Singapore

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What is the prevalence of endovascular SFA therapy as compared to surgical?

Moderate and rising. Greater awareness by patients and referring physicians in addition to improvements in endovascular proficiencies continue to drive demand for endovascular solutions in Singapore. Disease-specific devices and a relatively open regulatory environment allow today's physicians to offer cutting-edge technologies to patients who otherwise could not have been treated by endovascular therapy. Vascular surgeons are increasingly adopting an endovascular-first approach, which probably accounts for a large proportion of the rising trend.

How would you describe device availability in your country, both in types of devices and different vendors within each class?

Singapore is home to the regional headquarters of several medical device companies. Devices from various companies are readily available, and competition within each class of device is stiff, pushing companies to be more driven by performance and evidence. In addition, the sale of devices based on transparency and meritocracy allow companies to compete on a more level playing field. Singapore is a financial and medical bellwether for the region, so this encourages companies to continue having a presence here. I hope the regulatory environment continues to be both friendly and competitive.

In what ways does reimbursement (both government and private if applicable) affect device use? Which device classes are most affected?

Reimbursement for medical devices is certainly a major factor all around the world. In Singapore, reimbursement for devices in public hospitals could be much better. Patients still have to pay substantial amounts out of pocket for these devices. I think patients will be willing to pay for the devices if a physician is able to communicate the benefits of endovascular therapy over open surgery and is competently able to deliver good results. Patients with private insurance, however, are well covered in terms of medical devices. Regardless, in a cost-conscious environment, knowledge of the limitations and strengths of each device will ensure physicians adopt a rational use of devices.

Are there any historic or cultural forces unique to your country that have affected the penetration of endovascular options?

Asian patients are, in my opinion, particularly adverse to an amputation (minor or major) due to religious and cultural beliefs. Some patients believe that they should "meet their maker" with an intact body/appendages. Older patients are generally adverse to a big incision (eg, a bypass). Endovascular therapy is therefore a safe and attractive option for both the physician and elderly patients who often have multiple comorbidities. And furthermore, some Asian patients are adverse to having metallic implants (eg, stents).

How do most physicians receive training in endovascular therapies in your country?

Endovascular training is an ongoing, lifelong process, even for experienced physicians as long as medical device companies continue to innovate. Training is mainly by hands-on apprenticeship, although the use of endovascular trainers is certainly helpful.

Device companies have to understand that the main challenge in our region is to equip the physician with the skills to perform the intervention. This is in contrast to a mature market. Hence, the need to provide funds for congresses (eg, LINC Asia Pacific), workshops, and "in-your-lab" proctorships is essential. Company compliance issues, although necessary, are increasingly affecting physician education.

We regularly run live case workshops to help train local and regional physicians across all disciplines to adopt these techniques.

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What is your personal strategy or algorithm for treating:

- **Short, focal lesions:** There is good evidence for utilizing DCBs for short, focal SFA lesions, and this is the strategy we would generally employ. If there is severe mechanical recoil or dissection after predilatation, we may consider a DES.
- **Long lesions:** These are the common real-world lesions. Patency is generally poor with POBA, and although it is better with stents, in-stent restenosis continues to pose a real problem. Very often, we end up subintimal in a long CTO, and in a calcified vessel, stents are the only practical alternative to provide a mechanical solution to a mechanical problem in a heavily dissected vessel. We try to limit the length of stents as much as we can. Scoring balloons are occasionally used to limit the severity of dissection. If the mechanical result is good, I will consider a DCB, although the evidence for long lesions is mostly registry based.

  In the occasional long, diffuse, stenotic lesions (especially calcified ones), we usually consider rotational atherectomy to initially debulk the lesion and then treat it with a DCB. This is performed to prevent dissection and then expose the vessel wall to the paclitaxel. The results from the DEFINITIVE AR study are encouraging for directional atherectomy in combination with DCBs, and we would like to think that these can be extrapolated for rotational atherectomy. I am hesitant to do atherectomy in a long CTO where I am frequently in the subintimal plane, because the risk of perforation is high.
- **Calcified lesions:** This is often a stubborn problem, and the solutions are mainly mechanically based. Lesions that respond poorly to POBA need to be stented with dedicated stents that can deliver high radial-resistive forces. We have employed the so-called PIERCE technique[1] (percutaneous direct needle puncture of calcified plaque) in the SFA and below the knee with good results. It is safe and improves the compliance of the vessel for a better POBA or stent result in the event that high-pressure POBA does not work. We also occasionally use it during vessel preparation before placing a Supera stent (Abbott Vascular).
- **CTOs:** POBA has shown poor results, and adjunctive techniques are thus employed to improve acute and long-term results, as per the previously mentioned long lesions.
- **In-stent restenosis:** With the growing utilization of stents, this has been a real problem, and the results of POBA are poor. For symptomatic in-stent restenosis or occlusions, we employ DCBs with or without Rotarex thrombectomy (Straub Medical AG), and good results have been seen in several registries. We generally avoid covered stents, as our SFAs are generally smaller in Asia (5 mm), and thus there is concern about stent thrombosis should we have a stent-in-stent strategy. It is frustrating that heparin-coated covered stents are not available in my country.
- **Claudicants:** Claudicants have a good life expectancy and low risk for limb loss. Patency is required to keep them symptom free. In the absence of a good long-term solution for in-stent occlusions/restenosis, we prefer to avoid stents as much as we can. We would generally consider DCBs with bailout stenting for short lesions (as evidenced by the trials on the SFA by Medtronic and Bard Peripheral Vascular), which gives us good freedom from target lesion revascularization. For longer lesions, DCBs and bailout stenting are also employed, although the majority of the evidence is registry-based, but we have had good results with this strategy. The caveat is that after predilatation, the mechanical results have to be reasonably good (ie, no severe recoil or dissection). The lesions that have a predominantly mechanical problem are probably best served with a dedicated new-generation stent with low chronic outward force but high radial-resistive force. The combination of deliberate DCBs and stents rather than bailout stents is interesting, and we are eagerly awaiting further data.

  The strategy here is in contrast to critical limb ischemia patients who need the maximum effort for limb salvage (a femoropopliteal bypass equivalent in the SFA). These patients have a limited life expectancy and may not be symptomatic from SFA in-stent restenosis. Lesion for lesion, we tend to stent these, as compared to the claudicants. ■

1. Ichihashi S, Sato T, Iwakoshi S, et al. Technique of percutaneous direct needle puncture of calcified plaque in the superficial femoral artery or tibial artery to facilitate balloon catheter passage and balloon dilation of calcified lesions. J Vasc Interv Radiol. 2014;25:784-788.