

## TECHNICAL NOTE

## Reverse Retrograde Approach: An Alternative Method for Ipsilateral Access to the Superficial Femoral Artery

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Access for endovascular treatment of the superficial femoral artery (SFA) is usually gained through an antegrade approach from the ipsilateral common femoral artery (CFA), or by crossing over from the contralateral CFA. In this technical note, an alternative method, based on retrograde access of the ipsilateral iliac artery (IA), and conversion into an antegrade approach to the SFA, is described. Successful reverse ipsilateral catheterisation was obtained in 15/16 patients. Calcification of the CFA and IA required a crossover approach in one case. There were no complications related to the technique, except for moderate bleeding in relation to the deployment of a closure device.

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### INTRODUCTION

Both the antegrade approach from the ipsilateral common femoral artery (CFA), and crossover from the contralateral CFA have been described for the access to and endovascular treatment of the superficial femoral artery (SFA).<sup>1</sup>

The antegrade approach has the advantage of permitting the use of shorter tools, and additional support for manipulating catheters and guidewires. Its main drawbacks are the more demanding technical skills required for percutaneous puncture of the CFA and the potential difficulties of entering the SFA, avoiding its origin. Ultrasound guided puncture may help to increase the success rate, especially in obese patients.

The contralateral crossover approach is preferred by many vascular surgeons, in order to gain distance to the target lesion and allow a more comfortable working area, as well as minimising the risk of haematoma and the need for compression on the ipsilateral groin. However, the use of longer devices within tortuous iliac arteries may prove a major inconvenience for a correct navigation and deployment of larger devices.

In this technical note, an alternative method, based on retrograde access to the ipsilateral iliac artery and conversion into an antegrade approach to the SFA, is described. Its indications, advantages, and drawbacks are analysed, based on experience in a short series of patients.

### TECHNICAL SUMMARY

The technique for the reverse retrograde approach of the ipsilateral SFA is described in the supplementary video presentation, accessible online. Briefly, the bifurcation of the CFA ipsilateral to the target lesion is identified with ultrasound and marked on the skin. Retrograde puncture of the CFA is performed about 2 cm above the CFA bifurcation with an incident angle of at least a 45° (Fig. 1).

A SOS Omniselective like 5 F catheter is advanced over a 0.35" Glidewire, leaving a pre-mounted 5 F sheath at the proximal end of the catheter. It is important in this phase to manipulate the catheter without advancing the sheath through the skin and artery, in order to avoid the risk of bleeding around the catheter during further exchanges. The S-shaped tip of the SOS catheter is unfolded in the lower aorta or common iliac artery (Fig. 2A). It is then pulled back to the level of origin of the SFA. In this position, the tip is easily twisted 360° within the CFA, permitting alignment with the SFA ostium. Then, the wire is advanced inside the SFA (Fig. 2B). Further withdrawal of the SOS catheter, until the secondary curve of the tip emerges through the puncture site, facilitates turning up of the proximal part of the catheter (Fig. 2C). In this position, the body of the catheter is reversed upwards and the introducer is advanced over the catheter, until it is completely placed inside the SFA (Fig. 2D).

Sixteen consecutive patients (2 women, 14 men; mean age 65.4 ± 4.5 years) underwent endovascular procedures on the ipsilateral SFA with this approach. A simple balloon angioplasty was performed in five patients, bare stenting in seven, and endograft deployment in four.

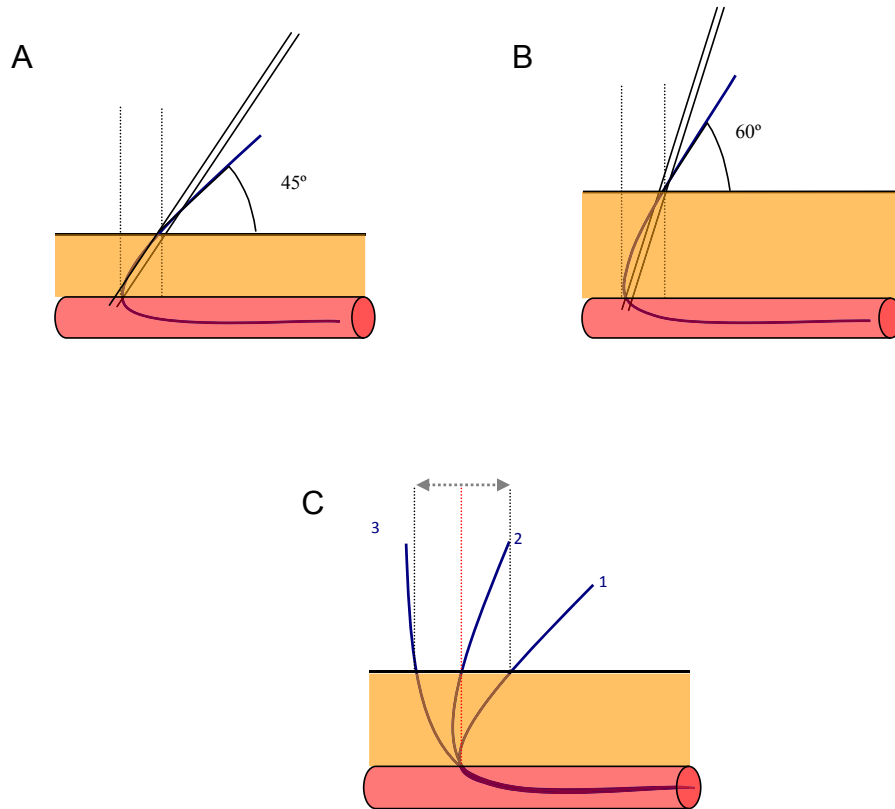
Successful reverse ipsilateral catheterisation was obtained in 15/16 patients. In one case, excessive calcification

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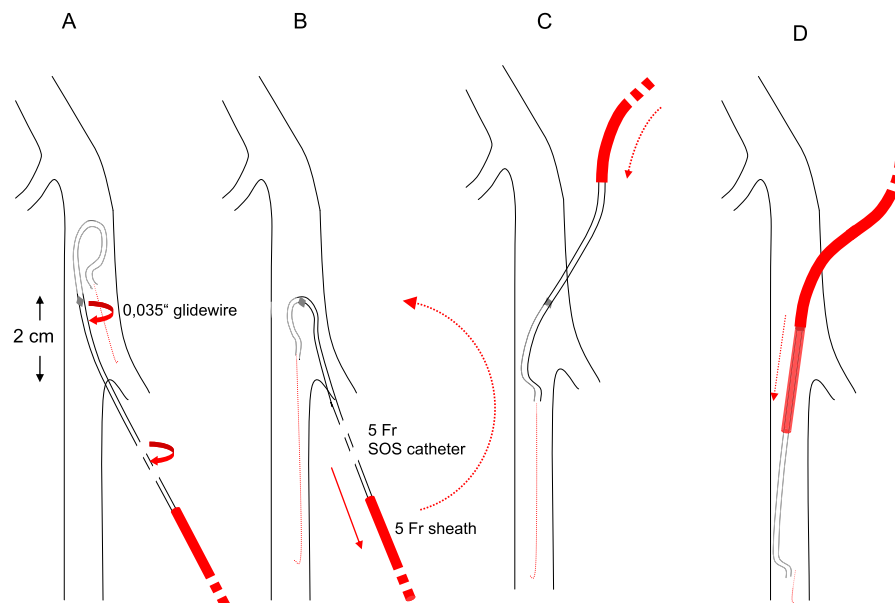


**Figure 1.** Depending on the size of the patient, an angle between (A) 45° and (B) 60° of catheter position, corresponding to 60° to 75° puncture angle is preferred. (C) Proximal displacement of the overlying skin in the groin facilitates the upright reversion maneuver.

of the ipsilateral CFA and iliac arteries required a crossover approach from the contralateral groin. There were no specific complications related to the technique, except for moderate bleeding and haematoma in relation to the deployment of a closure device.

## DISCUSSION

Alternative methods for the antegrade approach to the ipsilateral SFA with the aid of balloons have been described,<sup>2,3</sup> as well as with pre-curved needles,<sup>4,5</sup> wires,<sup>6</sup> or more complex sets.<sup>7,8</sup> However, the double puncture



**Figure 2.** Technique for the reverse retrograde approach to the ipsilateral superficial femoral artery. See description in text.

**Table 1.** Reverse retrograde access to the ipsilateral superficial femoral artery.

First author	Year	Catheter	Patients
Kadir <sup>11</sup>	1981	Cobra 2	Technical note
Shenoy <sup>9</sup>	1983	Sidewinder	Technical note
Patel <sup>13</sup>	1990	Triangular	18
Bohndorf <sup>12</sup>	1991	Angled	Technical note
Hartnel <sup>10</sup>	1998	SOS	24
Miralles	Present	SOS + coaxial sheath series	16

technique, big sheaths, and some cumbersome manoeuvres are usually required.

Similarly, reverse catheterisation of the SFA using catheters with different tip shapes—Sidewinder,<sup>9</sup> SOS,<sup>10</sup> Cobra,<sup>11</sup> Angled,<sup>12</sup> and triangular<sup>13</sup>—have all been referenced (see Table 1).

Performance of antegrade catheterisation, as described in this report, has three major advantages: (1) the all in one procedure avoids the need to exchange wires or catheters, minimising the risk of back bleeding; (2) use of a coaxial wire and catheter as a shuttle shaft permits easy guidance and advancement of the pre-mounted sheath (a braided one of the same size is highly advisable), avoiding the risk of damage to the artery at the CFA access site (this is the main difference from the original technique, as described by Hartnell<sup>10</sup> and that used by other authors); (3) when bilateral infrainguinal intervention is planned, this technique allows for converting the access to antegrade after the contralateral intervention is completed.

## CONCLUSION

The reverse retrograde approach may be a reliable alternative method for the ipsilateral access to the SFA. Possible limitations include the presence of extensive calcifications in the ipsilateral iliac and common femoral arteries. Caution is advisable in using the approach for treatment of lesions in the proximal SFA. Use of protective leaded gloves is highly advisable in order to minimise exposure to radiation of the hands while applying this technique.

## CONFLICT OF INTEREST

None.

## FUNDING

None.

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