A New Needle for AV-Fistula Puncture for Adults and Children

J MAGASI, H W ASBACH, K MÖHRING, H W SCHÜLER
University of Heidelberg, German Federal Republic

A new needle for the puncture of subcutaneous arterio venous fistulas as well as larger vessels needed for haemodialysis is proposed (Figure 1). The shaft is made of stainless steel (DIN 4371) with an external diameter of 1.8 mm and an internal diameter of 1.6 mm and is characterised by two new improvements over previously used cannulas.

Besides the normal requirements of a fistula needle such as sufficient lumen to achieve an optimal blood flow, a sharp smoothly polished tip and a polished and siliconised inner and outer surface, the new needle possesses the following additional advantages:
(1) a flexible handle attached to the side of the needle,
(2) an additional opening in the immediate proximity of the tip (Figure 2).

Figure 1. Photograph of the newly constructed needle for av-fistula puncture
Figure 2. Scheme of the needle: (a) handle, (b) additional opening at the tip of the needle, (c) flexible wing of the handle

Figure 3. Photograph of the needle during puncture

Fistula needles used up to this time have either no handle or a transversely positioned one. The latter type has been found to hinder the view of the blood vessel to be punctured and has proven inconvenient while inserting the second fistula needle in that it does not permit the needle to be rotated in the vessel. Rotation of the fistula needle has been shown to be important in achieving positional correction when the blood flow is interrupted during haemodialysis.

The handle of the needle constructed by us is in a lateral position to the shaft, at a 90° angle to the longitudinal axis. The posterior third of the handle can be bent 90 degrees in such a manner that it can be grasped with thumb and index finger during the puncture procedure (Figure 3).
After puncture the turned-up handle can be replaced in its original flat position.

Thus it is possible to rotate the needle up to 180° in the vessel. The 180° rotation of the inserted needle appears to us to be important since the normal, longitudinally cut needle opening is subsequently directed into the axial blood flow (Figure 4).

After rotation, an arm or needle movement will not result in injury of the vessel intima. Thus complications such as local thrombosis or fistula perforation with development of haematoma compressing the fistula are eliminated.

When a position is found in which an optimal blood flow is guaranteed the needle is attached at its handle to the arm of the patient with adhesive tape.

Consequently a dislocation, rotation or an accidental retraction of the needle is impossible.

The second characteristic of the needle is the additional opening at the needle’s tip. Conventional needles, without this additional opening, tend at times to draw endothelium into the needle opening leading to its occlusion so that interruption of the blood flow occurs. Experience has shown that this additional orifice generally prevents this type of flow reduction.