

DRUG-ELUTING STENT SOLUTIONS

Drug-Eluting Stent Outcomes with IVUS

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

This article, the first of a two-part series on drug-eluting stent (DES) outcomes, focuses on the use of intravascular ultrasound (IVUS) during an angioplasty procedure.

By Dr. James M. Ritter

Dr. Ritter graduated from Thomas Jefferson University in 1986 and has practiced interventional cardiology at Christiana Care in Wilmington, Delaware, since 1989, currently serving as co-director of the interventional lab and participating in clinical trials for new devices.

Q The field of interventional cardiology has drastically evolved over the past 30 years. Where have you seen the most evolution?

A From my standpoint, the evolution from angioplasty to stenting has had the most impact on the field of interventional cardiology, resulting in safer interventions that can be performed on more complex lesions. More recently, there has been a dramatic improvement in rates of restenosis and target vessel revascularization (TVR). Studies of bare-metal stents (BMS) have demonstrated that IVUS has played a role in improving these interventional results. IVUS has also been a key tool in evaluating new technologies and verifying their efficacy and safety.

Q How does IVUS differ from angiography, and why would you choose to use both?

A Angiography is a good starting point, providing information on the general condition of the coronary tree, but if you routinely rely on angiograms alone, you are going to inaccurately characterize a significant number of lesions. IVUS offers much more specific information in regards to disease and plaque significance, giving you a better picture of lesion severity, reference vessel diameter and lesion length (Figure 1). An example of this was highlighted in the CRUISE Study¹, where approximately 50% of patients with normal angiograms were shown to have plaque deposits under IVUS. The detailed information IVUS provides can guide your procedure to help determine the type of intervention that best suits your patient.

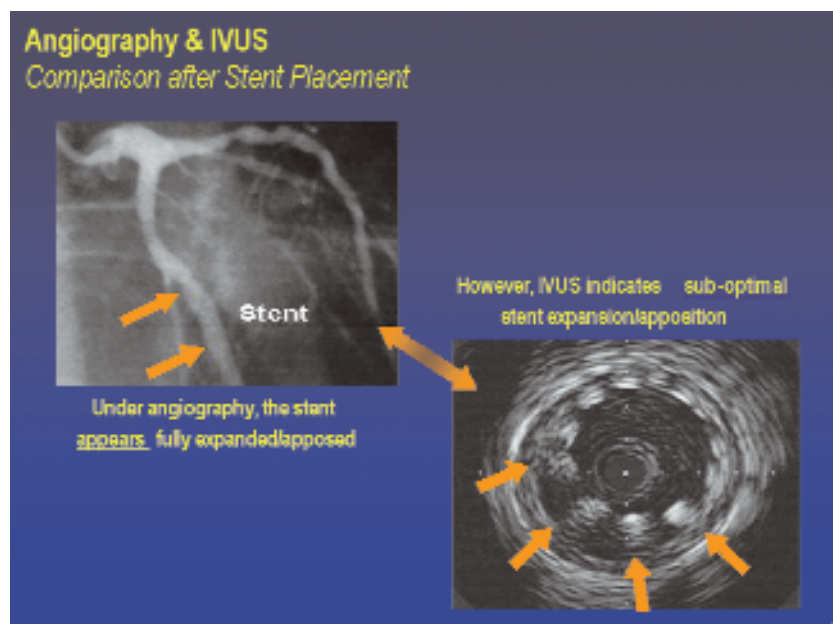


Figure 1. Comparison between angiography and IVUS after stent placement.

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For example, longer stents (over 16 mm) may look quite good on an angiogram, but I have found IVUS commonly reveals under-expansion of the central portion of a stent. As a result, I've adopted high-pressure balloon inflation with relatively short balloons inside stents of 20 mm or longer. Recently, I placed a stent in a patient with a discrete critical left anterior descending (LAD) stenosis. After stenting, the result looked good upon angiography, but when I performed IVUS, I was able to identify a much more significant segment of disease more distal in the vessel. I had originally planned to treat the patient medically, but based on IVUS, I stented that segment as well.

Q Prior to stent implantation, is it important to utilize IVUS? What about after stent placement?

A Prior to stent implantation, there may be questions about lesion severity or content, particularly in regards to calcification and lesion length, that angiography cannot answer. You may also have difficulty selecting the appropriate stent length and diameter for a relatively diffusely diseased vessel. For example, in challenging lesions, IVUS is extremely helpful to determine the severity of the disease and then assist during an intervention, if chosen as the preferred treatment. Furthermore, several BMS trials and registries^{1,2} have demonstrated that myocardial adverse events and rates of TVR and restenosis are lower in IVUS-guided interventions compared to angiogram-guided interventions.

IVUS is also important after stent placement. A study published in 2006 by Dr. Ron Waksman³ found that up to 80% percent of DES may be inadequately deployed, leaving a significant number of patients with sub-optimally deployed stents. IVUS can help address this problem by reducing the number of sub-optimally deployed stents, which should positively affect or reduce the risk of restenosis.

Q Are there any misconceptions your peers may have in regards to IVUS?

A IVUS is often perceived to be time-consuming, which discourages some operators. However, as you and your staff become more familiar with IVUS, it becomes a relatively seamless part of a procedure. Additionally, many interventionalists are not aware that IVUS is a cost-effective procedure, especially if subsequent procedures are avoided.

Q Where have you seen improvements in IVUS over the past few years?

A I think Boston Scientific's iLab™ Intravascular Ultrasound Imaging System is going to address many of the current shortcomings of IVUS, making the technology easier and less time-consuming to use. The iLab System can be permanently installed as a plug-and-play device in the cath lab, which reduces set-up time and gives interventionalists the ability to obtain tableside measurements and view images on cath lab monitors.

Q Do you have any additional insights?

A I think IVUS is an under-utilized technology. Particularly in the DES era, I would hope that IVUS is going to aid in minimizing some of the complications we have seen with stents. Stents have been a great advance in interventional cardiology, but I think it is still incumbent upon the interventional cardiologist to ensure that each patient leaves the cath lab with an optimally deployed stent.

References

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2. Kasaoka S, Tobis JM, Akiyama T, et al. Angiographic and intravascular ultrasound predictors of in-stent restenosis. *J Am Coll Cardiol* 1998;32:1630-1635.
3. Waksman R, et al. Comparison of paclitaxel-eluting stent and sirolimus-eluting stent expansion at incremental delivery pressures. *Cardiovasc Revasc Med* 2006;7:208-211.

Visit www.bostonscientific.com to view the instructions for use of the iLab™ Intravascular Ultrasound Imaging System.

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