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Are DCBs a Durable Solution?

A discussion of DCB durability and superiority in the context of 2-year data.

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When CE Mark approval was first given to drug-eluting stents (DESs) followed by drug-coated balloons (DCBs), the nonsurgical treatment of occlusive disease in the femoropopliteal arterial bed started to come of age. The ability to reduce repeat interventions in some patient populations, even without the need for a metal scaffold, is particularly attractive in the femoropopliteal region, where the risk of restenosis is especially high due to the presence of high mechanical forces.

SUPERIORITY OF DCBs OVER PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY

Paclitaxel without any polymeric coating was first approved on a self-expanding nitinol stent platform (Zilver PTX, Cook Medical) in late 2009. Level 1 randomized controlled trial data demonstrated an improvement in patency and target lesion revascularization (TLR) compared to both percutaneous transluminal angioplasty (PTA) and bare-metal stents at 12-months, and these outcomes have continued to 5 years of follow-up.[1,2] However, the use of a stent in the lower extremity, regardless of the presence of an antiproliferative agent, remains somewhat controversial due to early platforms being associated with stent fractures. Fortunately, data from later generations of stents have seen dramatic reductions—although not the elimination—of fractures. Real-world data recently published on the use of DESs in Japan demonstrated a less complex pattern of stent restenosis, as well as its subsequent retreatment. The first two attempts at using nonpaclitaxel polymer-based stents in the SIROCCO and STRIDES trials did not produce positive results.[3,4] There has always been a question of the quality of the polymers used on the stents in these trials, as well as the decision not to use paclitaxel. The recently published 2-year results from the MAJESTIC trial showed a freedom from TLR rate of 92.5% utilizing the polymer-based Eluvia Drug-Eluting Vascular Stent System (Boston Scientific Corporation), and they appear to be to very promising.[5] Certainly if longer-term results hold up in a randomized trial the way Zilver PTX's did, the argument for stent utilization will become even stronger.

Two large United States–based pivotal trials have demonstrated superiority of DCBs over PTA in claudicants, and several ongoing registries are showing excellent TLR rates in longer lesions and in-stent restenosis.[6-8] The IN.PACT SFA randomized controlled trial evaluated the In.Pact Admiral DCB (Medtronic) versus PTA; 2-year data demonstrated significant efficacy with stable primary patency of 78.9% in the DCB group versus 50.1% for PTA ($P < .001$) and a TLR rate of 9.1% versus 28.3% for the PTA group ($P < .001$).[9] The randomized LEVANT trial evaluated the Lutonix DCB (Bard Peripheral Vascular) versus PTA in femoropopliteal lesions and showed a 12-month primary patency rate of 65.2% for DCB versus 52.6% for PTA ($P = .02$).[10]

QUALIFYING DCB SUCCESS

Not all patient subsets may experience the same benefit. More recently, the reality that DCBs may not be universally successful and the durability may wane after 2 to 3 years has started to be reported. As we look back at the DCB trials that have demonstrated excellent 2-year patency data, we must remember that these trials excluded patients with significant calcification and in whom predilatation was not successful. A recent publication by Fanelli et al reported that DCBs were less effective at 1 year in patients with a higher degree of calcium. The study found that significant calcification led to lower ankle-brachial index at follow-up, lower primary patency, higher TLR, and less prevention of late lumen loss.[11] Real-world use of DCBs has also started to show mixed results. Although data from IN.PACT Global have been excellent overall, even up to 2 years, over 40% of the longer lesions required stenting. Recent single-center retrospective results from Dierk Scheinert, MD, and his group in Leipzig have led us to pause. In this very complex group of long lesions (24-cm mean length, 65% occluded), and with over 37% treated for in-stent restenosis, stent implantation was performed in 23.3% of the lesions.

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Kaplan-Meier estimates of primary patency were 79.2% and 53.7% for all lesions at 1 and 2 years, respectively, whereas freedom from TLR was 85.4% and 68.6%. Primary patency for in-stent restenosis treatment was 76.6% and 48.6%, and freedom from TLR was 83% and 58.7% at 1 and 2 years, respectively.[12] This group published another study with propensity-matched data for complex femoropopliteal disease treated with DCBs, standard, and interwoven nitinol stents, which demonstrated equivalent, continued patency reduction from 1 to 3 years with DCBs compared to tubular nitinol stents.[13]

DCBs IN CRITICAL LIMB ISCHEMIA

As the femoropopliteal treatment options continue to mature, the next data set needed is safety in the critical limb Ischemia (CLI) population. DCBs for CLI have only been studied with core lab documentation in the tibial population. Interestingly, a large, multinational, randomized trial (IN.PACT DEEP) performed outside the United States failed to demonstrate improved patency and limb salvage.[14] In fact, there was a nonstatistically significant trend in major amputations seen in the DCB group. Although there has been no reported increase in amputations in the currently reported device approval studies, these are based on claudicants and not patients with CLI, and these trials also would only report on major amputations, not toe amputations. Certainly the amount of antimitotic agent going downstream will be higher when multiple, longer DCBs with larger diameters are utilized. This effect would be expected to be less with DESs and completely eliminated with polymer-based DESs. A study with the appropriate controls is needed to develop more insight.

CONCLUSION

Ultimately, the use of DESs and DCBs in the femoropopliteal region are improving outcomes in the femoropopliteal bed and appear to be the most optimal first treatment for patients with claudication. In the device approval populations, the 5-year DES results are impressive, as are the 2-year DCB results. However, in more complex lesions we need to develop further data sets that help us optimize which patient populations will be best treated with DESs or DCBs, both short and long term. ■

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