



Commentary

C. Setacci*, P. Sirignano

Department of Vascular and Endovascular Surgery, University of Sienna, Viale Bracci 1, I-53100 Siena, Italy

It was a pleasure to re-read this paper by London et al.,¹ which was published almost 20 years ago.¹ This was not, however, the first report on subintimal angioplasty (SIA) by the Leicester group. The principles of the technique had previously been published by its pioneer (Amman Bolia) in *Clinical Radiology* in 1989.² The London paper¹ was, however, to become a mile-stone which helped to change attitudes around the world regarding the role of endovascular techniques in patients with lower limb arterial occlusive disease. It is interesting to recall that at the beginning of the 1990s, bypass surgery was viewed as being the undisputed 'gold standard' and inadvertent entry into the subintimal space during angioplasty was viewed as a potentially dangerous technical error, usually necessitating the procedure to be abandoned. By contrast, Bolia's SIA technique deliberately created a new subintimal lumen and London's paper¹ was the first substantial series to offer evidence about what was to become known as SIA was a useful and safe technique to treat long femoro-popliteal artery occlusions.

London¹ reported a consecutive series of 200 procedures with an initial technical success of nearly 80%, in a generally unselected population of patients with lower limb ischaemia. No formal subgroups analyses were reported, but the paper did not observe significant differences in outcome with respect to diabetes, critical limb ischaemia (CLI), site of occlusion or the length of the lesions. Upon reviewing the paper (again), a number of observations come to mind. First; the incidence of CLI was limited to only 22 cases, representing only 11% of patients in the successful group. The majority of successfully treated patients were claudicants, with good runoff vessels, especially below the knee. This preponderance of claudicants could certainly bias interpretation of the outcome data and lead to an over-estimation of the real potential SIA in CLI patients. Second; it appears that

a significant minority of the lesions treated (46%) were <10 cm long. However, notwithstanding these limitations, London's paper had the undoubted effect of revising attitudes towards the role of endovascular therapy in patients with long femoro-popliteal occlusions. Prior to this time, the broad consensus would have been that distal reconstruction should be the preferred treatment option.

It is also interesting to observe that nearly 20 years after publication of London's paper, the technique of SIA has not changed substantially. It largely remains faithful to the teachings of Amman Bolia and it would probably be fair to say that it (SIA) has not achieved comparable technical advances in the manner seen with the corporately sponsored EVAR revolution following publication of the seminal paper by Parodi.³ The only change (in recent years) has been the introduction of dedicated re-entry devices,^{4–8} which facilitates the use of SIA in some patients with TASC type C/D lesions. The 're-entry' devices do, however, somehow betray the original spirit of the SIA method. Citing London: "*The specific advantage offered by subintimal angioplasty is that it does not require specialized equipment, it is relatively cheap, thus it is not a relatively difficult procedure and it is non-traumatic*".¹

Since 1994, a number of centres have published outcomes after SIA,^{9–17} but we still do not have level-1 evidence supporting the effectiveness of SIA. Two meta-analyses^{18,19} have, however, published an overview of the literature. Bown¹⁸ observed that the overall technical success rate for SIA in the literature was acceptable (approximately 86%), but primary patency rates at one year (approximately 56%) did not match the high initial success rate. However, long-term limb salvage was excellent (approximately 90%) and limb salvage was not only maintained at longer follow-up periods, but was comparable with different degrees of ischaemia severity and the use of adjunctive stenting. Bown observed that there did not appear to have been any real change in technical success, limb salvage or primary patency rates in the time since London published the initial Leicester experience,

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* Corresponding author. Tel.: +39 577 585123; fax: +39 577 233426.

E-mail address: setacci@unisi.it (C. Setacci).

suggesting that the learning curve for the technique was relatively steep in those centres that choose to pursue this method of angioplasty and who went on to publish their results. In the second meta-analysis, Met et al.¹⁹ concluded that the role of SIA was still evolving and that at their hospital, open surgery for CLI had reduced by more than 50% over the preceding decade, indicating that (in their mind) that a significant proportion of patients could be treated by SIA. Met's meta-analysis showed that for CLI, SIA had an important role despite moderate long-term patency rates. In effect, SIA seemed to serve as a "temporary bypass" during which time wound healing and limb salvage was obtained. More importantly, SIA could be repeated should symptoms recur.

Because SIA has generally been associated with lower patency rates than surgery,^{20–23} some authorities believe that open revascularization should remain 'the gold standard' in patients with critical limb ischaemia,^{24,25} despite the fact that no randomised trial has specifically compared SIA with bypass. In the BASIL trial,²¹ any type of transluminal or subintimal angioplasty procedure was permitted, but too few patients were eligible for randomization due to their local anatomy and many patients probably made a personal choice to choose a minimally invasive option. When considering the late results of the BASIL Trial, surgical bypass has been promoted as being superior to angioplasty; however, the results for SIA remain encouraging. In other published series detailing outcomes following lower limb bypass surgery, primary patency rates are better than those observed in this meta-analysis of SIA, but it is important to observe that limb salvage rates are virtually identical to those observed in this study.^{26–29}

In conclusion; after 20 years of clinical practice, SIA should not just be assessed by primary and secondary patency criteria, but also by clinical outcomes. It is this observer's opinion that attitudes towards the treatment of CLI need to incorporate patient-oriented outcomes.^{30,31} Patency and limb salvage rates are examples of physician-oriented endpoints and we need to define 'clinical success' by achieving all of the following parameters: patency to the point of wound healing, limb salvage at one year, maintenance of ambulatory status at one year and survival.³⁰ SIA is another tool in the armamentarium of the vascular surgeon and interventionist that should be used in synergy with surgery and with those other endovascular techniques to achieve the best clinical success for our patients.

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