CLINICAL EXPERIENCE WITH A PROTOTYPE OF A NEW RE-WINDABLE COIL KIDNEY

J. HOELTZENBEIN

Department of Surgery, St. Franziskus-Hospital, Münster/Westf., Federal Republic of Germany

Regular dialysis treatment is a rather expensive form of therapy. Membrane support, blood tubing, pumps for blood and dialysate, and the tank for the dialysate are items, however, which can be re-used over and over again. The items which have to be replaced every time are relatively inexpensive, namely cellophane membrane, saline, heparin, dialysate concentrate, and tap water.

We have constructed a simple and efficient dialysis system, details of which are presented in the demonstration in this volume. Very little labour is required to assemble the system. Essentially, it is a coil type device with a length of 10 m dialysis tubing. Perfusion pressure is rather high, therefore a blood pump must be used. Thus, depending on the speed of the blood pump, considerable ultrafiltration can be achieved. The blood tubing support consists of silicone rubber which after flushing is heat sterilized. The coil can then be wound in a sterile fashion within a few minutes. The dry coil is stored until use. No chemical sterilization – for instance with formaldehyde solution – is required. While initially 2 l of saline were used to flush the coil, it is our practice now to use only 1 l of saline. No pyrogenic reactions have been observed in approximately 250 dialyses following this procedure.

Into the last 200 ml of saline which are used for priming, 3 ml of heparin are injected. The blood tubes are then connected to the patient without blood priming. The speed of the blood pump is adjusted between 150 and 200 ml/min. Higher blood speeds are only used for greater ultrafiltration, if required. In approximately 250 dialyses in 5 chronic patients, the average duration of a single dialysis has been about 4 hours. During this time, NPN has been lowered by an average of some 40%. Dialysate volume has been increased from originally 100 l to 150 l to avoid a change of dialysate during dialysis. Since in prolonged dialyses toward the end, the blood level drop in nitrogenous wastes is only slow, it has been our practice to shorten the single dialysis and dialyze—if necessary—more often which is greatly facilitated by the ease of assembly and low cost of our system. On average, 20 to 30 g of urea have been extracted during a single dialysis and the weight loss including the reinfusion amounted to about 1 kg. This is a rather fast ultrafiltration. Because of the reinfusion of blood after completion of dialysis, post-dialysis hypotension was alleviated, however, and the patients were generally able to walk about without feeling drowsy. Practically all of the blood is reinfused out of the machine into the patient; 400 ml of saline are required for this reinfusion leaving only 1/2 ml of whole blood or less in the machine. The fact that blood loss during dialysis is negligible has also been an encouragement for more frequent dialyses. Transfusions of packed cells have been required only initially when a patient entered the programme for correction of anaemia. Later, in the course of treatment, transfusions have been virtually abolished, while the haemoglobin level showed a rising trend spontaneously in almost every patient, although a normal level was not reached. It was our definite impression that more frequent dialyses of shorter duration did much to improve the clinical well-being of the patients.
A PROTOTYPE OF A NEW RE-WINDABLE COIL KIDNEY

(A film was shown illustrating the preparation of dialysate in the tank, flushing and priming of dialyzer with saline, connection to patient, saline wash-in and estimation of residual blood volume.)

The blood lines have no bubble trap or clot filter. After dialysis, the blood is returned into the patient and the amount left in the machine is measured by a complete wash-out. For comparison, 1 ml of the patient's blood is added to an equal amount of saline and the difference in colours noted. The empty cellophane is seen to contain no more blood.