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Editorial Comment

"QCA and the Emperor's New Clothes"

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In the accompanying article, Blasini et al. raise interesting issues for interventional cardiologists, comparing angiography and intravascular ultrasound (IVUS) for assessing lumen size after coronary artery stent placement [1]. In 225 patients who had Palmaz-Schatz stents placed, angiography over-estimated the minimum lumen diameter relative to IVUS imaging by a mean of 0.4 ± 0.4 mm. The difference was significant if inflations were performed with lower pressures and the difference was negligible after high-pressure inflations. I would like to comment on three issues stimulated by this article.

Both clinical studies and in vitro analyses have demonstrated that where angiography and IVUS disagree, it is likely that ultrasound is the more accurate descriptor of reality. One reason for this is that IVUS provides a technique for imaging from within the lumen that overcomes the problem of projection imaging, such as angiography, where overlap of vessels and tortuosity may not permit an accurate assessment of stenosis. In addition, there are significant magnification assumptions when using the guiding catheter as the ruler. A 2.7 mm guide catheter represents only 11 pixels in a 640 by 480 pixel matrix. Thus, measuring an artery of between 1 mm and 4 mm, one could easily be off by 1 or 2 pixels or nearly 10% of the ruler. With IVUS imaging, the ''ruler'' is inherent to the image and is based on the speed of sound in tissue at 37°C. These observations suggest that quantitative coronary angiography has been given too much credence in our literature and design of studies. It is like trying to make 3 decimal place accuracy out of a technique whose scale may be off by several tenths of a millimeter. We confuse the reproducibility that computerized measurements provide with accuracy in representing complex luminal topography.

The second issue that this article raises is the concern for potential trauma from high-pressure inflations. Although this study showed a better correlation between IVUS and QCA at higher-pressure inflations, there has been significant concern that higher-pressure inflations may lead to increased trauma and a higher restenosis rate. This was a valid concern several years ago when longer balloons had to be used, but this may be less of a problem now that industry provides shorter balloons whose shoulder approximates the true length of the stent. In the United States, we are still constrained by using an archaic stent delivery system; therefore, we cannot be certain if the punch-out balloon is repositioned exactly where the stent was deployed. Interventionalists throughout Europe hand crimp stents onto high-pressure balloons. The deployment is facilitated because the profile of the device is smaller and the likelihood of deploying the high pressure only within the stent is increased.

The third issue that this article raises is that in the current era of high-pressure balloon inflations following stent delivery, the incidence of subacute stent thrombosis is approximately 1%, whether or not IVUS imaging is used. The question is whether IVUS may improve the restenosis rate by optimizing the primary stent result. Although Blasini et al. do not provide any restenosis data, their improved minimum lumen diameter following IVUS imaging would predict a lower restenosis rate. Our analysis of 750 patients with follow-up angiography suggests that by optimizing the intrastent lumen cross-sectional area, there is a significant benefit of IVUS imaging to decrease restenosis (unpublished data).

I have raised just three concerns that were stimulated by this article. Blasini and his co-workers should be congratulated for the fine work that adds significant data to this continuing scientific debate.

REFERENCES

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