A New Semi-Automatic Peritoneal Dialysis System

A. VERCELLONE, G. PICCOLI, P. L. CAVALLI, S. ALLOATTI and G. P. SEGOLONI

Clinica Medica Generale, Università di Torino, Turin, Italy

Further clinical experience with a personal automatic Peritoneal Dialysis system, presented at the 1968 EDTA, has confirmed the practicability and safety of in-line sterilisation of the dialysis liquid with a Millipore filter (0.22μ) and of the use of a closed circuit which prevents contamination during use.

With this system it is possible to effect a rapid cycle dialysis with an increase in the efficiency of dialysis, without overburdening the nurses and with a low working cost.

A more simple model has now been developed. This is semi-automatic and retains the most important advantages of the original instrument.

The uncomplicated operation of this instrument, reduced to the simple movement of a lever, does not require skilled personnel to work it, and the conduction of the dialysis can often be entrusted to the patients themselves.

The instrument works as follows:

A pump draws the dialyzing solution from a reservoir and sends it through a Millipore filter (0.22μ) and through a heater to a plastic bag connected to a measuring dynamometer which when the desired quantity of liquid is reached, stops the pump. A hand controlled valve alternately opens the inlet and the outlet of the dialyzing liquid from the peritoneal cavity of the patient. When it is moved to the withdrawal position, it puts the feed pump into motion to fill the plastic bag. In the liquid in-put position inside the peritoneal cavity the electric feed of the pump is interrupted, thus avoiding a forced introduction of an undesired quantity of solution.

The system is fitted with a suction pump to speed up liquid extraction.

The set is capable of obtaining a high flow 'rapid-cycle' dialysis.

Ing. Elio Colussi and Dr. Emilio Denti of the Biomedical Engineering Department of Sorin (Italy) carried out the technical development.
Simultaneous treatment of two patients is envisaged.

The satisfactory condition of the Millipore filter is tested by air injection at 2 atm. If the filter is sound, this air will not pass. Injection takes place upstream from the filter by the vacuum and pressure pump.

The safety of the Millipore filter (0.22μ) under conditions of prolonged work and intermittent demand by the dialytic techniques has been confirmed through bacteriologic investigations, by filtering 40 litres of a solution contaminated by Staphylococcus (Oxford strain), Escherichia Coli and Bacillus Subtilis.

The endoperitoneal introduction into the rabbit of pyrogenic substances has produced febrile reaction although sometimes late and slight. For this reason it is advisable to use a non-pyrogenic concentrated solution and fresh distilled water.

The addition of penicillin in a dose of 100,000 I. U. reduces bacteric multiplication in the reserve tank.

REFERENCES


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Figure 1. Peritoneal dialysis circuit diagram:
1. Supply tank for dialysis fluid; 2. Safety tank; 3. Circulating pump;
4. Thermostatic bath; 5. Sterilizing filter (Millipore 0.22μ);
6. Automatic measuring balance; 7. Sterile reservoir and circuit in PVC;
8. Collecting and measuring tank; 9. Vacuum and pressure pump;
V1. By pass; V2. Non-return valve; V3-V4. Safety valves;
E1-E2. Alternating valve; CP. Peritoneal cavity.
Figure 2. The new semi-automatic peritoneal dialysis machine