Coil Haemodialysis with a Modified "Mingle-pass" Pot

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A prototype mingle-pass 'pot', using a coil, was developed at Ham Green Hospital as an alternative to the Kiil dialyser (Macrae et al., 1969).

This prototype 'pot' was designed to utilise the principles of the Kolff twin-coil mingle-pass dialyser (Travenol Laboratories Inc) but with a great reduction in the overall size. In addition the 'pot' incorporated a method of applying negative pressure to the dialysate compartment, obviating the need for occlusive venous pressure. It was found, however, that excessive fluid loss occurred and that circumferential cuff pressure applied to the coil achieved adequate ultrafiltration. Adaptability to all forms of dialysate supply systems and simplicity in operation were the main considerations in its development.

DESCRIPTION

The dialyser comprises a 'pot' container with clamp and lid to support an Ultraflo 100 coil (Baxter Laboratories Ltd), a recirculating pump, and an overflow. The equipment measures 41 cm in height, 28 cm in width and 24 cm in depth and weighs 10.3 kg. It is manufactured in perspex and stainless steel and may be used free standing or mounted on a single bed supply and monitoring system, as shown in Figure 1.

MODE OF OPERATION

Operational requirements consist of a constant supply of dialysate and an adjustable effluent extraction. With a minimal amount of dialysate running to overflow, a fixed level is maintained in the 'pot' by balancing a constant inflow with the adjustable effluent. The dialysate flow circuit is shown in Figure 2.

RESULTS

In the last two years over 700 dialyses have been performed using the 'pot'.
Table I

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of dialysis</td>
<td>6-8 hours (2-3 times weekly)</td>
</tr>
<tr>
<td>Priming volume</td>
<td>350 ± 50 ml</td>
</tr>
<tr>
<td>Washback volume</td>
<td>500 ± 100 ml</td>
</tr>
<tr>
<td>Residual volume</td>
<td>3 ml packed cells</td>
</tr>
<tr>
<td>Burst rate</td>
<td>5%</td>
</tr>
<tr>
<td>Ultrafiltration rate</td>
<td>350 ± 30 ml/hour at:</td>
</tr>
<tr>
<td></td>
<td>venous pressure 50 mm Hg</td>
</tr>
<tr>
<td></td>
<td>cuff pressure 150 mm Hg</td>
</tr>
<tr>
<td>Pre-dialysis blood urea</td>
<td>160 ± 35 mg/100 ml</td>
</tr>
<tr>
<td>Post-dialysis blood urea</td>
<td>60 ± 20 mg/100 ml</td>
</tr>
<tr>
<td>Urea dialysance (blood flow of 150 ml/min)</td>
<td>160 ml/min</td>
</tr>
</tbody>
</table>

The dialysis characteristics are summarized in Table I.

The 'pot' has been used in a Renal Unit whose regular dialysis programme is provided by Kiil dialysers. This situation has allowed comparisons to be
made and conclusions to be drawn, and these are outlined below:

ADVANTAGES

Adaptable to all forms of dialysate supply systems
Reduced risk of hepatitis dissemination amongst patients and staff
   (a) minimal exposure to blood on dismantling dialyser
   (b) simple effective chemical sterilisation, eg formaldehyde
   (c) disposable dialysis element, ie 'Ultraflo' 100 coil

Shorter dialysis time
Reduced staff work load
Quicker home training
Cheaper home conversions
No pyrogenic reactions
Ideal in post-operative patients — shorter period of heparinisation.
DISADVANTAGES

Cost of coils remains high
Theoretical possibility of increased incidence of dis-equilibration
(not encountered in this series).

CONCLUSIONS

The increasing incidence of a dialysis-associated hepatitis will continue to
stimulate interest in disposable dialysers. The ultimate aim is for a com-
pletely disposable dialyser.

In the reference unit, which runs a combined dialysis and transplant pro-
gramme, the most impressive application of the 'pot' system is in the dialy-
sis of the post-transplanted patient. Here, short frequent dialyses with
minimal heparinisation are indicated.

The ultimate success of maintenance haemodialysis is measured by the
degree of patient rehabilitation and is reflected by the plane of nutrition,
arrest and reversal of the uraemic syndrome and the control of hypertension.
Over the relatively short period of two years this method of dialysis, using
the Ultraflo 100 coil compares very favourably with successful Kii1 dialysis.
However, what is of fundamental importance is its greater patient acceptance
and its simplicity in use. In view of the many advantages it is felt that a
wider application of the 'pot' is warranted.

ACKNOWLEDGMENTS

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REFERENCE

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