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Editorial Comment

Not All Stents Are Created Equal

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The accompanying article by Nicosia et al. [1] documents three cases in which intravascular ultrasound (IVUS) imaging of a tantalum coil stent produced disruption of the stent architecture with compromise of blood flow in one of the cases. This report emphasizes the concern for safety when using IVUS imaging catheters. This issue is of significant concern to interventionalists and especially to those who are just starting to use this technology and may not be familiar with some of the handling characteristics.

In general, IVUS imaging can be performed safely. In a retrospective registry of over 2,200 cases, vessel spasm was the most frequent complication (2.9%) of IVUS studies [2]. Vessel spasm and angina are quickly reversible by removing the catheter and infusing nitroglycerin. Significant complications such as acute occlusion, dissection, or arrhythmias developed in less than 1% of patients and major complications such as myocardial infarction or emergency bypass surgery occurred in only 0.3%. Most of these complications have occurred when using IVUS as a diagnostic tool prior to an intervention when the artery lumen is still severely compromised or following an interventional procedure such as balloon dilatation or atherectomy that may leave dissections on which the ultrasound catheter may get caught. In some devices, the plastic sheath is not tapered, which may lead to the catheter catching on a flap or a rigid stented wall. With ultrasound catheters where the plastic tip is tapered in a monorail design, the catheter may separate from the guidewire, which can lead to buckling of the plastic sheath which could traumatize the artery.

With respect to coronary artery stents, the Palmaz-Schatz slotted tubular design has been remarkably resistant to catheter trauma by ultrasound imaging catheters. Although occasionally it may be difficult to pass an ultrasound catheter through a rigid section of the stent, especially when there is an angle at the entrance to the stent, this almost never results in dislodgement of the stent itself (Fig. 1). Frequently the ultrasound catheter can be advanced by redirecting the guiding catheter and guidewire to change the angle of entry into the stent. When coil stents, such as the Gianturco-Roubin design, are imaged by IVUS there have been anecdotal reports of dislodgement of the coils which are not as rigid or compressed against the wall as the slotted tubular design (Fig. 2). This has led some investigators to be wary of imaging coiled stents with IVUS catheters, however, we have found if one is cautious, the coiled stents can be imaged quite satisfactorily.

The fundamental lesson is that one should never force the ultrasound sheath through a stent but that the catheter should slide through the artery over the guidewire with minimal force. If the ultrasound catheter does not advance with minimal pressure then the study should be stopped. In the accompanying article [1] the authors describe another type of coiled stent design which has the benefit of being radiopaque, although occasionally this interferes with the angiographic assessment of the lumen size. This is precisely the situation where it might be reassuring to visualize the stented zone from within the artery to ensure adequate deployment. Clearly there must be a compromise between the added information gained by ultrasound imaging and the risk of trauma to the stent by using another device. There are close to 20 stent designs that are in the process of clinical assessment, each with potentially different benefits and limitations. During this period of experimentation with new stent shapes and compositions, we will learn that some may be more susceptible to catching balloon folds or ultrasound catheters. It is appropriate for interventionalists to be aware of potential complications that can occur as documented in these case reports. The incidence of this complication can be kept to a minimum if the operator understands that ultrasound catheters should not be forced through a lesion but must follow the guidewire with a minimal amount of forward pressure. In addition, it is important to understand that this complication is more likely to occur with certain stent designs, such as the coiled stent.

REFERENCES
