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Femoral positioning of Tesio catheters for hemodialysis

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ABSTRACT: Vascular access may be of crucial importance in long-term dialyzed patients when traditional blood access fails.
Long-term central vascular access devices are usually inserted in the internal jugular or subclavian veins but thrombosis may be the major factor limiting their long-term use. To solve this problem the Tesio caheter is one of the most commonly recommended tools for long-term use in RD patients, and is normally placed in the neck veins.
In this study the femoral vein is indicated as an alternative site for positioning the Tesio catheter. The "high" exit (abdominal) reported here presents some advantages for the patient who can then walk without difficulties while maintaining a high blood flow that is similar to those achieved with catheters implanted in other sites.

KEY WORDS: *Dialysis, Vascular access, Tesio catheter, Femoral vein*

INTRODUCTION

Hemodialysis efficiency depends mainly on two factors: high blood flow and low recirculation. To guarantee both factors it is necessary to have a suitable vascular access, either "natural" (by native vessels) or "artificial" (grafts or central vein catheters) (1).
A common experience in dialysis units is the growing need – in elderly patients or subjects affected by vascular problems – for artificial vascular accesses (for instance silicon or other material catheters), placed in a central vein for a long period of time. In our unit the percentage of these patients is 20%, but the actual requirement is probably understimated. In fact, the arteriovenous fistula does not always provide high blood flow with low recirculation, because these parameters depend on the puncture procedure and the actual site; on the contrary, catheter performance is constant when the catheter is open and no kinking is present.
The original Tesio technique for twin catheter insertion into the internal jugular vein was based on the opportunity, given by the clavicula to support the devices (2).
Using this method, it is possible to perform parasternal subcutaneous tunnelling and so patient discomfort is minimal and catheter kinking unlikely.
Theoretically, a similar anatomic support is missed if another central vein is employed and the exit site, working on femoral vein, is placed at the anteromedial side of the thigh (7).
Therefore, we have focused on a new method of femoral catheter positioning with two advantages:
1. Abdominal exit site, without any obstacles from the lower limb.
2. "Soft" catheters curvature, to avoid kinking and obtain maximum blood flow.

MATERIALS AND METHODS

We have used the kits produced in the U.S.A. by "Medical Components Inc." and distributed in Italy by "Bellco SpA" (2, 4-6).
Silicon seems to be a well tolerated material for two reasons: better biocompatibility (therefore lower risk of thrombosis) and higher flexibility, to prevent any traumatism by the catheter's body.

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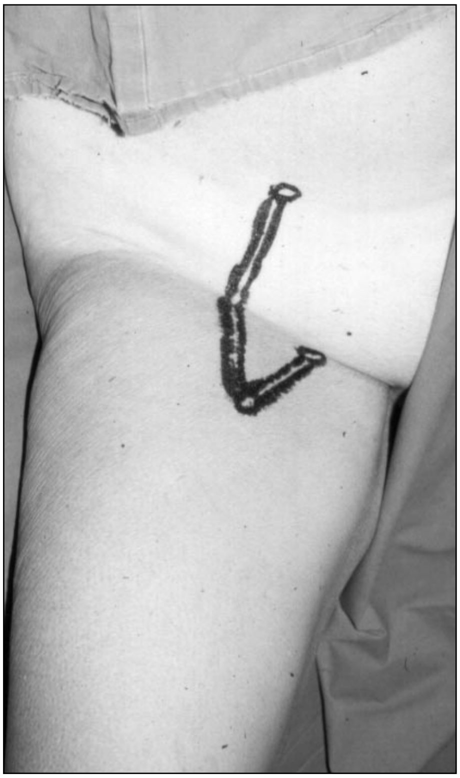


Fig. 1 - *Course of catheters.*

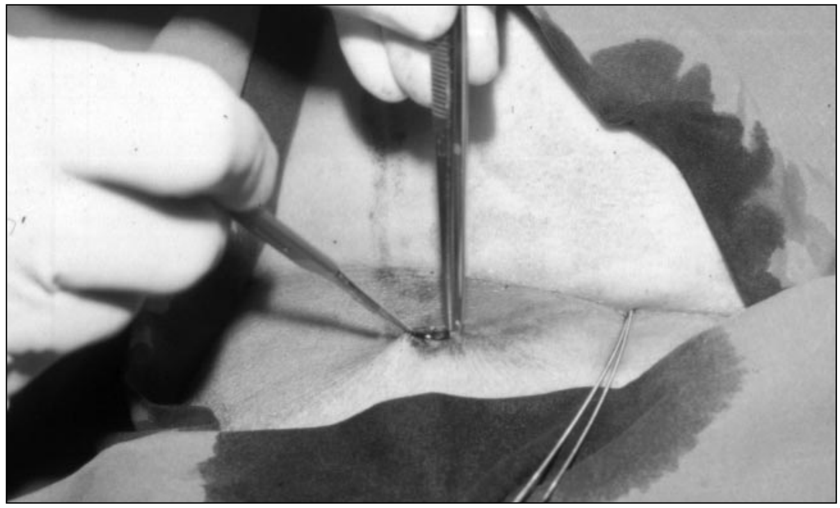


Fig. 2 - ***After guidewire positioning the skin is cut to create an excavation.***

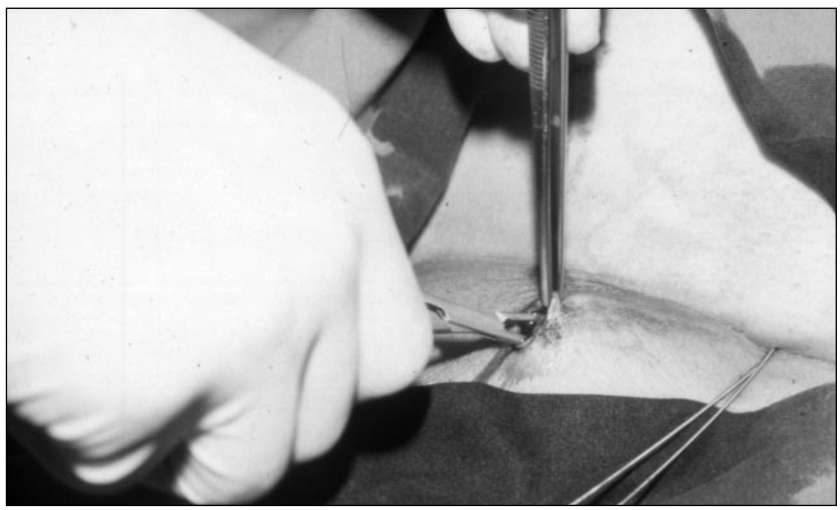


Fig. 3 - ***An excavation (3x3 cm) is made by blunted clamp.***

Since biocompatibility seems to depend more on the physical (i.e. surface feature) than on the chemical nature of catheters, silicon is today the material preferred for these applications. Common surgical instruments (lancet, clamps, curved "pean" clamps and other ordinary instruments) are necessary for correct positioning.

Local anesthesia is achieved with 2% xylocain.

Although it is not a must, fluoroscopy control is advisable because any malpositioning into paravertebral vein, should be corrected immediately.

DESCRIPTION OF THE OPERATION

After local anesthesia the femoral vein can be localized by an explorer needle and, one by one, two guidewires can be inserted. (Figs. 1-2 respectively).

On the skin, below (6-8 cm) and laterally of the guidewire introduction site, a small incision (2 cm) is made (Fig. 2).

Using a blunted clamp, a subcutaneous excavation is then prepared (3x3 cm) through the incision, to enable to turn both catheters gently (Fig. 3).

One by one, the twin-catheters are inserted carefully controlling the distance between both catheter emergence in order to minimize recirculation. At this point the subcutaneous tunnel is anesthetised as far as the emergence (Fig. 4).

Using a Redon needle, each catheter is inserted through the space already created (Figs. 5-6-7).

By means of a second subcutaneous penetration through the space, both catheters are pushed upwards towards anterior-superior iliac spine, 2-3 cm more medially (Figs. 8-9).

Finally Figure 10 shows the two catheters emerging

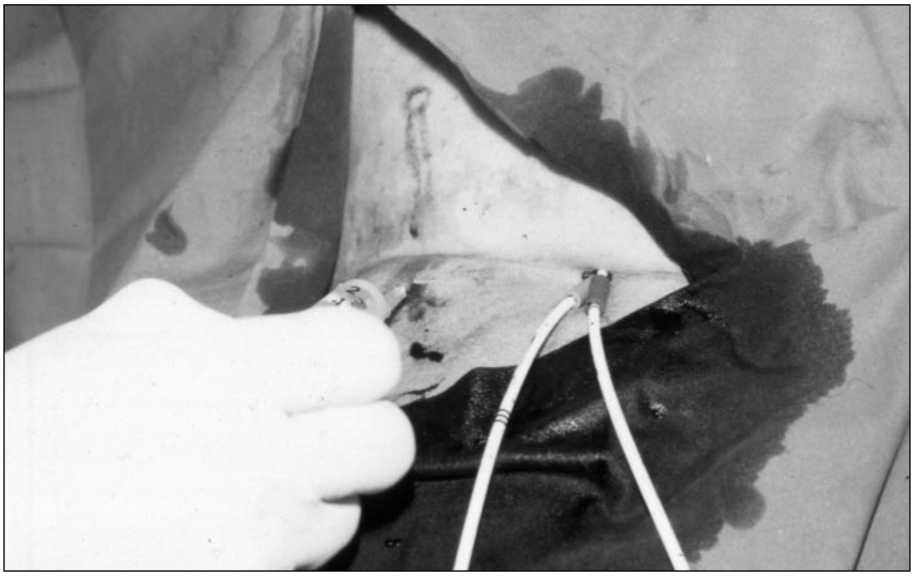


Fig. 4 - ***After positioning the twin catheters into the femoral vein the skin on the subcutaneous tunnel is anesthetized as far at the exit site.***

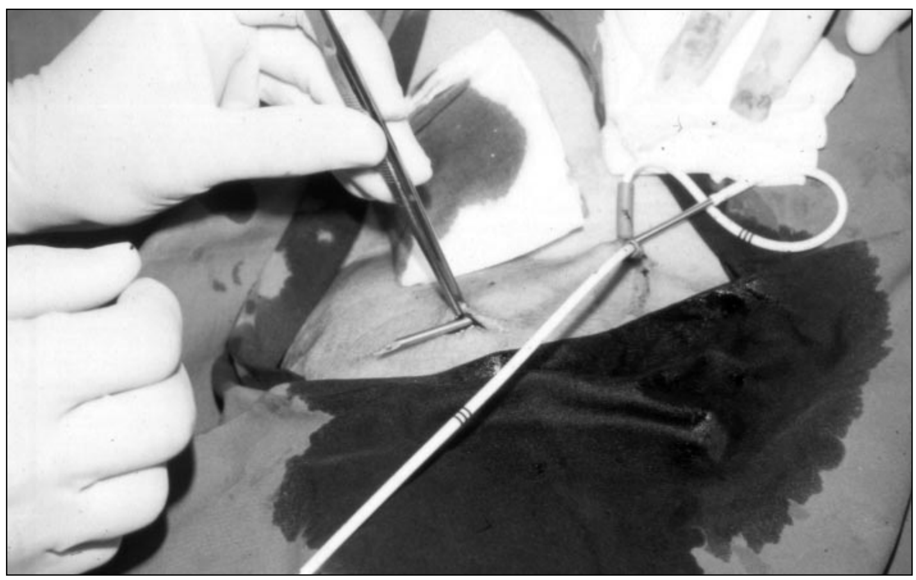
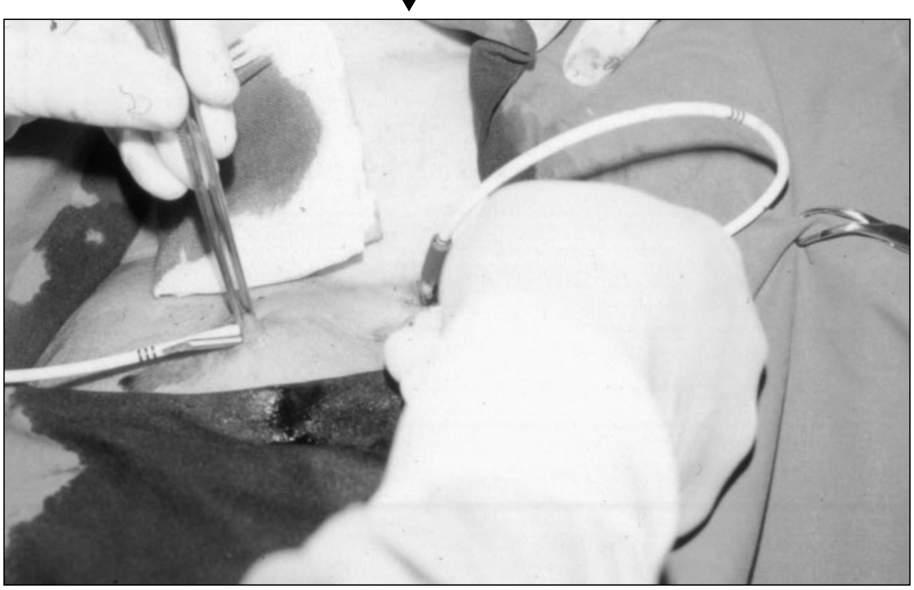


Fig. 5-6 - ***With the help of a Redon needle each catheter is dragged, through a subcutaneous tunnel.***



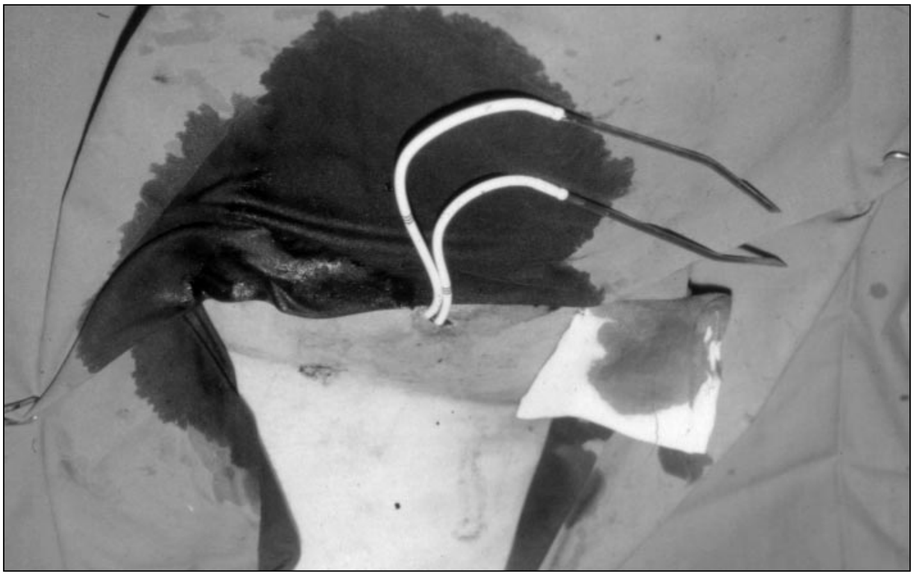


Fig. 7 - ***Both catheters are emerging from the tunnel.***

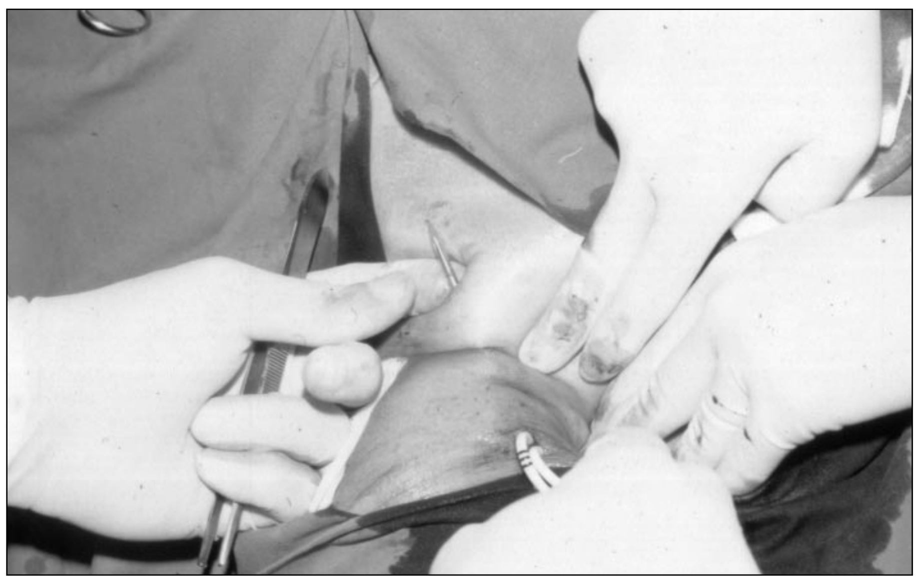
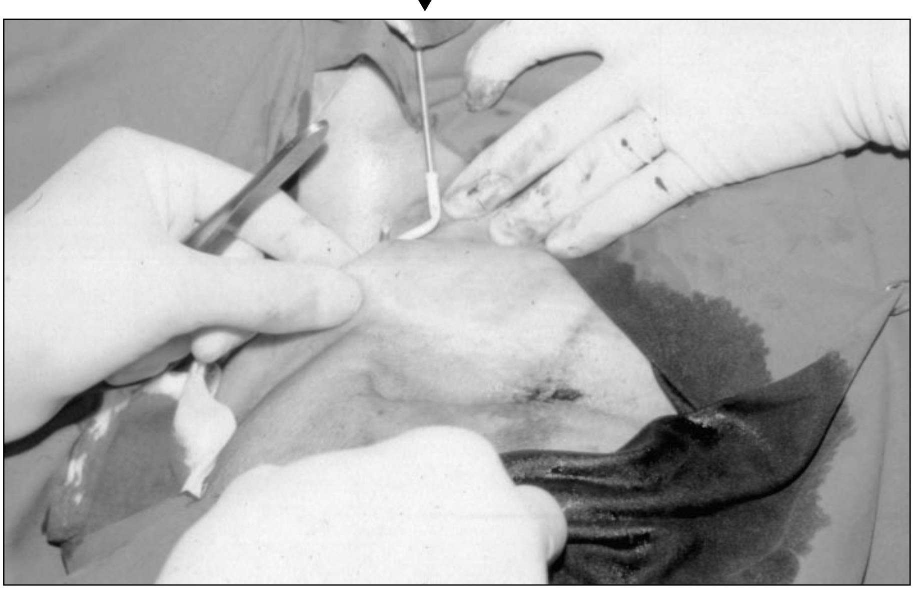


Fig. 8-9 - ***Each catheter is tunnelled upwards, towards the chosen exit site.***



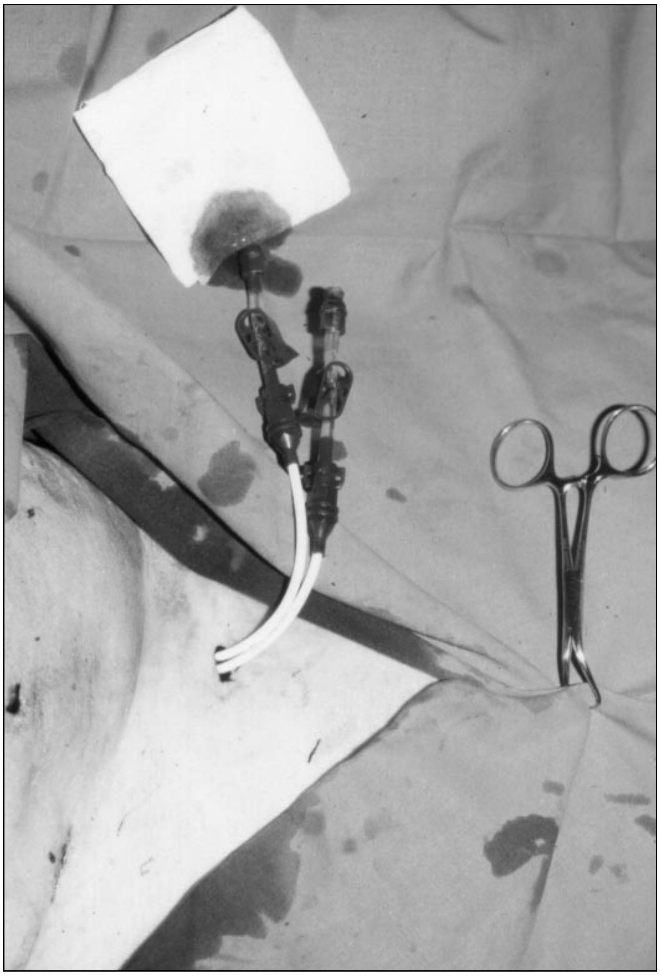


Fig. 10 - ***The catheters are emerging from the skin and are equipped with their respective connecting device.***

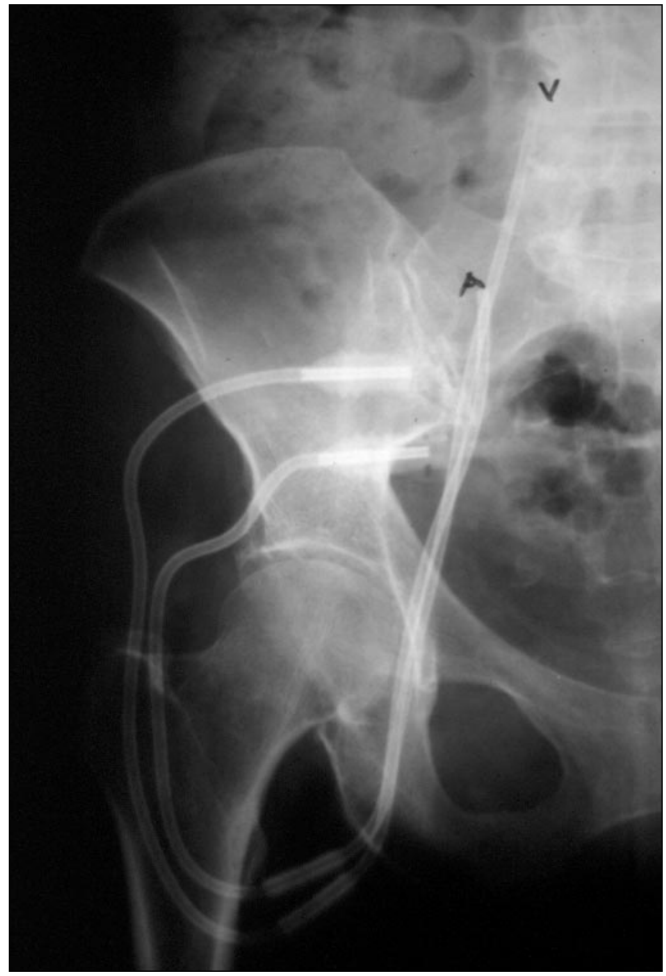


Fig. 11 - ***X-ray picture showing a correct positioning, without kinking and with the correct distance, between arterious and venous extremities.***

from the skin with connecting devices.

A simple cutaneous suture of both incisions is the last step of the operation.

A radiographic control after operation is advisable in order to evaluate the correct positioning, the distance between catheter extremities and the absence of kinking (Fig. 11).

CONCLUSION

Our data indicate that the "high" catheter exit does not affect the lower limb motility. Furthermore another advantage, provided by the antigravitational positioning, is the increased resistance to tractions and dislocations.

Our experience with this new method is still preliminary; presently we have only a 26-month observation period and a too small number of cases for statistical analysis.

Using this technique we easily obtain high blood flow (250 ml/min or more) and, as indicated above another advantage consists in low recirculation (<5-10%). In conclusion, it is not difficult to obtain satisfactory KT/V. Until now we have observed no infection (both of the tunnel site and systemic), and so far no catheter had to be removed due to this complication. Moreover, no venous lumen stenosis, no iliac vein or inferior vena cava thrombosis, no stasis at the lower limb were observed in our series after prolonged use.

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