

VASCULAR ACCESS TO HAEMODIALYSIS: A STUDY OF 38 PATIENTS

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Abstract

A series of 38 patients in whom vascular access for haemodialysis was achieved by establishing an arterio-venous shunt or arterio-venous fistula, is presented. Arteriovenous fistula provides adequate vascular access for long term haemodialysis and is associated with lesser number of complications. Arterio-venous shunt on the other hand is satisfactory for obtaining vascular access for short period of time in patients with acute renal failure. The technique of operation and the incidence of complications of both the procedures are discussed and compared with other published series (JPMA 31:126, 1981).

Introduction

Haemodialysis has become an established method of management for the patients with acute and chronic renal failure. This has been brought about by technical advances in two major aspects of dialysis: the development of an efficient and safe artificial kidney and the provision of a reliable and regular access to circulation.

First experimental haemodialysis was done in animals in the year 1913 (Abel et al., 1913) but the first efficient system for haemodialysis was introduced by Kolff in 1943 (Kolff and Berk, 1944). In the beginning haemodialysis was limited to the treatment of acute renal failure and some acute intoxications because each treatment on an artificial kidney required a separate arterial and venous cannulation for each dialysis. Repeated dialysis was therefore not possible because of the limited number of sites available for arterial and venous cannulation. In 1960 Scribner introduced the technique of using semi permanent teflon silastic arterio-venous shunts (Quinton et al., 1960), which revolutionised the process of haemodialysis and it became possible to obtain repeated access to the patient's circulation. Since then several other methods have been introduced, notably the arterio-venous fistula (Brescia et al., 1966), the autogenous vein graft (May et al., 1969) and the large vessel applique (Thomas, 1969). Presently two techniques are in common use namely semipermanent teflon-silastic arteriovenous shunts and internal arterio-venous fistula.

Material and Methods

Between January, 1978 to January 1981 a series of 38 patients required vascular access for renal disease and were included in the present study. Vascular access was established for acute renal failure in six patients and in 32 for chronic renal disease. The age of the patients varies from 15 to 75 years with an average of 43 years (Table I).

Table I: Age Group in 38 Patients

<i>Age</i>	<i>Number</i>
15-25 years	6
26-35 ,,	8
36-45 ,,	9
46-55 ,,	7
56-65 ,,	4
66-75 ,,	4
Total	38

Of the 38 patients only four were females. Arteriovenous shunts were inserted using a Scribner teflon silastic shunt, the size varied from patient to patient. Initially all shunts were applied in the left forearm but during the later half of the study a definite protocol was followed. In patients with acute renal failure the shunt was inserted in the nondominant hand while in patients with chronic renal failure a shunt was established in the leg followed by the establishment of an internal arterio-venous fistula in the nondominant hand.

Operating Technique

The technique used is that described by Bell (1977). The shunt is inserted about 2 cms proximal to the wrist joint, using radial artery and cephalic vein. After preparing the part 7, an area about 7-8 cms over the radial artery is infiltrated with 2 percent lignocaine. A longitudinal incision is made over the radial artery and the artery is exposed and ligated distally and the largest calibre teflon vessel tip is inserted and secured with silk suture. The lumen of the artery is irrigated with 40 to 50 mis of heparin solution (10 units per ml). Cephalic vein is then exposed through the same incision and cannu-lized and irrigated with heparin solution. The vessel tips are then connected to vessel tubings and the shunt is established. The vessel tubing is brought out through a separate incision and wound is closed in layers. In the leg the posterior tibial artery and long saphenous vein is used.

For internal arterio-venous fistula, radial artery and cephalic vein are exposed as for shunt. Distal end of the radial artery is ligated and is divided. The divided end of the cephalic vein is brought in close approximation with the radial artery and an end to side anostomosis made using 7-0 silk.

Results

Of the 38 shunts and six fistulae one shunt and one fistula failed to function post operatively. Both of these were in the same patient whose vessels were grossly arterio sclerotic. The longest period for which the shunt was used in the present series was 10 months while the shortest was two months. In patients with acute renal failure the shunts were removed after complete recovery. In two patients the

shunts had to be replaced due to clotting. Five fistulae which matured successfully are still providing vascular access. The longest period for which fistula has been used is now two years. Several complications were observed with A-V shunts and are shown in Table II.

Table II: Complications Recorded in 38 Patients with AV Shunts

<i>Complication</i>	<i>No of Patients</i>
Bleeding	8
Infection	4
Clotting	4
Erosion of Skin	3
Dislodgement	1
Gangrene	1
Skin Allergy	1

Bleeding occurred in 20 per cent of the patient.. Of the eight patients in this group, six were seriously ill and dialysis was carried out immediately after inserting the shunt. The process of dialysis requires heparinisation and this may be an important reason for bleeding. However, this can be minimised by pioperly timing the insertion of the shunt 24 hours prior to dialysis.

Erosion of skin and dislodgement was seen in only a few patients and in all of them the shunt was in use for more than 6 months. Gangrene of the big toe occurred in one patient who was confined to bed for several months. Infection was recorded in four patients and controlled by appropriate antibiotic therapy. Clotting of the shunt is not an uncommon problem and was* encountered in four patients. Heparinised saline was used with satisfactory results although in two patients the shunt had to be replaced due to clotting. This seemed to occur more frequently where veins were consumed as a result of repeated intravenous infusions prior to dialysis.

Discussion

Establishment of an arterio-venous shunt is technically a simple procedure and provides satisfactory access to the patients circulation for a limited period of time. However, arterio-venous fistula is the procedure of choice if vascular access is required for a prolonged period of time. The overall cost of inserting a Scribner teflon silastic shunt at present is Rs. 1000/- while that for an A-V fistula is Rs. 200,- although the later procedure requires special technical skill and meticulous care. In patients with end stage renal disease requiring haemodialysis for an indefinite period of time an A-V fistula should be made much before the actual dialysis programme begins. The life of shunt recorded in the present study varied between 2 to 10 months with a mean of 6 months. Haimov (1975) in a collective review

on the vascular access to haemodialysis records the life of shunt varying from two months to two years with a mean of 3 months.

The rate of infection for silastic shunt has been rather high at 13.2 percent and this has probably resulted on account of a large number of emergency procedures performed in the present series. An infection rate varying from 17 to 50 percent has been reported by Foran et al. (1970). Bleeding from the wound following shunt insertion occurred in a number of patients in the early part of the study. Erosion of skin and dislodgement occurs only when shunt is used for a long period of time and is preventable if an A-V fistula is made soon in these patients. Internal A-V fistula although technically difficult and associated with an initial failure rate of 15 to 25 percent (Haimov et al., 1973) is superior to shunt for prolonged vascular access. Once the fistula is established and used successfully the incidence of late failure is low and Byrne and his colleagues (1971) record a failure rate of only 5 percent in patients where fistula has been used for a period of 6 months. To date there are numerous patients who have been maintained on dialysis for more than 5 years with the same arteriovenous fistula (Haimov et al., 1974). Our experience is limited to only six patients with one failure and the fistulae in the rest of the patients is providing satisfactory access to the vascular system and the longest period for which we have used the same fistula is two years.

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