CLINICAL EXPERIENCES WITH THE CONCENTRIC COIL KIDNEY

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The concentric coil kidney, briefly described at the last E.D.T.A.-meeting, combines the advantages of the Kiil-kidney, i.e., low filling volume, pumpless system, with the advantages of the coil kidneys (ready availability, shorter preparation and dialysis time and disposability).

We have used this kidney in 120 dialyses on acute and chronic patients. Kolff has taken our concentric kidney apart into four small coils and adapted its use on a large scale for home dialysis. Let me first briefly demonstrate how such kidneys are made.

Special netting makes spacers unnecessary. The winding board (Fig. 1) allows easy assembly of the coils within 20 minutes each. A novel connection for putting cellophane and silicone rubber tubes together is the prerequisite for quick assembly. A small plastic sleeve replaces the conventional ligatures (Fig. 2).

Clinical use is very simple (Fig. 3). Filling volume of a coil of $4 \times 3$ m (surface area 10,800 cm$^2$) is 400 ml. There is no blood pump necessary under normal conditions which

Fig. 1. Winding board for assembly of the concentric coil.
makes supervision very easy. Heparin is injected once at the beginning of dialysis and again another small dose after three hours, when the 100 litre tank of bath solution is changed. This change is effected within a few seconds. The in vivo clearances of urea have averaged between 90 and 120 ml/min. In vitro clearance at a flow of 200 ml/min. is 130 ml/min. using Visking tubing. It rises to 150 ml/min. when cuprophan tubes are used. Clearance curves tend to level off at a flow of 400 ml/min. at values of 175 and 190 ml/min., respectively. Although clinical blood flows through the pumpless coil depend on the shunt conditions, the blood flows measured by the bubble method have ranged between 120 and in some cases
well above 200 ml/min. My results have been confirmed at the Cleveland Clinic. With a good blood flow, a dialysis time of six hours with one change of bath solution will bring about a decrease of NPN by about 50%. Weight loss during this dialysis time would amount to an average of 1 kg. Greater ultrafiltration which is frequently necessary, can be obtained by the use of a blood pump or, which we have preferred, by addition of glucose to the bath solution. When using cuprophane tubing, in some cases a dialysis time of four hours has been sufficient to maintain patients in good condition, using dialysis twice weekly. With heavier patients dialysis three times weekly was necessary on this basis. We definitely had the impression that the more frequent dialyses did much to improve clinical condition and well-being. In one patient, we have for some time therefore used daily short dialysis of two hours, except for the week-ends. This led to frequent re-use, up to three or four times, of the blood filled coils without any apparent ill effect. Otherwise, blood was regularly collected after dialysis in an ACD-bottle, by tilting the coils into a vertical position and thus driving out the blood with air. Blood loss with this procedure was calculated to amount to 20-35 ml.