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Short communication

Late In-Stent Restenosis of Saphenous Vein Grafts: What Have We Learnt So Far?

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ABBREVIATIONS

SVG: Saphenous Vein Graft; PCI: Percutaneous Coronary Intervention; ISR: In-Stent Restenosis; DES: Drug-Eluting Stents; IVUS: Intravascular Ultrasound

DESCRIPTION

Regardless of the bypassed area, the overall benefit of Saphenous Vein Grafts (SVGs) is highly restricted by progressive degenerative disease: 90% of SVGs remain patent after 30 days, 65% after 5 years and only 50% after 10 years [1,2]. Patients with SGV are not only older but usually suffer from significant co-diseases. This presents an essential clinical dilemma.

Percutaneous Coronary Intervention (PCI) of SVGs was showed to result in higher rates of mortality, iatrogenic myocardial infarction and In-Stent Restenosis (ISR), when compared to PCI of native coronary arteries, mainly due to the embolization of atherothrombotic debris into the distal circulation [3]. Different techniques were developed to address this issue, among them protection devices (proximal and distal), proper pharmacology regime and special stenting methods (e.g. direct and undersize or suck-u-surge). No single technique has ever been demonstrated to bring a statistically significant difference. Despite all these possibilities, rates of ISR and target vessel failure of degenerated SVGs remain relatively high [4].

The management of patients with SVG-ISR is both an extremely important topic and a significant clinical problem. Generally speaking, interventional treatment of SVG-ISR is safer than treatment of *de novo* SVG stenosis, just like treating native vessel ISR is safer than treating *de novo* native lesion [2]. This is usually due to decrease in periprocedural adverse events such as slow or no-reflow, dissection and distal embolization. Furthermore, in case of late SVG-ISR, the typical pathology mechanism is ongoing neointimal hyperplasia, so there can be little concern about embolic protection. The possible interventional strategies are plain balloon angioplasty, high-pressure or ultra-high-pressure balloon dilatation, drug-eluting balloons and Drug-Eluting Stents (DES in DES). The safety and effectivity of additive techniques such as stent ablation, intravascular lithotripsy or Excimer Laser Coronary Atherectomy (ECLA) have not been thoroughly examined so far. In a double-blind randomized trial that included 120 patients with SVG-ISR, however, intracoronary brachytherapy showed a positive outcome with significantly lower restenosis in the irradiated group at 6 months compared with the control group and noted a 79% decrease in the need for repeat intervention [5].

Complete occlusions of SVG are not uncommon and often occur after suboptimal SVG-ISR PCI results. In acute settings, PCI may be challenging due to progressive thrombus resistance. As showed in small cohort studies, in the subacute setting, a combination of thrombectomy (usually with balloon dilation) and a prolonged systemic GP IIb/IIIa therapy, may be a successful strategy [6]. According to some single reports, avoidance of ad-hoc stenting and delay of stent implantation for a few days to weeks in order to first address the large thrombus burden pharmacologically, was another plausible option [7]. Most experienced cardiologist would defer coronary interventions in chronic total in-stent SVG occlusion and favor a recanalization of the native vessel.

As conventional angiography underestimates the severity of graft remodeling and the neointima development, Intravascular Ultrasound (IVUS) can be used to better understand the lesion morphology and severity and to plan the proper interventional strategy [3]. IVUS studies were able to detect atheroma in the SGV as early as after 8 post-operative months [8]. As a rule, however, IVUS is not recommended before stenting in *de novo* SVG lesions to avoid potential embolization [9].

CONCLUSION

Late-term SVG PCI seems to be associated a high number of subsequent cardiac events due to restenosis and progressive vein graft disease. Whereas embolic protection strategies bring some

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reasonable benefit, recent studies questioned the value of routinely employing embolic protection and are not generally recommended. The use of DES as first-line therapy can be justified by the fact that DES showed to be more effective than Bare Metal Stent (BMS) in reducing the rate of Target Lesion Revascularization (TLR). In case of SVG-ISR, however, it may be reasonable to avoid the DES-in-DES strategy, especially when neo-atherosclerosis and not stent under expansion can be demonstrated. Paclitaxel-eluting balloons may be a safe and effective option. Whether this concept could be confirmed in large high-quality data, remains unanswered.

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