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Rota Ablation – When There is No Other Option. A Complex Case of 86 Years Old Male with Multiple Comorbidities Presenting With Stemi

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Abstract

The aim of this report is to explore the direct and long-term outcome in a high risk patient who was treated with rotational atherectomy (RA) to assist the placement of drug eluting stents in heavily calcified lesions. The patient presented with acute STEMI and had severely calcified Left main stem (LMS) disease, requiring plaque modification before coronary angioplasty and stent implantation. As the patient was elderly, with multiple comorbidities including a number of coronary interventions, a decision of conservative management was made. Patient then re-presented with typical chest pain and pulmonary edema. A Heart Team meeting was called and high risk decision of RA to LMS was taken. His percutaneous transluminal coronary angioplasty (PTCA) to LM and LAD was planned. LMS to LAD was rotablated with 1.75 burr and PTCA with 3.5 NC at 20 Atm.

During the procedure, patient developed flash pulmonary edema. In post-operative care, his renal functions deteriorated and nephrology was taken on board. After multiple sessions of hemodialysis, patient was clinically improved and stabilized. The report highlights the expertise required in RA of a complex LMS disease and judicious post-procedure care which resulted in significant reduction of morbidity, mortality and frequent hospitalizations of the patient.

Keywords: Percutaneous coronary intervention, Coronary artery calcification, Rotational atherectomy, Rotablation, STEMI

1. Introduction

Coronary artery calcification (CAC) poses serious obstacles to routine percutaneous coronary interventions (PCI). Calcified lesions are difficult to cross, expand and carry increased risks of inadequate stent placement, angiographic complications, and poor clinical outcomes.¹ CAC is often secondary to old age, diabetes mellitus and chronic renal failure (CRF).

Various methods exist to improve procedural outcomes. Rotablation is widely available in most countries, however expertise for it in difficult cases and cost are major limitations hampering its usage. The aim of this report is to examine procedural success and long-term mortality outcomes.

2. Case report

An 86-year-old man, known diabetic with chronic kidney disease Stage 3, established coronary artery disease and past history of multi-vessel percutaneous coronary intervention (PCI), presented to Accident and Emergency (A&E) due to typical chest pain a day before which lasted for 1 h. He was asymptomatic on admission. His 12 lead ECG was performed which showed ST elevations in anterior leads (Fig. 1).

His cardiac enzymes were raised with Trop I of 25000 pg/mL and CKMB 26 ng/mL. His echocardiography was performed which showed reduced ejection fraction of 35%. Patient was not clinically in congestive heart failure. Patient was admitted in CCU for further management. Considering his age

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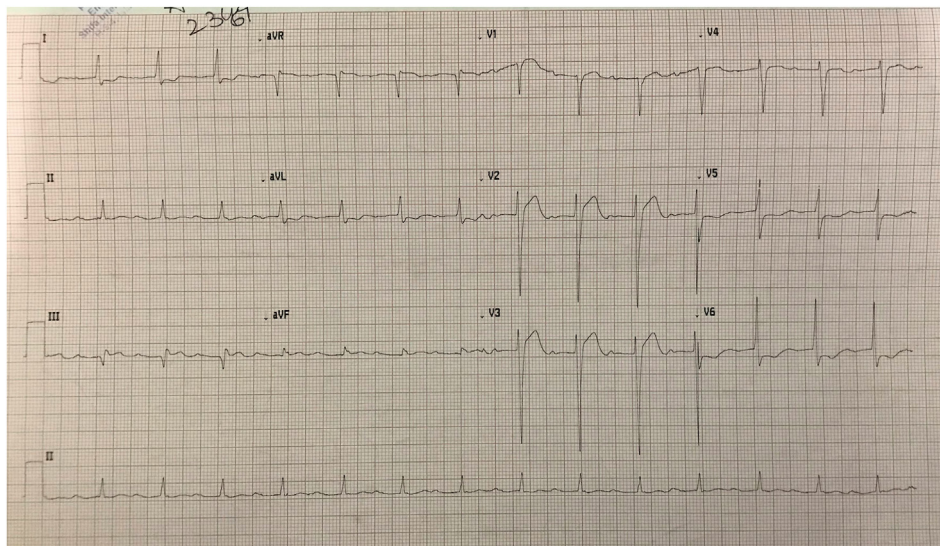


Fig. 1. 12 lead ECG showing ST elevations in anterior leads.

and significant comorbidities, and as he stayed asymptomatic during hospital stay, it was decided to manage him with maximum medical therapy. Patient was discharged on dual antiplatelets, high dose statins and antianginal medications.

3 days later, he re-presented in A & E with typical chest pain, dyspnea NYHA class IV and orthopnea. He had persistent ST elevations in anterior leads with a CKMB of 31 ng/mL and worsening renal functions. So, patient was admitted again under the working diagnosis of re-infarction on maximum medical therapy, cardiogenic pulmonary edema and acute on chronic renal dysfunction (serum

creatinine 2.6 mg/dL). It was decided this time to proceed with coronary angiogram. His angiogram revealed severely calcified triple vessel coronary artery disease with left anterior descending (LAD) showing subtotal ostio-proximal stenosis, left circumflex (LCX) 95% ostial stenosis with patent stent in proximal to mid segment along-with mild in-stent restenosis (ISR), right system was dominant with chronic total occlusion (CTO) after proximal stented segment with faint retrograde filling from left system (Figs. 2 and 3).

Based on these findings, the heart team meeting was called. Patient was given the option of high risk



Fig. 2. Shows distal LM 80–90% calcified lesion. Proximal LAD 80–90% calcified. LCX is 70–80% calcified stenosis.

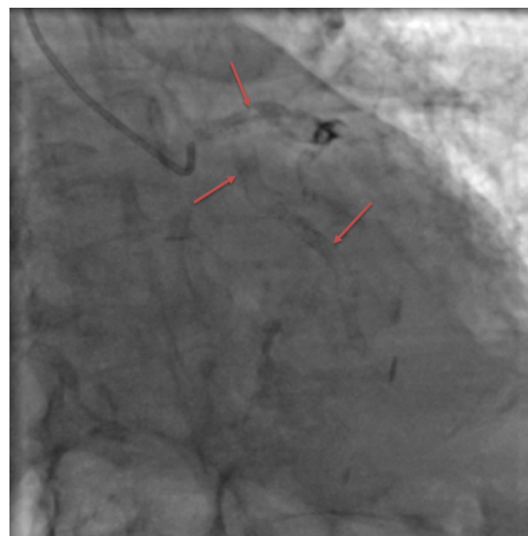


Fig. 3. Before dye injection, shows severe calcification of LM, LCX and proximal LAD (tram-track appearance).

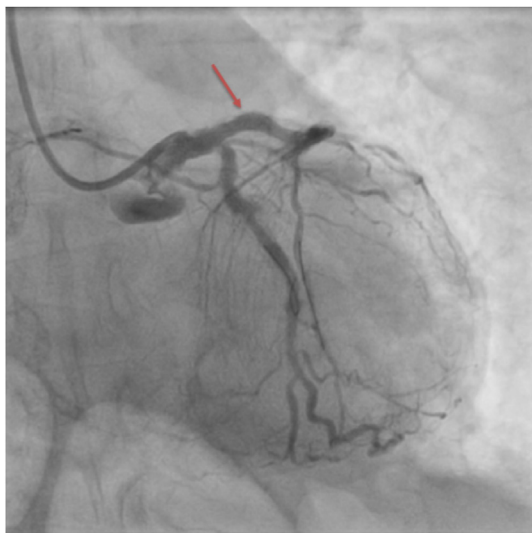


Fig. 4. Post PCI dye injection showing optimal final result and good flow after stenting of LMS to LAD.

coronary artery bypass grafting (CABG) versus high risk Rota-assisted PCI to the culprit lesion in proximal LAD. Family opted for high risk PCI. Nephrology was taken on board to optimize his renal function perioperatively.

His percutaneous transluminal coronary angioplasty (PTCA) to LM and LAD were planned. 6 French femoral venous access was established. TVP was placed via right femoral vein. LCA was engaged with 7 French BL 3.0 guide and LAD wired with Runthrough and 1.5 OTW balloon. Wire swapped to rota floppy. LMS to LAD was rotablated with 1.75 burr and PTCA with 3.5 NC at 20 Atm. LCX was wired with whisper and PTCA performed with 2.5 NC. LMS to LAD was stented with 3.5 × 34 mm DES at 16Atm. Proximal optimization technique (POT) in LM stem performed with 5.0 NC and distal optimization technique (DOT) with 3.5 NC. Acceptable final result was achieved (Fig. 4).

During the procedure, patient developed flash cardiogenic pulmonary edema requiring intravenous diuresis on table and immediately post-procedure. Patient was shifted back to CCU on low dose inotropic support and nephrology was consulted again. Post procedure, patient required 3 sessions of haemodialysis (HD) due to unsatisfactory response to furosemide in the presence of deteriorating renal functions and pulmonary oedema. Patient responded to HD sessions and improved clinically. He was then discharged on guideline directed medical therapy with twice weekly sessions of HD. At 4 weeks follow-up in the outpatient clinic, he had significant normalisation of his functional status (resolution of shortness of breath and chest pain) and his Echo showed significant

improvement in LV systolic function of 45–50% with the continuous need for HD. At follow-up after 6 months, he had stable cardiovascular status with adequate urine output allowing him to discontinue HD.

3. Discussion

The management of heavily calcified coronary lesions (HCCL) presents as a significant clinical challenge for interventional cardiologists. To begin with, the geometry and rigidity of these calcified lesions make optimal device delivery and deployment difficult.² Furthermore, balloon dilatation of heavily calcified stenosis might also increase the risk of dissection or perforation.³

As a result, various devices and techniques have been developed to address these clinically relevant challenges. One such advancement is rotational atherectomy, in which a portion of the fibrous, calcified, inelastic plaque is crushed by using a rotating brass burr mounted on a flexible drive shaft and coated with diamond chips, thereby modifying the plaque compliance. This results in a smooth, non-endothelialized surface with intact media.^{4,5} Because of differential cutting, healthy vessel segments proximal and distal to the lesions remain unaffected. Following a successful rotational atherectomy, an open path is left for subsequent balloon angioplasty or stenting of the initial lesion.⁶

Though CABG is still the class I indication for unprotected left main coronary artery (LMCA) disease in current PCI guidelines, increasingly favourable PCI clinical results highlight the fact that PCI for unprotected left main has been upgraded to a class IIa or IIb alternative to CABG in anatomically suitable patients or those at a higher risk for surgical adverse events^{7,8} In actual practice, conservative thinking and local traditions usually prevent elderly patients with complex LM lesions from undergoing open heart surgery. On the other hand, well-performed PCI was associated with short procedure time, short duration of hospitalization, and faster recovery, which are very important in high risk patients, whereas bypass surgery in elderly patients with multiple co-morbidities could be associated with very high surgical risk.^{9,10}

In the drug-eluting stent (DES) era, the resurgence of rotational atherectomy (RA) particularly for very complex heavily calcified lesions,^{11,12} highlights the importance of plaque modifications before DES can be successfully deployed to exert the expected effects. The most common risks are acute no flow, severe vessel dissection with impending acute closure, athero-embolism, and transient profound

hypotension.¹³ Many coronary interventionists are intimidated by rota-ablation for these reasons. However, it is critical to anticipate and prevent these events while also dealing with them appropriately once they occur. On the other hand, thrombus-laden vessels, vessels with existing advanced dissections, last remaining vessels and saphenous venous grafts have traditionally been considered contraindications to rota-ablation therapy.^{14,15}

4. Conclusion

ST elevation MI, in the setting of advancing age, decompensated congestive heart failure and renal dysfunction adds to the complexity of any coronary intervention. Rotational atherectomy for severely calcified culprit lesions further adds to the existing challenges. Though, when the procedure is inevitable, through adequate planning and preparation, involvement of multi-disciplinary expertise and in the hands of experienced operators, we can significantly improve immediate and long-term outcomes. Use of bigger burr size, for debulking is helpful in lesion preparation and will make the lesion yield. Judicious use of contrast in such cases is helpful in minimising and managing post-op renal complications. At successful conclusion of such high risk procedures, we can significantly reduce the morbidity, mortality and frequent hospitalizations of the patients.

Consent statement

Written informed consent was obtained from the patient's next of kin to publish this report in accordance with the journal's patient consent policy.

Ethical disclosure

The authors declare that no experiments were performed on humans for this study.

Right to privacy and informed consent

The authors declare that complete privacy has been maintained regarding personal information of the patient. An informed consent was taken from the patient verbally over telephone.

Post note

The case was discussed as an oral presentation in Annual meeting of Combined EuroPCR 2021 for educational purposes.

Conflict of interest

There is no conflict of interest.

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