When the Stuck Burr is Stubborn: Retrieving an Entrapped Rotablator Burr Via a Step-by-Step Algorithm

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Abstract

Rotational atherectomy is an invaluable tool available for interventional cardiologists. Like any other procedure, risks of complications are present despite the care taken by the proceduralist. In the case of rotational atherectomy, burr entrapment is one such catastrophic complication. This case describes a complex percutaneous coronary intervention case that was complicated by burr entrapment. This case highlights the systematic method utilizing multiple techniques that was needed to free the entrapped burr.

Keywords: Rotational atherectomy; Stubborn; Algorithm; Coronary intervention case.

Introduction

Rotational atherectomy (RA) is an effective method of modifying severely calcified lesions. It is well accepted that RA is a vital tool for lesion preparation prior to stenting in heavily calcified stenoses. A rare and potentially catastrophic complication of RA is burr entrapment.

Although surgical removal is an effective option, open surgery is invasive and brings about its own risks. While there are case reports describing interventional management of percutaneous retrieval of the entrapped burr, these are few in numbers²-⁴. Authors present a case of the retrieval of an entrapped burr using previously described techniques in a stepwise progression.

Case report

The patient is an 84-year-old female with past medical history of diastolic heart failure who presented to the hospital for chest pain. The patient was admitted for ACS due to elevated troponins and electrocardiogram showing T wave inversions in lead III and V₆ without ST elevation or depression. Stress testing as part
of the initial workup showed high risk factors including severe inducible ischemia in the Left Anterior Descending (LAD) artery and a drop in ejection fraction, consistent with multivessel disease.

Next, coronary angiography was performed. The left main (LM) artery was severely calcified with a 90% ostial stenosis. The LAD was heavily calcified with multiple lesions, including 95% stenosis at the ostium with a tubular 70% stenosis mid-vessel, and the left circumflex (LCX) artery showed moderate diffuse disease and a 50% calcified stenosis at the vessel ostium (Figure 1.1).

Lastly, the Right Coronary Artery (RCA) showed moderate diffuse disease. Although coronary artery bypass graft (CABG) was recommended, the patient refused what would have been a high-risk surgery given patients poor functional capacity and comorbidities. Thus, a high-risk percutaneous coronary intervention (PCI) with Imeplla® and RA was offered.

Researchers’ initial intervention was with the mid-LAD lesion with 70% stenosis. An 8 Fr EBU 3.5 guiding catheter was successfully placed in the ostium of the LM. A 0.014 x 300 Hi-Torque balanced middleweight universal wire was placed across the LAD lesion. A 150 cm Turnpike® LP guide catheter was successfully placed in the ostium of the LAD. This was followed by a 0.009in/330cm RotaWire floppy wire placed across the lesion. A 1.50 mm RotaPro™ burr was used for RA. Three passes were made, and on the last pass authors noticed a deceleration as the burr was entrapped at the site of the calcified lesion (Figure 1.3). Researchers initially attempted gentle traction to pull back the Rotablator but were unsuccessful. Researchers tried to cut the shaft of the RotaPro™ burr and pulled gently while advancing the sleeve over it, however this also proved ineffective. Authors then attempted to free the Rotablator using balloons. Access was obtained with a micro-puncture into the Impella® sheath from the left femoral artery and authors advanced an EBU guide where authors wired the LAD using a Fielder® XT wire.

The initial attempt with balloon angioplasty was with a 1.5mm x 15mm Takeru™ RX balloon. The balloon was placed across the lesion and given a single inflation with maximal pressure of 12 ATM, however the balloon could not be advanced across the lesion (Figure 1.2).

The second attempt at balloon angioplasty was done with a 1.0 x 8 Sapphire® Pro II balloon. The balloon was placed across the lesion again, and was given two inflations with a maximum pressure of 10 ATM. However, authors were unable to advance across the lesion with this balloon as well. Lastly, researchers attempted to remove the RotaPro™ burr with a microsnare. A 6 Fr EBU 3.5 guiding catheter was placed with a 7 Fr Guidezilla™ guide extension successfully, allowing us to direct the catheter to the LAD ostium.

Authors then used a 4mm micro snare to pull on the RotaPro™ burr while advancing the guide liner to successfully retrieve it. After retrieval, researcher still felt it imperative to modify the calcified plaque in the mid-LAD. Researchers initially
guiding catheter to place a 0.014 in x 335 in ViperWire Advance® FlexTip wire in the LAD. A 1.25mm x 135cm Diamondback Coronary® with glide assist burr was then used to successfully complete orbital atherectomy. Authors employed a NC Quantum Apex™ RX (Figure 1.4) (2.5 x 15) balloon which was inflated several times with a maximum pressure of 12 ATM to complete the Resolute Onyx™ drug-eluting stent was advanced across the lesion and deployed with a single inflation with a maximum pressure of 16 ATM with good result. Authors were then able to complete the remaining lesion interventions successfully using a DK-crush technique for the LM bifurcation. Patient tolerated the procedure well despite brief periods of minimal flow to LAD and loss of pulsatility and remained hemodynamically stable and was weaned off patients Impella® in the lab. The patient had no complaints post-procedure and in subsequent follow-ups (Figure 1.5-1.7).

**Figure 1:** (1) Fluoroscopy pre percutaneous coronary intervention demonstrating multivessel disease. (2) Entrapped burr with second wire down; Guide-extension and unable to cross with balloon. (3) CSI®-orbital atherectomy. (4) Left Main Artery post modification (Area 13.2mm2) (5-7). Fluoroscopy post percutaneous coronary intervention demonstrating well-deployed stent.

**Discussion**

This case describes the importance of utilizing multiple methods to retrieve an entrapped burr. RA is an invaluable modality of PCI for complex and heavily calcified lesions. It is therefore imperative for operators that perform RA to have methods of releasing an ensnared Rotablator percutaneously. Few distinct methods to perform this have been presented, with techniques including using a balloon catheter and wedging a guiding catheter between the...
stuck burr and the vessel wall [3,4]. A methodology like ours in disassembling the Rotablator and then using a percutaneous snare to remove the burr has also been reported.

This method of releasing the burr can be useful when the guide wire of a balloon catheter cannot be advanced through the stenosed area and inflating the balloon proximal to the lesion does not free the ensnared burr. This method can also be used with a single access technique via micropuncture on an Impella® catheter for access, showing its efficacy in high-risk PCI.

**Conclusion**

Given the variability and complexity seen with each patient, interventional cardiologists using RA should be aware of the multitude of techniques available in burr retrieval and be able to utilize a step-by-step algorithm consisting of different modalities to ensure success.

**References**