THE TEFLON-SILASTIC ARTERIOVENOUS SHUNT

A. E. KULATILAKE

Department of Surgery, Royal Postgraduate Medical School and Hammersmith Hospital, London, United Kingdom

The absence of suitable blood vessels for cannulation may be a major limiting factor in the management of patients on an intermittent haemodialysis programme. In the long term the teflon-silastic shunt has given better results than other forms of cannulation (Quinton et al., 1962; Shaldon, 1966). The survival of arteriovenous shunts depends on the attention to detail both in the technique of insertion and their subsequent management. Detailed accounts of technique and after-care have been given by Retan and Lewis (1966) and Clark and Parsons (1966).

The danger in using the Seldinger technique of I.V.C. cannulation for intermittent dialysis has been stressed by Kulatilake (1966). Some aspects of further studies in the behaviour of the teflon-silastic shunt is presented.

Radiography

Routine soft tissue radiography of limbs and pelvis were carried out. Of 15 patients so investigated 3 showed evidence of arterial calcification though only 2 had some of the limb vessels affected. One patient had to have 7 shunts in the space of 18 months as episodes of leaking and clotting terminated in infection or replacement. Arterienography of the shunt was carried out on 3 patients as a routine 6 monthly procedure for 2 years and in others at episodes of clotting. After testing the sensitivity of the patient 5-6 cc of 60% Hypaque was injected and radiographs taken. If there was evidence of spasm local analgesia was used. Abnormalities of alignment, aneurysm formation or sites of clot in the arterial component were diagnosed (Fig. 1, 2). In the vein the nature and site of the thrombosis with the anatomy of suitable veins for further cannulations were identified.

Histology

When shunts were removed either as a terminal procedure or for replacement, histological studies were carried out. Arteries showed no evidence of reaction to the teflon tip inserted into their lumina even after 2.5 years. Aneurysm formation and thrombosis in the artery at the vessel tip, were seen to occur if a blood pump was used too vigorously and/or following the use of unmoulded tips at cannulation (Fig. 3). On the other hand the vein appeared to be narrowed from hypertrophy of the intima mainly due to arterialisiation and to the incorporation of fragments of fibrin on to the intima (Fig. 4, 5). As further narrowing occurred more episodes of clotting and organisation of clot remnants were evident. This process usually takes 6-9 months. Eventually atrophy of the media with patches of organising thrombi and canalisation was associated with intimal hypertrophy. One vein was found to be fully thrombosed but the re-canalisation was so complete that sufficient blood flowed through it to give an efficient dialysis for 18 months. This patient was maintained on phenindione for the last 14 months.
Anticoagulation

The use of anticoagulants in selected patients has been practised at many centres either as a short or a long term policy. Four of our patients were maintained on phenindione and the results were as shown in Table I. It appears from the follow-up of those patients and from the microscopic studies that if anticoagulation is to be carried out, therapy should be initiated at the first episode of clotting.

Fig. 1. Radial arteriogram of aneurysm at vessel tip.

Fig. 2. Photograph of longitudinal section of aneurysm.
   1. Cannula,  2. Thrombus in cavity.
Fig. 3. Composite picture of vertical section through vessel tip and artery.
1. Damaged segment of arterial wall,
2. Clot adherent at site of damaged intima,
3. Teflon vessel tip.

Fig. 4. Photograph of longitudinal section of venous segment with vessel tip in situ.
1. Bruising of vessel wall from attempted unblocking,
2. Fibrin tags on surface of lumen,
3. Hypertrophic segment,
4. Teflon vessel tip.
Fig. 5. Photomicrograph of transverse section of hypertrophic segment in vein (X13.2).

Results
In the 11 years from 1956 we have performed 2,639 haemodialyses on 528 patients. The experience of shunts in patients on intermittent haemodialyses has been 255 patient months. The average shunt life in these patients has been 13 months.

<table>
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<th>TABLE I</th>
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<td><strong>Effect of anticoagulation on the time of shunt replacement</strong></td>
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<tr>
<td>(4 patients)</td>
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<td>Average life in patient months</td>
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<tr>
<td>Whole shunt</td>
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<td>Arterial end</td>
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<td>Venous end</td>
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REFERENCES


