

Tissue folate depletion localised to marrow tissue may explain why the rapid onset of cytopenias occurs in acutely ill patients before total body folate stores are depleted. Patients kept in intensive care for over four or five days should receive oral folic acid to prevent the development of potentially lethal thrombocytopenia and neutropenia. Vitamin B₁₂, which may be deficient in older patients, should also be given, unless the serum concentration is known to be normal.

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¹ Wardrop, C A J, *et al*, *Lancet*, 1975, 2, 640.

² Ibbotson, R M, Colvin, B T, and Colvin, M P, *British Medical Journal*, 1975, 4, 145.

³ Saary, M, *et al*, *Journal of Clinical Pathology*, 1975, 28, 324.

⁴ Herbert, V, *et al*, *British Journal of Haematology*, 1973, 24, 713.

⁵ Lane, F, *et al*, *British Journal of Haematology*, 1976, 34, 489.

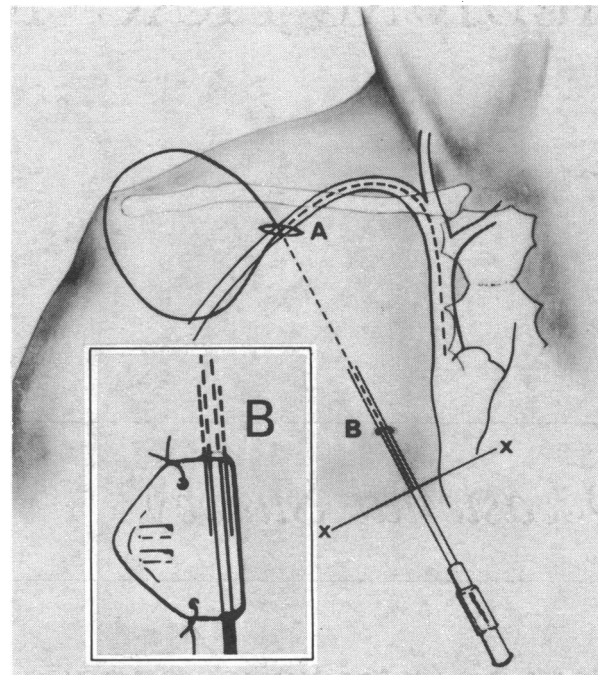
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Department of Haematology, Christchurch Hospital and Christchurch Clinical School of Medicine, University of Otago, Christchurch, New Zealand

M E J BEARD, FRACP, FRCPATH, haematologist

C S HATIPOV, QTA, research technologist

J W HAMER, FRACP, FRCPA, associate professor of pathology



The catheter has been threaded retrogradely through the introducer from A until it appears at B. The introducer is seen partially withdrawn from the skin tunnel and before it is cut in plane X-X leaving 2 cm subcutaneously and 2 cm external to the skin. In the inset a clip has been placed over the catheter and sleeve of introducer and fixed to the skin with sutures.

Skin tunnel for central venous catheter: non-operative technique

Access to the circulation for prolonged intravenous feeding is best obtained using a central venous catheter. Once inserted, a silicone rubber catheter tunnelled under the skin has advantages, but hitherto insertion of a catheter in this way has required an open surgical approach to the central veins. Here I describe a simpler "blind" technique that enables a skin-tunnelled catheter to be used routinely.

Method

The procedure is carried out in a clean room using strict aseptic technique. The patient is sedated and placed in the head-down position. Local anaesthesia is induced with 1% lignocaine. A Vygon silicone rubber catheter* (internal diameter 1 mm) is inserted by a standard infraclavicular approach, except that the introducer is inserted through a 1-cm skin incision (A) made 2 cm below the mid point of the clavicle. The position of the catheter is checked radiologically, ensuring that the tip is correctly placed in the distal superior vena cava or right atrium. The catheter hub is then removed and the introducer withdrawn over the catheter, which is then clipped at the free end.

The introducer is now reinserted through a skin puncture (B) at a convenient site on the anterior chest wall, about 7 cm below and medial to incision A; it is passed through the subcutaneous tissues until its sharp end protrudes through incision A. The catheter is threaded into the introducer at A until the end of the catheter is seen within the transparent introducer at B.

The introducer is partially withdrawn and cut at X-X (see figure) so that 2 cm remains in the subcutaneous tunnel and 2 cm protrudes from the puncture site. The catheter is then pushed fully through the 4-cm sleeve of introducer, care being taken that kinks do not occur at incision A. The catheter is fixed within the surrounding introducer with a plastic spray.† The

*Intralet introducer 1132.17 and silicone rubber catheter No 181.17. Vygon UK Ltd, Unit E, Eskdale Road, Uxbridge, Middlesex.

†Opsite spray. Smith and Nephew Ltd, Welwyn Garden City, Herts.

plastic clip supplied with the catheter is placed to grip both the sleeve and the emerging catheter. The clip is fixed to the skin with two silk sutures (see inset to figure).

The end of the catheter is trimmed, the hub is replaced and fixed with two silk ties, and the drip set is connected to the hub. Incision A is closed with a stitch. Incision A and skin puncture B are cleaned with chlorhexidine in alcohol and, after drying, sprayed with povidone iodine powder. Incision A is covered with a small sterile dressing, and puncture B dressed with Transpore.‡ If a longer skin tunnel is required two or more short skin tunnels can be joined using multiple insertions of the introducer and intermediate incisions.

Discussion

This technique is now used routinely at this hospital in all patients receiving central venous feeding in conjunction with a strict protocol for maintaining asepsis. It has contributed to an increase in mean catheter "life" from 14 days in 1976 to 41 days during the first five months of 1977. The flat anterior chest wall has proved much more convenient to dress than the conventional infraclavicular entry site in the hollow below the clavicle. The sleeve of introducer prevents looping of the soft silicone rubber catheter between its point of fixation and the skin entry site. The skin tunnel helps stabilise the catheter and allows the patient complete freedom of movement. It seems likely that the increased distance between the skin entry site and the vein decreases the risk of infection gaining access to the blood stream from the skin.

‡Transpore, 12 × 10 cm. 3M, 3M Center, St Paul, Mn, USA.

St Mark's Hospital, London EC1V 2PS

J POWELL-TUCK, MB, MRCP, research fellow