echocardiographic findings of an ejection fraction of 50%, along with hypokinesia of the apex and anterior wall. Coronary angiography revealed triple-vessel coronary artery disease, including a bifurcation lesion in the left anterior descending artery (LAD) involving the diagonal branch.

Results: Following a successful PCI to the LAD, the patient developed chest pain. An immediate relook angiogram demonstrated occlusion of the side branch at the ostium. Subsequent intervention to the side branch was performed, but it resulted in thrombus propagation within the main vessel. The main vessel was then reintervened, while the branch vessel was managed medically. On a follow-up angiogram, both the main vessel and side branch showed patent flow, with TIMI III flow in both.

Conclusion: Bifurcation lesions in coronary arteries pose a significant challenge for interventional cardiologists. The Jailed Balloon Stent Kissing Technique (J-BSKT) can be an effective strategy for managing such lesions, though complications such as side branch thrombosis may occur, necessitating careful patient monitoring and management.

Keywords

Bifurcation Stenting, Acute Coronary Syndrome.

Published by Pakistan Society of Interventional Cardiology

Introduction

Coronary bifurcation lesions are frequently encountered in clinical practice and it represent up to 15-20% of all lesions requiring PCI[1]. If bifurcation lesions are managed with a single stent, side branch closure is observed in 4.5-26% of cases. This phenomenon is mostly caused by plaque displacement, side branch ostial recoil, and/or dissection propagation. Side branch size (small side branch reference diameter), severe angulations from the main vessel, and other anatomical characteristics are linked to an increased likelihood of side branch closure[2,3]. Various effective strategies have been employed globally to negotiate them. Among one of these is the Jailed Balloon-Stent Kissing technique, or J- BSKT. Thrombus formation is a key independent predictor of adverse outcomes in these patients[4]. Acute coronary syndrome is characterized by a high risk of thrombosis, and guidelines highlight the importance of proper initial treatment with antiplatelet agents and effective anticoagulation. Despite effective antiplatelet and anticoagulation due to high thrombus burden complex interventions done during these settings can be complicated. Our instance illustrates a similar situation that was managed successfully.

Case Presentation

73 years old male patient, known hypertensive admitted with Non-ST elevation Myocardial infarction (NSTEMI).

Electrocardiogram showed Sinus Rhythm with ST-segment depressions in precordial leads Echocardiography showed Ejection fraction of 50% with severely hypokinetic Mid to distal anterior wall, and Apex. The patient was hemodynamically stable, being managed as NSTEMI with TIMI score 4, coronary angiogram done showed triple vessel coronary artery disease. He was given option for Coronary artery bypass graft surgery (CABG) first. Patient refused surgical intervention hence planned for percutaneous revascularization.

Diagnostic Assessment

Angiography was done via the Right radial approach, Judkin left and Judkin right catheters were used, and showed a left dominant system with significant stenosis in left circumflex artery (LCX) and bifurcating lesion in Left anterior descending artery (LAD) and diagonal branch as shown in Figure 1(A)(B). The right coronary artery (RCA) was non-dominant with critical disease in mid portion.

This was a case of triple vessel coronary artery disease So after the heart team meeting CABG was advised but the patient refused to undergo surgery. As LAD seemed to be the culprit artery, it was decided to intervene LAD first via the J-SKBT to save the large side branch.

Therapeutic Intervention

For Percutaneous coronary intervention (PCI), an EBU catheter was used to engage the Left system, workhorse wires were used and cross the lesion of LAD and Diagonal branch. Wire successfully parked in main vessel as well as side branch for protection. LAD was predilated with semi complaint balloon (SC) 2.0*15 and the side branch was predilated with the same balloon. SC 2.0*15 balloon was placed in the side branch and 2.75*30 stent in the LAD. Stent deployed at 9 atm simultaneously with inflation of balloon at 8 atm in the side branch as shown in Figure 2. Good angiographic results with TIMI III Flow achieved in LAD and side branch. The patient was shifted to cardiac care unit (CCU).

After 90 minutes patient developed severe chest pain, ECG done showed ST elevation in lateral leads. The patient was shifted to Cath Lab again for relook angiogram, which showed totally occluded diagonal branch as shown in Figure 3 (A).

Again, the left system engaged, the wire crossed, side branch dilated again. Initially, TIMI 2 flow was seen in the side branch but later it occluded again. In addition, a thrombus was also seen in LAD. Intravenous Injection of enoxaparin was given and Glycoprotein IIB/IIIA inhibitors (tirofiban) started. LAD dilated with balloon TIMI 3 flow seen in LAD, but a diagonal branch was occluded from the ostium as shown in Figure 3 (B)(C)(D) respectively. It was decided not to compromise the main vessel for the sake of side branch hence patient shifted

back to CCU on GP IIB/IIIA infusion. Ticagrelor was continued instead of clopidogrel

Follow-Up and Outcomes

Post procedure patient was admitted in CCU. EKG changes settled. The patient was clinically and hemodynamically stable. On the second day was shifted for Relook angiogram. Showed TIMI 3 flow in main vessel as well as the side branch as shown in Figure 4.

Discussion

The cornerstone of any successful percutaneous coronary intervention is adequate anticoagulation. It is recommended because of the potential for thrombus formation following balloon dilation and the thrombogenic nature of the equipment. Recommended ACT during PCI should be 250-350 sec. Unfractionated heparin is commonly used to maintain effective anticoagulation. It acts by binding and enhancing the effects of antithrombin which in turn inhibit factor IIa and Xa. Unfractionated heparin has several limitations in addition to variable anticoagulation effects[5].

In our case, a comparable mechanism-caused incident led to an acute event. The problem was successfully resolved by implementing a different anti-coagulation strategy and incorporating tirofiban into the management plan.

Notably, ACT should always be examined in accordance with established procedural protocols before moving forward with such a complex procedure, and all necessary precautions should be followed to avoid serious outcomes. Additionally, an action plan should be established before commencing the procedure to address any potential complications.

Acute coronary syndromes indicate a high-risk group of patients who are prone to complications due to prothrombotic or hypercoagulable condition[5]. This hypercoagulable state to some extent is dealt with potent anticoagulants and antiplatelet agents. Despite these measures thrombotic pathway is somewhat active due to drastic release of inflammatory markers in this event[6]. Procedural complexity increases the risk of post procedure complications, and instent thrombosis[7]. Consequently, the operator should be ready for these problems when performing a complex procedure in the context of acute coronary syndrome. It is recommended to use ticagrelor rather than clopidogrel in such circumstances[8].

GP IIB/IIA inhibitors should be administered to the patient following the procedure[9]. Our patient was managed successfully when we adhered to the suggested protocol

Conclusion

This case highlights the significance of rapid diagnosis and tailored management in patients with SCAD. While conservative management is generally preferred for stable patients, the decision to proceed with stenting was justified in this case due to hemodynamic instability and a history of cardiac arrest, resulting in improved outcomes. Continued research and clinical awareness are vital for understanding SCAD's pathophysiology, improving diagnostic accuracy, and refining management protocols to enhance patient outcomes in this rare yet significant condition.

Learning points

- Coronary bifurcation lesions pose significant challenges for interventional cardiologists, requiring specialized strategies for optimal management.
- Meticulous procedural planning and careful navigation are essential to prevent complications, particularly in complex PCI cases involving bifurcation lesions.
- The Balloon Stent Kissing Technique (BSKT) is a safe and effective strategy, offering potential advantages over other techniques such as the JWT (jailing wire technique), especially in protecting the side branch during PCI for bifurcation lesions.
- Prioritization of the main vessel is critical; the main vessel should never be compromised in favor of the side branch.

- ACT monitoring is crucial, particularly during complex procedures where various anticoagulants may be used. Ensuring adequate anticoagulation can prevent thrombotic complications.
- Ticagrelor is preferred over clopidogrel in patients at high risk of thrombosis due to its superior antiplatelet efficacy, especially in high-risk PCI cases

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Figure/Video

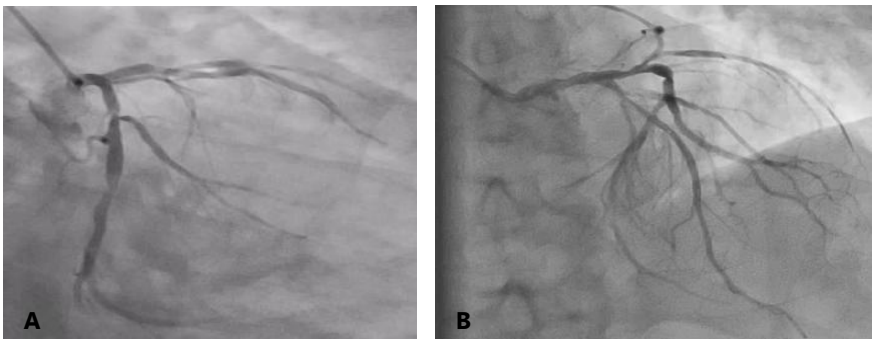


Figure 1(A): Caudal angulation showing critical disease in proximal and midsegment of left circumflex artery
(B): Cranial view depicting bifurcating disease in Left anterior descending artery and diagonal branch

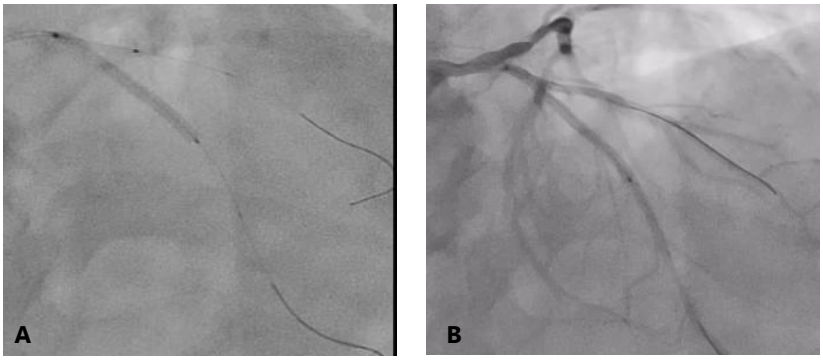
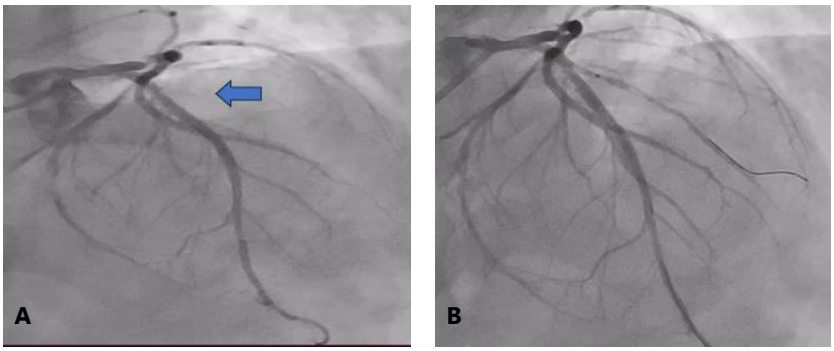


Figure 2(A): Stent deployment in LAD simultaneously with inflation of balloon in the side branch
(B): Good angiographic results with TIMI III flow



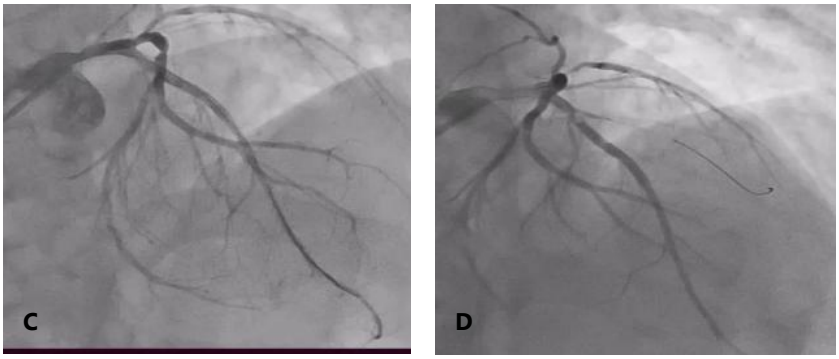


Figure 3(A): Relook angiogram showing totally occluded side branch.
(B): LAD and Diagonal branch rewired, and side branch dilated Again
(C): Flow compromised in diagonal branch as well as LAD
(D): Thrombus also seen in LAD

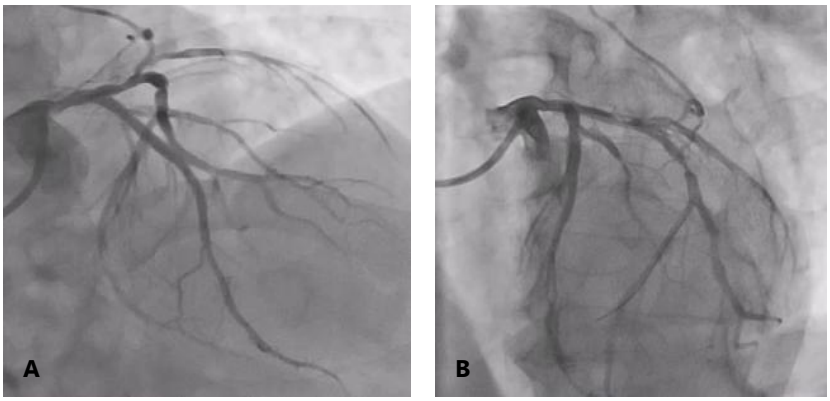


Figure 4(A): Cranial view showing TIMI III flow in both the LAD and diagonal branch
(B): Caudal view illustrating a patent diagonal branch with optimal flow