The ReeKross balloon catheter for Subintimal Angioplasty and Stenting of Occluded Superficial Femoral Arteries.

Courtesy of Dr. Mohan Adiseshiah, FRCS,FRCP
University College Hospital, London WC1E 6AA

**Aim.** Following the publication of the BASIL randomised control trial\(^1\) of bypass surgery versus angioplasty (SIA) of the superficial femoral artery (SFA) for critical leg ischaemia, it has become justified to attempt angioplasty as a first line therapy. As the results showed equivalence in terms of limb salvage, but lower cost and length of stay in favour of angioplasty, we now routinely opt for angioplasty +/- stenting for the occluded (SFA) in this clinical context. The search for more efficacious and efficient technical aids continues, and we here describe a new balloon which demonstrates many advantages over currently available ones.

**The Patient** was a 60-year-old man - a non-smoker, not diabetic but hypertensive (treated) and with treated hyperlipidaemia. He presented with rest pain and crippling caudication at 10 metres of 2 months duration. Past medical history included a major stroke with near complete recovery after 8 years due to a left internal carotid occlusion. Physical examination revealed an overweight man with good femoral pulses but absent distal pulses. The right foot was colder and with slow capillary return. There was no ulcer or gangrene. Duplex ultrasound (DUS) revealed a mid SFA stenosis on the right and a total occlusion 12 cm long of the distal SFA. The popliteal appeared reasonable and the peroneal and posterior tibial arteries were patent to the ankle. Common, profunda and proximal SFA waveforms were triphasic, but only monophasic waveforms were discernable below the SFA occlusion. The ankle/brachial systolic pressure index on the left was 0.4 and on the right (asymptomatic) was 0.7. Therefore the SFA disease was considered to be the significant cause of this patient’s critical ischaemia.

**The Procedure.** Under local anaesthesia and sedation with ultrasound guidance, an ante grade right femoral artery puncture was performed. Preliminary angiography confirmed the DUS finding of a mid SFA stricture and a distal 12 cm long occlusion (TASC 3). This is shown in Figs 1 and 2.

![Fig. 1](image1.png)  
![Fig. 2](image2.png)  

The SFA reconstituted via collaterals in Hunter’s canal (Fig 3). The popliteal artery showed a good calibre without narrowings (Fig 4) and 2-vessel runoff.

![Fig. 3](image3.png)  
![Fig. 4](image4.png)  

A sub-intimal angioplasty was performed using a 35 floppy 65 cm angled-tip Terumo guide-wire by the standard technique\(^2\). Guide-wire re-entry was achieved in the proximal popliteal artery. A ReeKross balloon catheter supported the guide wire–shaft 65 cm, 5 F, dimensions 5 mm X 4 cms. The balloon easily crossed the sub-intimal dissection.
The stricture was dilated (Fig 5) and a self-expanding nitinol stent 12 cm X 6 mm was deployed across the stricture (Fig 6).

Completion angiography showed swift flow through all sections and unaltered runoff in the infra-popliteal segment (Fig 7 and 8).

DUS after angioplasty showed good flow in the infra-popliteal section and a rise in ABPI to 0.8.

**Comment.** In general, we have found DUS invaluable in assessing patients with critical limb ischaemia. Not only is it possible to map the anatomical lesion, but also the flow velocity and waveform information enables the detection of haemodynamically significant lesions. Finally, the ABPI is essential in diagnosing critical limb ischaemia.

Following Bolia’s description of SIA, even long and ostensibly unsuitable SFA occlusions are re-opened. Traditionally, the balloons employed for dilatation of the SIA channel have suffered from some shortcomings. Firstly, “pushability” of the balloon after wire re-entry is not always easy because of buckling and bending of the traditional balloon shaft material. The shaft of the Reekross is virtually “super-stiff”, and will not buckle. This physical characteristic allows the balloon to be advanced more easily and quickly through the rough, calcified sub-intimal passage.

Traditional angioplasty balloons often have a poor profile especially after several dilatations in the sub-intimal space. The Reekross seems to keep its profile even after multiple dilatations, presumably because the balloon material must have a good “memory”.

A further consideration is the troublesome complication of bursting of the balloon. This is frequently encountered with traditional balloons, especially in SIA of calcified lesions. The manufacturers of Reekross claim better robustness in this regard. We have only a preliminary experience with the balloon and we expect from its behaviour in other respects that bursting may be less of a problem here.

We elect to stent SIA in all cases of poor angiographic flow at completion, and when the geometry does not appear satisfactory. Preliminary data suggests there is an immediate and a 12 month advantage for modern stents over SIA alone.

In summary, all cases of critical lower limb ischaemia, it is justified and more cost effective to attempt SIA +/- stenting as a first line of treatment. In the event of failure, bypass surgery can be performed.

---

**References**

1. **Adam DJ, Beard JD, Cleveland T, Bell J et al.** Bypass versus angioplasty in severe ischaemia of the leg (BASIL): multicentre, randomised controlled trial. Lancet 2005; 366: 1925-34