Risk Factor Management and the Interventionalist: Treating the Patient, Not Just the Lesion

Based on a presentation by Jeffrey J. Popma, MD

Presentation Summary

Interventional cardiologists focus their treatments on fixed obstructions, but atherosclerosis is a ubiquitous, diffuse process that involves the coronary tree. Angiography fails to detect widespread calcification in arteries, the presence of which correlates with atherosclerotic burden. Focusing only on angiography results and on the target lesion is misdirected. Cardiac events following revascularization are due to obstructions other than those at the original target site. Therefore, efforts should focus on strategies to reduce risk following revascularization.

Interventional cardiologists are trained to treat fixed coronary stenoses using stents, PTCA, or bypass surgery. However, said Jeffrey J. Popma, MD, Executive Director of the Cardiology Research Foundation at the Washington Cardiology Center in Washington, DC, this approach focuses on only part of the problem. Atherosclerosis is a ubiquitous process in patients undergoing coronary intervention and many important factors warrant attention, Dr. Popma explained. Calcification is important, especially the subtle calcifications seen on normal coronary arteriograms. Coronary events that occur following PTCA often occur at sites other than those where balloons and stents were used.

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"I want to emphasize that perhaps the most important patients are those who have been in the system for a while but who may require further care: that is, patients who have undergone coronary bypass surgery," he told listeners.

A decade ago, Dr. Popma explained, it was hypothesized that the development of atherosclerosis was as follows: the coronary arteries are normal at first, then they dilate in a compensatory fashion as atherosclerosis develops within the lumen; the arteries fill up with plaque, and 10 or 20 years later, focal atherosclerotic accumulation causes symptomatic coronary stenosis.

Ultrasound for Detection of Calcification

Use of intracoronary or intravascular ultrasound enables imaging the artery from inside out and visualizing what is

compromising the lumen, whereas angiogram visualizes the artery from outside in, he explained. Figure 1 shows a cross-section of a coronary artery that appears normal on angiography. However, on closer inspection, the lumen, which looks normal angiographically, is 70% full of atherosclerotic plaque.

"Atherosclerosis is a ubiquitous, diffuse process. Only 7% of referenced vessels in patients who present with symptomatic atherosclerotic disease are free of atherosclerotic plaque," said Dr. Popma.

Angiography underestimates the degree of atherosclerotic plaque, which is a problem for interventional cardiologists who look at reference vessels to determine degree of atherosclerosis. It is difficult to detect the full extent of atherosclerosis, because it can be present yet not evident on angiography. Plaque composition is an important factor, especially areas of calcification. Ultrasound can detect calcifications not seen on angiography, but it is difficult to treat areas of focal calcification with present techniques, Dr. Popma observed.

"The presence of calcification, as assessed by intravascular ultrasound, is one of the most important predictors of plaque burden in an artery. The degree and severity of calcifications increases with the plaque burden," he said.

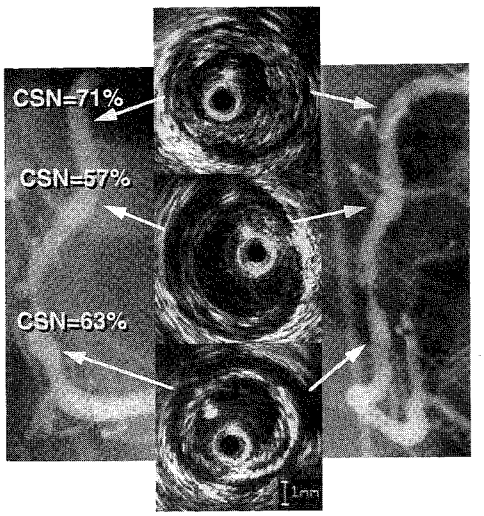
Restenosis

Atherectomy is assumed to remove the atherosclerotic plaque and thereby reduce the chances of restenosis. However, although an excellent, almost perfect angiographic result can be obtained with atherectomy, 55% to 65% of the vessel is still filled with atherosclerotic plaque, said Dr. Popma. The assumption that restenosis is due to intimal hyperplasia appears to be incorrect. In fact, sequential intravascular ultrasound has shown that the artery remodels and shrinks in size. The majority of lumen loss that occurs after coronary intervention and causes recurrent symptoms is due to the fact that the artery renarrows, which is missed on angiogram.

"There is a marked reduction in arterial size due to traumatic injury," he explained.

Interventional cardiologists are disappointed when restenosis occurs, because it means that their procedures didn't work. It was believed that as long as the blockage was removed and did not recur, the patient was helped.

Figure 1. Demonstration of Relatively Normal Appearing Segments (arrows) in the Right Coronary Artery



The central panels are cross-sections of the artery seen by intravascular ultrasound images demonstrating a substantial accumulation of atherosclerotic plaque in the region of the apparently normal angiographic lumen.

"If all we worry about is whether the target lesion recurs and the patient requires revascularization, we will have missed the fact that patients die of myocardial infarction and progression of disease," he emphasized.

Events Related to Other Sites

A study of 1246 patients undergoing balloon angioplasty provided important epidemiologic information about what happens to patients after coronary angioplasty.[1] The study showed that stenosis at the initial angioplasty site did

not recur, but events unrelated to the target site also occurred throughout the entire 12-month follow-up period.

Patients who have had bypass surgery appear to be at high risk. A survey at the Washington Hospital Center included 2200 patients who had native vessel angioplasty or coronary bypass with saphenous vein grafts.[2] Demographic data showed that these patients were predominantly male, older, had more coexisting cardiovascular disease, more diabetes, and recent MI. These patients were sicker to begin with, but they did not fare well following a coronary intervention procedure. Within 1 year of coronary intervention, 6.2% died or experienced an MI.

"For a long time," Dr. Popma told listeners, "interventional cardiologists such as myself thought we were doing the correct thing by simply looking at angiograms and at the treated area of the artery, and we missed a tremendous amount of information about our patients."

Dr. Popma and his colleagues are now committed to risk factor reduction as an essential part of management following coronary intervention procedures. Risk factor reduction may not prevent restenosis, but it will prevent death from MI or revascularization at sites of progression of atherosclerotic disease, he concluded.

··· REFERENCES ···

1. Kent KM, Williams DO, King SB, et al. Acute procedural and angiographic outcome in the angiopeptin for the prevention of restenosis after directional coronary atherectomy trial. *Circulation* 1993;88:I-546.

2. Popma JJ, Hong MK, Merritt AJ, et al. Early and late outcome after new device angioplasty of saphenous vein graft versus native coronary arteries. *Circulation* 1993;88:I-24.