Current and Future Clinical Applications of Drug-Coated Balloons

Written by ***Toni Rizzo***

Drug-coated balloons (DCB) offer homogeneous drug distribution to the vessel wall without the need for a permanent implant. Bruno Scheller, MD, Universitätsklinikum des Saarlandes, Homburg/Saar, Germany, discussed issues related to DCB development and evidence.

Endovascular Indications

In the Local Taxane with Short Time Contact for Reduction of Restenosis in Distal Arteries [THUNDER; Tepe G et al. *N Engl J Med* 2008] trial, patients with femoropopliteal artery stenosis or occlusion were randomly assigned to treatment with paclitaxel-coated balloons (n=48), uncoated balloons with paclitaxel in the contrast medium (n=52), or uncoated balloons without paclitaxel (control; n=54). Mean late lumen loss at 6 months was significantly lower in the paclitaxel-coated balloon group (0.4 mm) versus the control group (1.7 mm; p<0.001).

In five trials of DCB versus percutaneous transluminal angioplasty (PTA) in the superficial femoral artery (SFA), patients treated with DCB had significantly reduced restenosis at 6 and 12 months and clinical and functional benefit maintained up to 2 or more years [BIOLUX P-I, NCT01221610; FEMPac, NCT00472472; LEVANT I, NCT00930813; PACIFIER, NCT01083030; THUNDER, NCT00156624]. A subanalysis of the Paclitaxel-coated Balloons in Femoral Indication to Defeat Restenosis [PACIFIER] trial showed that DCB benefited patients with de novo stenosis and total occlusion in the SFA, independent of lesion length [Werk M et al. *Circ Cardiovasc Int* 2012. In press].

A nonrandomized study of patients with below-the-knee (BTK) lesions ~17 to 18 cm long reported a restenosis rate after 3 months of 27.4% with DCB versus 69% with PTA [Schmidt A et al. *Cath Card* Int 2010; Schmidt A et al. *J Am Coll Cardiol* 2011]. The randomized Drug Eluting Balloon in Peripheral Intervention for Below the Knee Angioplasty Evaluation [DEBATE-BTK; NCT01558505] trial demonstrated significantly reduced 12-month restenosis and reocclusion with DCB versus conventional balloon angioplasty in patients with diabetes and critical limb ischemia [Liistro F et al. LINC 2012].

In a nonrandomized series of patients with intracranial in-stent restenosis (ISR), high-grade restenosis rate occurred in 9% with DCB versus 50% with conventional balloon treatment [Vajda Z et al. *Am J Neuroradiol* 2011]. In patients with arteriovenous fistulas, target lesion primary patency was 70% with DCB versus 25% with conventional balloon at 6 months (p<0.001) [Karnabatidis D. CIRSE 2011 Abstract 1905.3].

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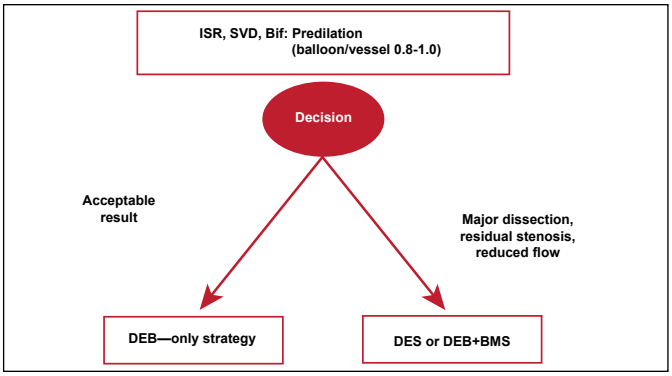
Coronary Indications

Compared with implantation of another DES, DCBs for coronary ISR may eliminate the need for a second or third stent, and reduce the need for prolonged dual antiplatelet therapy. Scheller et al. [*N Engl J Med* 2006] found that in-segment late lumen loss in DES patients treated for ISR was 0.03 mm with DCB versus 0.74 mm with a conventional balloon. Follow-up to 6 years demonstrated reduced target lesion revascularization with DCB (9.3%) versus conventional balloon (38.9%; p=0.004) [Scheller B et al. *JACC Cardiovasc Interv* 2012]. In patients with coronary ISR from a bare-metal stent (BMS), Unverdorben et al. [*Circulation* 2009] reported reduced in-stent late loss (0.19 mm vs 0.45 mm; p=0.01), in-segment late loss (0.17 mm vs 0.38 mm; p=0.03), and in-segment restenosis (7.0% vs 20.3%; p=0.06) with DCB versus DES.

Patients with sirolimus-eluting ISR had significantly reduced restenosis (8.7% vs 62.5%; p=0.0001) with DCB versus a conventional balloon [Habara S et al. *JACC Cardiovasc Interv* 2011]. The Paclitaxel-Eluting PTCA-Balloon Catheter to Treat Small Vessel Coronary Artery Disease [PEPCAD I; Unverdorben M et al. *Clin Res Cardiol* 2010] study in patients with de novo coronary lesions reported 6-month restenosis of ~5.5% with DCB and ~45% with DCB plus bare-metal stent (p=0.0001 for both).

The German consensus group recommendations for DCB use are shown in Figure 1 [Kleber FX et al. *EuroIntervention* 2011].

Figure 1. German Consensus Group Recommendations for DCB Use.



Source: Kleber FX et al. *EuroIntervention* 2011.

DCBs can be used for a variety of endovascular and coronary indications. Results thus far have been promising for both endovascular therapy and treatment of ISR in the coronary bed. De novo disease is more of a challenge but trials are ongoing to clarify DCB use for this indication. Prof. Scheller said that DCBs are not a replacement for DES but may become an important new option in endovascular and coronary intervention. Compared with bioabsorbable stents, DCB have much better evidence from randomized clinical trials and large registries. However, both methods appear complementary toward the goal of avoiding permanent implants. According to Prof. Scheller, DCB and bioabsorbable stents represent technology for a new age of vascular therapy with the aim of leaving nothing behind.

Interventional Stroke Therapy: Unraveling the Gordian Knot

Written by ***Toni Rizzo***

In a plenary session, Jacques Moret, MD, Beaujon University Hospital, Clichy, France, made an impassioned plea to interventional cardiologists and interventional radiologists to join neurologists in treating stroke patients. World Health Organization statistics show that in 2000, 1.1 million stroke events occurred in Europe. With a growing population aged >65, more than 1.5 million annual stroke events are expected in Europe by the year 2025 [Truelsen T et al. *Eur J Neurol* 2006]. Neurologists and interventional neuroradiologists are treating increasing numbers of patients with stroke for a variety of reasons, but patient care should be the most important reason. In some countries, interventional cardiologists have become more involved in stroke care.

Prof. Moret predicts that over the next few years, mechanical thrombectomy will become the preferred treatment for acute ischemic stroke. Comparing medical thrombolysis with mechanical thrombectomy is like comparing "driving a horse[-drawn] cart and piloting a space shuttle." Treatment of stroke with chemical thrombolysis is relatively straight forward and predicated on dosing algorithms, while successful mechanical thrombectomy requires a skilled operator with technical proficiency. A busy center performs 120 to 150 thrombectomies per year and employs 3 to 4 interventionalists, meaning that each operator will perform approximately 40 procedures per year. According to Prof. Moret, skilled, safe, and upgraded procedures cannot be performed with so little practice.

In some places, the growth of mechanical thrombectomy has led to a potential shortage of interventional neuroradiologists capable of performing these procedures. Prof. Moret proposed that interventional cardiologists as well as interventional radiologists, become involved in performing mechanical thrombectomy to help fill critical voids where they exist. Interventional cardiologists and interventional radiologists are skilled at endovascular interventional procedures, whereas neurologists do not have this expertise. There is commonality among interventional cardiologists and radiologists, as both contend with many of the same situations, including medical emergencies, acute thrombosis, and management of adjunctive antithrombotic therapy. By using new technology such as computed tomography angiography to visualize the cerebral vessels, the proximal and distal vessel around the clot can be better evaluated and a stent retriever system can be delivered with optimal control of the distal end.

Selecting appropriate stroke patients for mechanical thrombectomy, as well as optimizing medical management for these patients, will continue to be the primary responsibility of neurologists. However, Prof. Moret believes that interventional cardiologists and radiologists can and should become more involved. "When mechanical thrombectomy is indicated, there is no place for doctors lacking skill," said Prof. Moret. Interventional neuroradiologists, radiologists, and cardiologists should be involved in performing mechanical thrombectomies, with the primary goal being better patient care.