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Percutaneous coronary intervention of saphenous vein bypass grafts: Current state of the art

Background: Saphenous vein grafts (SVG) are the most common conduit used in coronary artery bypass surgery. However, within a decade from surgery approximately 50% of SVG will develop significant disease. Percutaneous coronary intervention (PCI) of diseased SVG is associated with a high risk of distal embolization, no-reflow, periprocedural myocardial infarction (MI), and late restenosis. This review examines the evolutionary advances and current status of PCI for this challenging problem.

Role of Stents: The preeminent role of coronary stenting for SVG disease was established by the SAVED trial. Compared to balloon angioplasty, bare metal stents resulted in improved procedural and angiographic outcomes. At 240 days, event-free survival was significantly higher in the stent group (73 vs. 58%, $p=0.04$). The role of drug-eluting stents (DES) remained uncertain initially due to the mixed results of smaller randomized trials. The superiority of DES was solidified by the 610 patient ISAR-CABG trial which demonstrated fewer cardiac events at 1 year with DES (15.4 vs. 22.1%, $p=0.03$). Optimal duration of dual antiplatelet therapy after SVG stenting has not been established. However, late and very late stent thrombosis occurs more frequently in SVG.

Distal Embolization: SVG intervention is fraught with a high risk of ischemic complications due to distal embolization. In the landmark SAFER trial, use of a distal protection device (DPD) resulted in a 42% relative reduction in early cardiac events. Despite the evidence of clinical benefit and guideline class I recommendation, DPD are used in <25% of SVG PCI. Delivery of filter devices can be technically challenging in complex SVG and this likely contributes to the reticence of some operators to use them. We have recently reported the value of simple adjunct techniques to facilitate the successful deployment of DPD in SVG.

No-Reflow: The development of no-reflow during PCI is a significant risk factor for MI and death. DPD is reduced but not eliminated no-reflow, which is a complex phenomenon involving both debris embolization and microvascular spasm. A variety of vasodilating drugs have been used to treat no-reflow including calcium channel blockers, adenosine, and nitroprusside. In the largest series of patients treated with drug therapy for no-reflow, intracoronary nicardipine was found to be over 98% successful in reversing no-reflow during PCI. It has been suggested that pretreatment with intracoronary nicardipine or other vasodilating agents may reduce the incidence of SVG no-reflow. In current practice, we utilize the apparent synergistic effect of prophylactic intracoronary nicardipine and distal protection filters in vein graft PCI. Compared to use of DPD alone, the combination of drug + device is associated with significantly fewer per procedural death/MI (10 vs. 1%, $p<0.01$).

Conclusion: Significant technical and procedural advances have improved the outcome of high risk SVG intervention.

Biography

Michael P Savage is the Ralph J Roberts Professor of Cardiology at Thomas Jefferson University and Director of the Cardiac Catheterization Laboratory at the Thomas Jefferson University Hospital in Philadelphia. He was instrumental in the formation of the recently opened Jefferson Angioplasty Center as a second-opinion center for high-risk patients with complex cardiovascular disease. The Jefferson team under him has pioneered many advances in interventional cardiology and was at the forefront of clinical research in the development of coronary stents that have revolutionized the treatment of heart disease. His research continues to advance the care of cardiac patients by perfecting techniques for less invasive alternatives to heart surgery. His work includes over 230 publications of original research, book chapters, and abstracts. He has lectured nationally and internationally on a variety of cardiac disease topics and is an Editorial Consultant for numerous journals. He has received multiple honors for patient care, research, and teaching. He is a Fellow of the American College of Cardiology, the Society of Cardiac Angiography and Interventions, and the American College of Physicians.

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