DRUG-ELUTING STENT SOLUTIONS

Improving Drug-Eluting Stent Outcomes With Proper Technique

This monthly column in Cath Lab Digest *reviews important points of distinction in drug-eluting stents, from characteristics to techniques, to provide valuable and relevant information about this technology.*

This article, the second of a two-part series on drug-eluting stent (DES) outcomes, focuses on the use of proper technique during an angioplasty procedure.

By Steven J. Yakubov, MD

Dr. Yakubov graduated from the Northeastern Ohio Universities College of Medicine and completed his internal medicine residency and chief medical residency at Riverside Methodist Hospital. He completed his cardiology fellowship at the University of Michigan Hospital and interventional cardiology fellowship at Riverside Methodist Hospital. He is the Medical Director of the MidWest Cardiology Research Foundation, which is participating in more than 40 clinical trials in interventional cardiology, peripheral vascular medicine, electrophysiology and clinical cardiology. Dr. Yakubov has authored or co-authored more than 40 publications.

Q **Recently, there has been an increased focus in the field of interventional cardiology on proper techniques. What has sparked renewed interest on this topic?**

A When drug-eluting stents (DES) were first introduced, restenosis rates were so low that the importance of technique was lost. Recent issues with stent thrombosis rates, particularly late-stent thrombosis rates, have reminded us that proper deployment and case selection are still very important. In fact, recent data suggests that approximately two-thirds of late-stent thrombosis cases with DES may be due to stent underexpansion[1], related to technical issues from post-dilatation, stent sizing and conformability.

Q **When is technique most important during an intervention?**

A Technique is important every step of the way. Before a procedure, case selection – determining how to approach a lesion – involves choosing the right wire as well as the right guide. Guidewire and guide catheter selection is especially important when treating complex lesions or if you think rotational atherectomy may be used. During a procedure, ensuring proper pre-dilation is essential for proper stent deployment. Finally, after a procedure, consideration of intravascular ultrasound (IVUS) for determining proper stent expansion is an option.

Q **How does lesion assessment and preparation assist in maximizing outcomes?**

A Prior to dilatation, it is essential to understand the size of the vessel and the morphology and characteristics of the lesion. By carefully assessing the size of the artery and lesion characteristics, you can select a stent that spans from a normal segment of the vessel to another normal segment, containing the entire lesion within the stent. If diseased areas at the edges of the stent are fully covered, this positively impacts stenosis and reduces the likelihood of restenosis.

You can visually assess the width and length of a lesion in a number of ways. Some physicians prefer to use angiography or marker wires, while others use the length of the pre-dilatation balloon. IVUS is another tool that allows you to assess the size of the vessel. This is useful for measuring the degree of stenosis, especially when angiography leaves you with less than a clear answer. IVUS may also be helpful for determining the correct stent is selected, as angiography often under-sizes the lesion.

Q **After making your initial lesion assessment, what techniques do you typically employ?**

It depends on the type of lesion. From a technical standpoint, most lesions can

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A be pre-treated with balloon angioplasty alone. I use a Cutting Balloon® Device in patients who do not have circumferential calcification but whose lesions are harder to fully dilate with a balloon alone, or in those who have a lesion in which the plaque appears to be more fibrous. Ostial lesions present a unique problem. Often a Cutting Balloon is a very useful adjunctive device in dilation of those lesions. At our institution, rotational atherectomy is used in a minority of cases, most often in patients who could not be dilated with a balloon. In these cases, it is an essential device.

Q What methods do you find most important during DES implantation, and why are these methods important?

A The methods that I find most important are full expansion of the balloon delivery system and high-pressure post-dilatation. Both help ensure that a stent is well apposed and fully expanded at all aspects of the stent, thus maximizing drug delivery to the arterial lumen. This reduces the likelihood of restenosis and increases the overall probability of a positive outcome (Figure 1). Using high-pressure inflation during stent deployment increases the likeli-

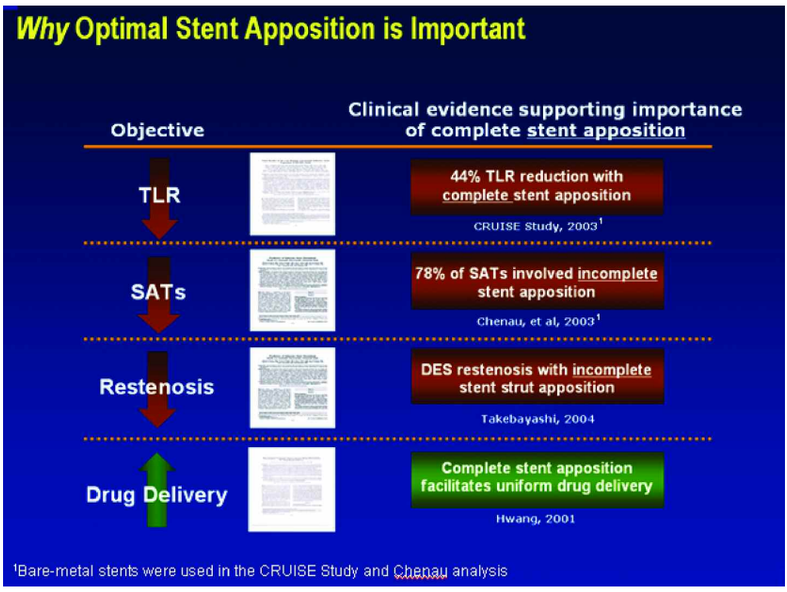

Figure 1.

hood of complete stent apposition. We rarely deploy a DES under 16 atmospheres (atm) of pressure. Most commonly, we use 16 atm or above to get the best apposition of the stent in that particular artery, and we rarely deviate from this standard.

Q Are there additional tools you utilize after stent implantation to increase the likelihood of a good DES outcome?

A Post-implantation, IVUS is helpful in providing a detailed look at the stent. This gives us a great idea if the stent has full apposition in all areas of the lesion. IVUS can also be useful when patients come back with restenosis to help define its mechanism, as well as to characterize the type of lesion and the true size of the artery that was treated.

Q How do cath lab staff contribute to improving technique during an intervention?

A Technologists and nurses are instrumental to a procedure. It's very helpful to have another set of experienced eyes looking at the same case, especially challenging ones. Familiarity with all of the devices – especially those used less frequently but that are essential during a procedure, such as rotational atherectomy – is extremely important. Many technologists have an in-depth understanding of IVUS and how it correlates to angiographic findings. Their technical prowess with devices and focus on proper technique continuously improves outcomes.

1. *Journal of the American College of Cardiology*, Volume 45, Issue 7, 5 April 2005, Pages 995-998.