A simple sheath removal after open trans-femoral catheterization procedure: the ZIP technique

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Abstract

The ZIP technique, a surgical equivalent of the 'Preclose' technique, useful for transcatheter aortic valve implantation or endovascular aortic aneurysm repair is described. While percutaneous closure devices are expensive, need a long learning curve and are associated with primary failure, the ZIP technique is easy and allows a quick, safe and anatomical closure of the artery. This procedure avoids arterial cross-clamping and no purse-string effect was demonstrated using Doppler ultrasound examination.

Keywords: Transcatheter aortic valve implantation • Femoral artery • Stenosis

INTRODUCTION

For transcatheter aortic valve implantation (TAVI) and endovascular aortic aneurysm repair (EVAR), the traditional approach involves the femoral artery. Two options are available: the percutaneous or the open technique. An open technique, allowing a quick and easy closure of the artery, is described.

TECHNIQUE

The femoral artery is exposed through a groin incision. The anterior wall of the artery is cleaned from surrounding tissues up to a few centimetres. If uneven calcified plaques are found by palpation, a longer part is freed. Then the most suitable site is chosen. At this level, before anticoagulation, a full thickness, double-incision is closed and a long-lasting local anaesthetic injected. The femoral artery is punctured a little bit downstream of the middle (Fig. 2 and Supplementary Video 1). The artery is gently pulled, to obtain coaptation of the arterial wall, and tied (Fig. 2 and Supplementary Video 1). During the TAVI procedure, when systolic arterial tension is >120 mmHg, a transitional cardiac pacing can be used to decrease arterial pressure. Closure is easier if both ends of the running suture are on the operator’s side. The incision is closed and a long-lasting local anaesthetic injected.

RESULTS

Fifty-five patients have been operated on according to this technique (36 TAVI and 19 EVAR for abdominal aneurysm). The 73 arteriotomies secondary to sheath insertion have always been in the boundary of the stitches. Five patients required an extra stitch. No primary failures were encountered. The elapsed time from sheath removal to skin closure has always been <10 min even in underexposed locations as under the inguinal ligament or above. There is no need for a compression bandage. There is no requirement for a period of bed rest and ambulation is allowed with no restriction, as there were no instances of bleeding after initialambulation.

The first 30 patients underwent Doppler US examination of the access site preoperatively and before discharge. The EVAR patients had a third US by the end of the first month. The interventional cardiology team clinically followed the TAVI patients. No secondary complications were reported. This kind of suture has no purse-string effect as shown by the unchanged flow documented by the Doppler US.

DISCUSSION

Transcatheter techniques, either TAVI or EVAR, use a large-diameter introducer sheath up to 24 Fr. Totally, transcatheter techniques have been described. Unfortunately, percutaneous closure devices are expensive, need experienced operators and primary failures are described [1–4]. As there is no need for clamping the artery with this technique, skin incision can be very short and reduced as the surgeon's experience increases. It is just few centimetres larger than the incision needed to create a subcutaneous tunnel recommended for the PROSTAR XL® device to have an optimal contact with the vessel wall. So this technique is...
CONCLUSION

While percutaneous closure devices are expensive, need a long learning curve and are associated with primary failures, the ZIP technique is easy and allows a quick, safe and anatomical closure of the artery.

SUPPLEMENTARY MATERIAL

Supplementary material (Video 1) is available at EJCTS online.

Video 1: The ZIP technique is an open equivalent of the ‘Preclose’ technique useful for transcatheter aortic valve implantation. The femoral artery is exposed through a 3-centimetre transverse groin.
The anterior wall of the artery is cleaned from surrounding tissues up to a few centimetres. A full-thickness, double-ended, running suture (monofilament 5.0) is conducted perpendicular to the artery. The bites are ~8 mm large. The artery is punctured a little bit downstream of the middle of the two rows. After sheath removal, bleeding is controlled with the finger. Both ends of the sutures are gently pulled, to obtain coaptation of the arterial wall, and tied.

**Conflict of interest:** none declared.

**REFERENCES**


