Editorial

Endovascular therapy for peripheral arterial disease in the femoropopliteal territory: an evolving promising scenario

Terapia endovascular para a doença arterial periférica no território fêmoro-poplíteo: um cenário promissor em evolução

Peripheral arterial disease (PAD) affects 8 to 10 million people in United States. Statistics regarding its prevalence in Brazil are scarce, varying from 3%, between 40 to 59 years, up to 20% in patients above 70 years old,[1] with an increasing trend as a result of higher life expectancy among the general population, as well as due to the contemporary pandemic context of some chronic diseases, mainly in Western societies, namely diabetes, obesity, and dyslipidemia.[2-4] It has a major harmful impact on quality of life and is an under-recognized marker of multisystem vascular disease. The risk of disease increases two to three-fold for every 10-year increase in age after 40 years, with men developing claudication about twice as commonly as women.[2,3] Mortality in patients with intermittent claudication is up to four times that of non-claudicants.[3,4]

Atherosclerotic lesions in lower limbs present relative symmetry (≅ 80%), despite the variable severity among such lesions. Concomitant adjacent lesions are very common, with iliac lesions occurring in 46% and below-the-knee lesions in up to 38% of patients.[4]

The initial conventional concept of non-surgical revascularization was introduced by Charles Dotter and Grüentzig. Since then, endovascular science has progressed impressively, especially during the past decade, when dramatic changes have occurred in the surgical management of patients with chronic critical limb ischemia, as well as in the way we define clinical success after revascularization. Endovascular interventions for treatment of critical limb ischemia and PAD have increased prolifically, with almost 40% performed in the femoropopliteal segment, and they are now performed more commonly than lower extremity bypass in many specialized vascular centers. Amputation rates have concomitantly declined 25% during this time.[4,5]

Stenotic femoropopliteal segment lesions are commonly short (≅ 80% < 5 cm). Nevertheless, occlusions are rarely shorter than 5 cm (≅ 9%).[4] Long segment recanalization of chronic total occlusions can be a valuable treatment option for patients with severe critical limb ischemia or intermittent claudication. It has been used since the 1990s to prolong the need for bypass in critical limb ischemia, and to provide pain relief in severe, lifestyle-limiting claudication from chronic vessel occlusion. Several techniques and devices have been identified as safe and practical in the approach to vascular recanalization. Originally used in the femoropopliteal segment, its role has been extended to the treatment of aortoiliac and infrapopliteal lesions, including the recanalization of trifurcation and long tibial occlusions. Technical success, primary patency, and complication rates appear not to be significantly different whether performed intraluminally or subintimally.[5]

Chronic total occlusions of the femoropopliteal and trifurcation vessels are classified as TASC II types C and D lesions, and surgical revascularization is traditionally the treatment of choice.[2] The advent of new endovascular techniques and devices has changed the landscape of vascular intervention, allowing these lesions to be treated by endovascular means.

The discussion surrounding endovascular interventions in PAD, particularly in the femoropopliteal segment, has gained outstanding relevance, especially in the last decade, due to a relatively disappointing (nevertheless evolving) long-term efficacy outcomes among available solutions in this segment, mainly after plain balloon angioplasty and/or atherectomy, whether utilizing balloons or stents, has also widened the therapeutic scenario, as well as the so-called third-generation auto-expandable nitinol stents.

Stenting in this segment has been challenging, frequently implanted on a bail-out basis and mainly performed after significant recoil, insufficient angioplasty, or flow-limiting dissection. The stent deployment rate increases directly with length. This arterial segment is submitted to several different forces, which negatively influence stent, clinical, and angiographic performances. Particularly in the femoropopliteal transition, the artery is subjected to compression, flexion, bending, and rotation forces during regular movement. Patency and target lesion revascularization rates have been disappointing, mainly due to a considerable stent fracture rate.[6] Fractures are related not only with the type of stent, being much more frequent in balloon- and next-generation auto-expansive nitinol stents, but also with the number and length of such devices deployed, leading to earlier restenosis and occlusion.[6] Several next-generation auto-expansive nitinol stent devices have shown promising results, with very low fracture rates that have enhanced their patency.[7-10]

The so-called third-generation auto-expandable nitinol stents represent a clear improvement in terms of size, profile, navigability, and delivery system. Design has been also of significant importance, with biomimetic features enhancing performance by improved resistance to crushing force and flexibility, as well as reduced chronic outward force, which has resulted in better fracture ratios since then.[8]

Regardless of the unquestionable progress of new generation regarding stent fractures, primary stenting in short femoropopliteal lesions appears not to be cost-effective.

This edition of *Revista Brasileira de Cardiologia Invasiva* presents a very interesting retrospective single center study, evaluating the safety and efficacy of two third-generation self-expandable nitinol stents within a short-term follow-up period. Despite a small sample size, the researchers could evaluate their early performance in a very challenging scenario, with a majority of diabetic patients having highly advanced disease, poor below-the-knee runoff, and long lesion length.

DOI of original article: http://dx.doi.org/10.1016/j.rbci.2016.06.003

Nevertheless, most procedures could be performed with only one stent, resulting in promising primary patency and limb salvage rates, as well as an absence of stent fractures in this period.

The advances achieved from these novel stent devices represent an improvement in this unfavorable scenario, namely in long and calcified chronic total occlusions in the femoropopliteal region. Further prospective randomized studies regarding this issue, including comparisons of different available technical solutions and their outcomes, are warranted.

Conflicts of interest

The authors declare no conflicts of interest.

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