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Rotational Atherectomy in Cardiology: Navigating the Intricate Landscape of Arterial Plaque

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INTRODUCTION

In the ever-evolving field of cardiology, innovative techniques continue to emerge, offering new perspectives on the management of Coronary Artery Disease (CAD). One such groundbreaking intervention is rotational atherectomy-a procedure that employs high-speed rotational devices to debulk and modify calcified plaque within coronary arteries. This article delves into the intricacies of rotational atherectomy, exploring its historical context, procedural nuances, clinical applications, and future directions. The evolution of coronary intervention witnessed several milestones, with the introduction of Percutaneous Transluminal Coronary Angioplasty (PTCA) marking a significant breakthrough. However, the presence of calcified and resistant lesions posed a challenge, paving the way for the development of rotational atherectomy as a solution to tackle these complex cases. Rotational atherectomy, also known as rotablation, was first introduced in the late 1980s by Dr. David Auth and Dr. Craig B. Thompson. The procedure aimed to address the limitations of traditional angioplasty in treating heavily calcified lesions, which often resisted balloon dilation. The core of rotational atherectomy lies in the deployment of specialized catheters equipped with a high-speed rotating burr at the distal end. The burr, typically diamond-coated, is connected to a motor that drives its rotation at speeds ranging from 140,000 to 200,000 Revolutions per Minute (RPM). As the burr rotates, it engages with the calcified plaque, grinding it into small particles.

DESCRIPTION

Patient selection for rotational atherectomy involves a thorough assessment of coronary anatomy, with imaging modalities such as angiography, Intravascular Ultrasound (IVUS), and Optical Coherence Tomography (OCT) providing valuable insights into the nature and extent of calcified lesions. Rotational atherectomy is particularly beneficial in cases of severely calcified lesions, which may be resistant to standard angioplasty techniques. Lesion characteristics, such as lesion length, degree of calcification, and vessel size, guide the decision-making process. The procedure begins with standard percutaneous access, followed by guidewire crossing of the target lesion. Rotational atherectomy is often employed as part of a larger Percutaneous Coronary Intervention (PCI) strategy. Choosing the appropriate burr size is crucial and is based on the vessel size and the degree of calcification. Undersizing or oversizing the burr can compromise the success of the procedure. Once the burr is in position, it is advanced through the calcified lesion while rotating at high speed. The ablation process is carefully monitored through angiography, and adjustments are made as needed to achieve optimal plaque modification. After rotational atherectomy, further assessment with angiography and intravascular imaging helps evaluate the result and guide subsequent interventions, such as balloon angioplasty and stent placement [1-4].

CONCLUSION

Rotational atherectomy has emerged as a crucial tool in the armamentarium of interventional cardiologists, providing a solution to the challenges posed by heavily calcified coronary lesions. As technology advances and our understanding of plaque modification deepens, the role of rotational atherectomy in coronary interventions is likely to evolve, contributing to improved outcomes for patients with complex coronary artery disease. While challenges and complications persist, ongoing research and innovation hold the promise of refining this technique, opening new frontiers in the field of interventional cardiology. Ongoing research focuses on refining burr design to enhance efficacy and safety. Improved materials, coatings, and modifications aim to optimize the performance of rotational atherectomy devices.

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CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

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