

# With the Solution in Sight

By Hildegard Kaulen, PhD

It is not unusual to find stenoses at sites where coronary arteries divide into two important branches. However, due to the complex and variable anatomy, angioplasty in such areas is fraught with difficulties. In addition, clinical results are compromised when the side branch has to be treated in addition to the main branch and more than one stent is required. *Medical Solutions* talked to Professor Josef Ludwig, MD, a cardiologist at the University Hospital at the Friedrich-Alexander-University Erlangen-Nuremberg, Germany, about the last meeting of the European Bifurcation Club, the best treatment of bifurcation lesions, and the future of drug-eluting stents.

## **A few weeks ago, the European Bifurcation Club met in Rome for the second time. How was the meeting?**

LUDWIG: It was very interesting. We covered quite a bit of ground in the area of treatment recommendations. The sentence: "The opposite of simple is not complicated, but wrong," aptly sums up our recommendations. Whenever possible, in the case of bifurcation lesions, only the main branch should receive a stent and the side branch should not be touched. In 70 percent of all cases, the hemodynamics in the side branch will be sufficient after stenting of the main branch. Thus, most bifurcation lesions require only one stent. This is what we mean by 'simple.'

## **This concept, however, does not apply to all lesions near bifurcations?**

LUDWIG: I fully agree with you. For this reason, we have developed a treatment algorithm. In this decision tree, not only do the the number, location, and lesion morphology play a role, but also anatomi-

cal details, such as the vessel diameter and the true bifurcation angle. The disease burden in the main and side branch is also decisive.

## **What does this treatment algorithm look like?**

LUDWIG: I have already mentioned one important point. For bifurcations, the first stent is placed into the main branch. This concludes the efforts for two-thirds of all interventions, which is an important change compared to earlier procedures that involved far more than the current approach. If the lumen of the side branch is constricted by more than 75 percent after the main branch has been supplied, this vascular section has to be treated as well. As a first step, balloon dilatation is used to eliminate the stenosis. If this is unsuccessful, the side branch needs a stent as well. The preferred technique is known as provisional T-stenting. The stent for the side branch is passed through the large mesh of the stent in the main branch.

## **What role does the bifurcation angle play? Does it make a difference whether the stent is inserted into a side branch at a 90- or 45-degree angle?**

LUDWIG: This is exactly the point that determines which approach will be used. If the bifurcation angle lies at 90 degrees or slightly below – the bifurcation is T-shaped – the stent is placed close to the ostium, that is, at the origin of the side branch. T-stenting provides for good coverage of the vessel wall in this region. If the angle is very narrow – the bifurcation is Y-shaped – it is not that simple. The stent would either extend too far into the main branch so that the flow characteristics of the blood would change, or cover-

age of the ostium would be insufficient, resulting in early restenosis. In the case of very narrow bifurcation angles, the stent has to be placed using the crush technique. For this purpose, the walls of the two stents are firmly pressed together where they overlap at the height of the ostium and are then pressed against the vessel wall.

## **Are the other techniques for placing bifurcation stents, the culotte or the kissing stent methods, for example, no longer used?**

LUDWIG: Their importance is negligible. With both techniques, two stents are placed in the main branch. In the case of the culotte technique, they slide into one another; with the kissing stent technique, they lie side by side. This increases the metallic load in the main branch, which increases the risk of an in-stent thrombosis.

## **The use of T-stenting or the crush technique is decided by the bifurcation angle. How do you determine this angle?**

LUDWIG: It is not possible to reliably estimate the angle from a two-dimensional angiogram. For this reason, we had to rely, until now, on additional information provided by computed tomography. However, the *syngo*® IC3D software from Siemens Medical Solutions now enables us to determine the bifurcation angle online in the cath lab. We need nothing more than the views that are acquired in the course of intervention. The software uses the information and, within seconds, computes the three-dimensional geometry of the vessels, including the data for the bifurcation angle and the vessel diameter.



Professor Josef Ludwig, MD, is a member of the European Bifurcation Club, and an expert on treating complex bifurcation lesions.



#### How does *syngo* IC3D work?

LUDWIG: Three-dimensional reconstruction requires two views spaced at a 30 degree angle. The software provides useful suggestions. To increase the accuracy of the reconstruction, a third view can be added. Again, the software provides suggestions. The three-dimensional model is created online in the cath lab. The computation does not interfere with our normal workflow. Not only does *syngo* IC3D provide us with precise information regarding the bifurcation angle, we also avoid vessel overlapping effects and significant foreshortening, which could affect clinical results. Our data are highly promising. We are in the process of starting a large multicenter study to fully fathom the clinical relevance of *syngo* IC3D.

#### One more question with respect to drug-eluting stents. Euphoria was followed by disillusion. After four years, cardiac lethality increased by a magnitude of 1.2, overall lethality by a magnitude of 1.5. How do you interpret the data?

LUDWIG: These data have to be taken very seriously, but there is no need for hysteria. The most important message is that we have to continue dual anti-thrombotic therapy with Aspirin® and clopidogrel longer than before. For the sirolimus-eluting stent, a three-month therapy was prescribed; for the paclitaxel-eluting stent it was extended to six months. Obviously, this is not long enough. By now, American medical associations recommend a 12-month therapy.



*The interview with Professor Ludwig was held in Erlangen, Germany, by Hildegard Kaulen, PhD, journalist for medicine and the sciences.*