Journal of Case Reports and Studies
Volume 12 | Issue 2
ISSN: 2348-9820

Case Report Open Access

Intravascular Lithotripsy in Stent Failure in Calcified Vessel in Acute MI Setting

Punish Sadana*, Preeti Sharma

Director-Cardiology Max Superspeciality Hospital, Dehradun, India

***Corresponding Author:** Punish Sadana, Director-Cardiology Max Superspeciality Hospital, Dehradun, India, Tel.: +91 8171517788, E-mail: drpunishsadana@gmail.com

Citation: Punish Sadana, Preeti Sharma (2024) Intravascular Lithotripsy in Stent Failure in Calcified Vessel in Acute MI Sett ing, J Case Rep Stud 12(2): 201

Received Date: June 26, 2024 **Accepted Date:** July 26, 2024 **Published Date:** July 30, 2024

Abstract

Coronary artery calcification (CAC) is commonly encountered by interventional cardiologists. Severe CAC may impair stent delivery or result in stent underexpansion, stent thrombosis and/orin-stent restenosis (ISR).Adequate preparation of heavily calcified coronary lesions (e.g. using non-compliant balloons, cutting/scoring balloons, rotational/orbital atherectomy or intravascular lithotripsy) prior to stent implantation is essential in preventing stent underexpansion.However, in certain cases the deployed stent may remain underexpanded despite extensive lesion preparation.Recent reports have suggested that IVL could be used with success in patients with acute stent failure.We present a case of Acute IWMI with stent underexpansion during primary PCI due to focal dense calcification managed with IVL with good final result. **Shockwave** Intravascular Lithotripsy (IVL) is the only technology that cracks both medial and intimal calcium while minimizing trauma to the vessel wall.In the recent past it has been indicated for denovo calcified coronary lesions and calcified Instent restenosis.For IVL use in acute stent failure it is a off label indication.

Keywords: CAC(Coronary artery calcium),PCI(Percutaneous coronary intervention),IWMI(Inferior wall MI),IVL(Intravscular lithotripsy),RA(rotational atherectomy),NCB(non compliant balloon)

Introduction

Stent underexpansion is a common problem in heavily calcified coronary lesions treated with percutaneous coronary intervention, and has been associated with in-stent restenosis, stent thrombosis and, subsequently, poor clinical outcomes.Despite of the plethora of tools available to adequately prepare these lesions (e.g. non-compliant balloon (NCB), cutting/scoring balloons, rotational atherectomy (RA), excimer laser coronary angioplasty (ELCA) and intravascular lithotripsy (IVL)) , the deployed stent may remain underexpanded in certain cases.The management of stent underexpansion in heavily calcified coronary lesions is considered very challenging.Coronary IVL has recently been introduced as a novel modality for de novo preparation of severely calcified coronary lesions with good outcomes.Hypothetically, cracking the calcium preventing stent expansion by using IVL may also be an attractive approach to the management of stent underexpansion after PCI. Using IVL for this indication carries the risk of damaging the drug polymer, increasing the risk of eventual stent thrombosis and restenosis. Whether or not the theoretical effect of IVL on the drug polymer has any clinical impact on patient's outcome has not been yet fully elucidated.

Case Report

A 79 year old female a known case of Diabetes Mellitus presented with chest pain for two hours duration.On Evaluation her vitals were stable,systemic examination doesn't showed any abnormality. ECG showed st elevation in inferior leads and Echo Showed RWMA in RCA terrritory with EF of 40%.

CAG done which revealed triple vessel disease with Proximal RCA 100% blocked(figure 1).Patient was taken for PTCA to RCA and after predilation two 3mm DES deployed from mid to distal RCA and proximal tomid RCA. Postdilation done. But even after postdilation upto 26 atm with NC balloon proximal stent remained underexpanded at a focal area which is visble in stent boost(figure 3).Then 3x12mm IVL balloon used for lthotripsy for fracturing the calcium and stent got expanded (Figure 4)

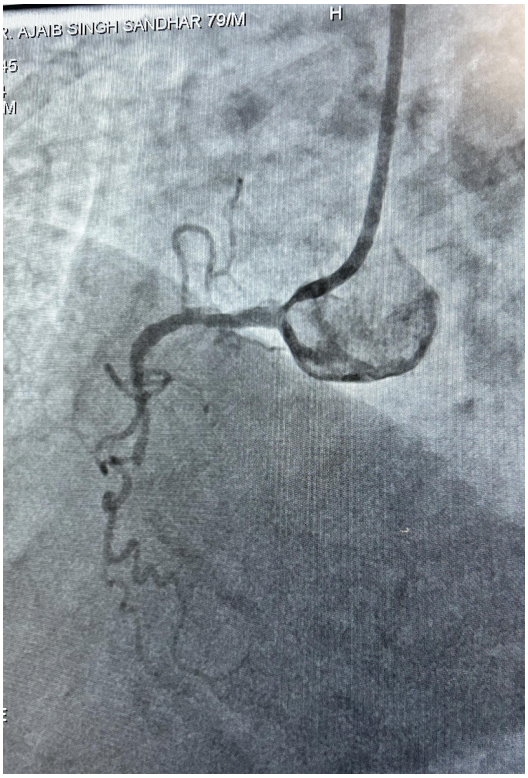

Figure 1: Proximal RCA 100% blocked

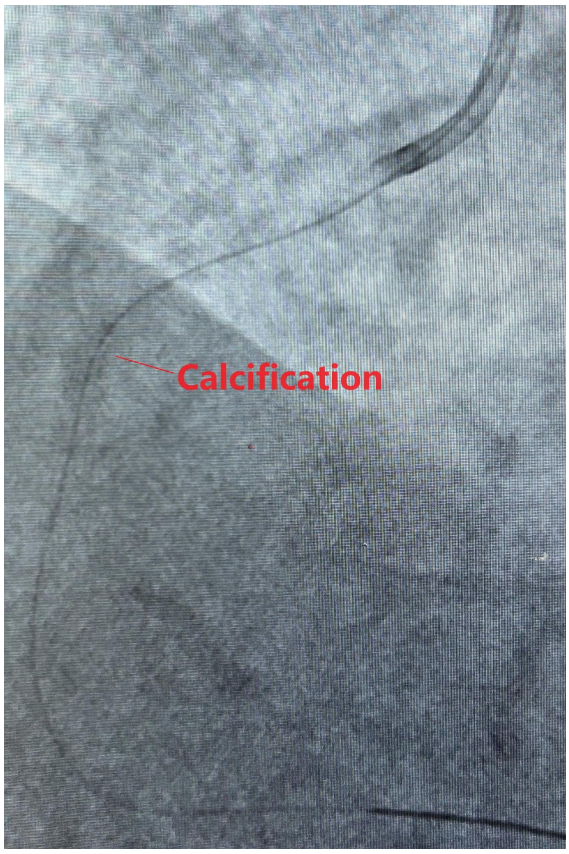

Figure 2: Calcification seen in prox RCA

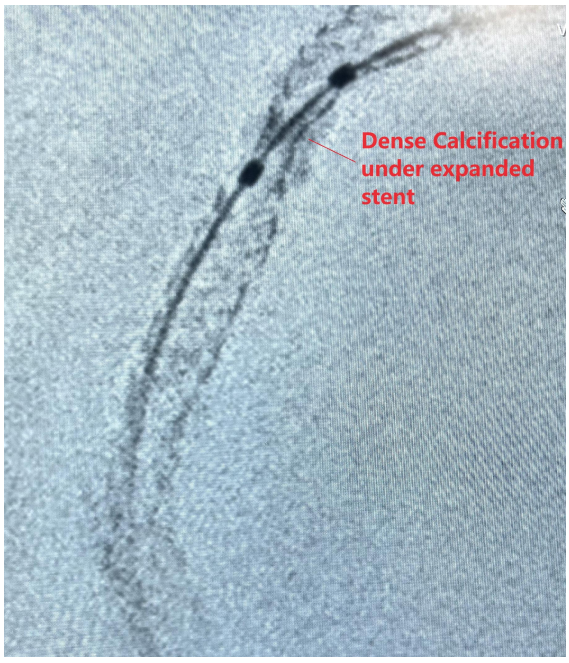

Figure 3: Stent Boost: Under expanded stent

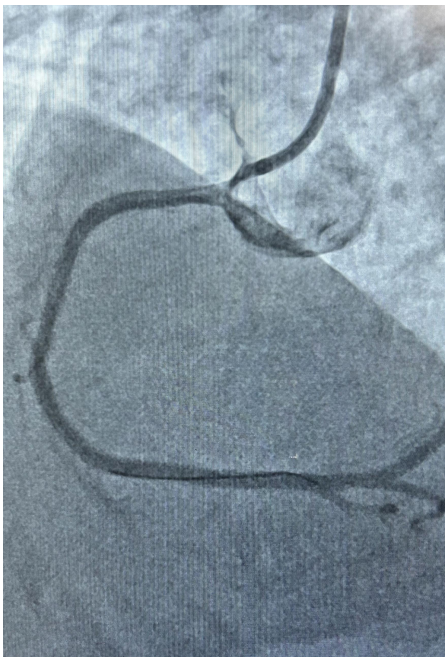

Figure 4: Fully expanded stent after IVL

Discussion

PTCA of heavily calcified lesions may be associated with early complications (dissection, perforation, myocardial infarction [MI]) and/or late adverse events (restenosis, stent fracture, thrombosis, and repeat revascularization). Coronary calcification may impede stent delivery and deployment, leading to underexpansion, malapposition, or direct damage to the stent surface (including the polymer), potentially impairing drug delivery. Suboptimal stent expansion is the strongest predictor of subsequent stent thrombosis and restenosis. Although atherectomy facilitates stent expansion, the extent of calcium modification is limited by guidewire bias and may be associated with peri-procedural complications including slow-flow, no-reflow, coronary dissection, perforation, and MI .The other techniques like cutting balloon has a limitation of delievering due to its bulky design

Intravascular lithotripsy (IVL) is a novel tool for calcified lesion modification using acoustic pressure waves.The coronary IVL system consists of a balloon catheter with two integrated emitters, a lithotripsy generator and a connector cable. These emitters create sonic pressure waves that selectively fracture coronary calcium (both superficial and deep) with an effective pressure of 50 atm and alter vessel compliance. This distinctive nature of IVL makes it, at least in theory, very suitable for treating acute stent underexpansion resulting from heavy coronary calcification.The COIL is the largest registry assessing the role of coronary IVL in patients with stent failure. which showed that IVL is a safe treatment for coronary stent failure, including cases with an acutely under-expanded stent. IVL doesn't have risk of slow flow and minimal chances of perforation of the vessel as ballon is inlated at 4 atm only.The other benefit of IVL is that it has a rapid learning curve

Conclusion

Coronary artery calcification (CAC) is a highly prevalent pathology seen in patients with severe coronary artery disease and is associated with higher rates of adverse cardiac events.Since the initial IVL trials only described use of IVL in calcified de novo stenosis of coronaries, currently IVL is only available as an off-label use for treatment of calcium mediated ISR or stent under--expansion.Our case have shown the benefit of using IVL in acute stent failure which might be a step forward for making it a tool of choice in such settings

References

1. M.C. Santos et al. (2020) Intravascular lithotripsy for treatment of severely calcified coronary artery disease:J. Am. Coll. Cardiol, 76: 2635-46.

2. Maria C Santos, Tina Lin, Peter Barlis (2011) In-stent restenosis associated with stent malapposition: seven year optical coherence tomography findings: Int. J. Cardiol, 147: 149-51.

3. B. Honton et al. (2005) Repeat stenting for the prevention of the early lumen loss phenomenon in patients with in-stent restenosis. Angiographic and intravascular ultrasound findings of a randomized study: Am. Heart J, 149: e1-8.

4. K Kassab et al. (2022) Mid-term outcome of de novo lesions vs. in stent restenosis treated by intravascular lithotripsy procedures: insights from the French shock initiative: Int. J. Cardiol, 365: 106-11.

5. GC Siontis et al. (2022) Intracoronary lithotripsy use for in-stent restenosis, including multilayer ISR, Am. Coll. Cardiol, 44:10-13.

6. Brodmann M, Werner M, Brinton TJ, et al. (2017) Safety and performance f lithoplasty for treatment of calcified peripheral artery lesions. J Am Coll Cardiol, 70: 908-10.

7. Brodmann M, Werner M, Holden A, et al. (2019) Primary outcomes and mechanism of action of intravascular lithotripsy in calcified, femoropopliteal lesions: results of Disrupt PAD II. Catheter Cardiovasc Interv, 93: 335-42.

8. Tepe G, Brodmann M, Werner M, et al. (2021) Intravascular lithotripsy for peipheral artery calcification: 30-day outcomes from the randomized disrupt PAD III trial. JACC Cardiovasc Interv, 14: 1352–61.

9. Kereiakes DJ, Virmani R, Hokama JY, et al. (2021) Principles of intravascular ithotripsy for calcific plaque modification. JACC Cardiovasc Interv, 14: 1275-92.