SINGLE NEEDLE CONTINUOUS FLOW HAEMODIALYSIS WITHOUT A CONTROL MODULE

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Grimsrud et al. were the first to design a double lumen single needle which could be used for haemodialysis without auxiliary equipment. The main problem was clotting in the annular space between the inner and outer needle.

McLaughlin succeeded in manufacturing a new version of this needle ('Duo cath') which was used in 26 patients with different types of blood access by Kaplan et al., and Hansen and Rosen. The decrease in BUN and creatinine concentration during dialysis with this single needle was not significantly different from two needle dialysis. There was also no difference in the fall of haptoglobin.

The device consists of a 13 gauge (arterial) needle through which a 16 gauge (venous) needle with a blunt end is inserted. The two channels are separated from each other and both needles function simultaneously during dialysis (continuous flow), allowing dialysis without the use of a control module.

Insertion into the bloodstream is by means of a 17 gauge needle; the puncture hole is stretched to accommodate the 13 gauge outer needle.

The present report pertains to recirculation studies in 10 patients at a bloodflow rate of 200 to 210 ml/min. Nine patients had an a-v fistula, and one patient a saphenous loop in the forearm. Using urea, the percentage recirculation R was calculated from the formula \[ R = \frac{A-a}{A} \times 100 \], in which \( A \) = concentration in systemic venous blood, \( a \) = concentration in pre-dialyser blood and \( v \) = concentration in post-dialyser blood.

The percentage range of recirculation was between 0 and 18.1% (Table I). In some patients the test was repeated during different dialyses. The persistent high percentage of recirculation in patient Fr. was probably caused by a fistula aneurysm which acted as a mixing chamber.

Additional Remarks
The double lumen needle is harder to insert; a straight portion of a vessel with a length of 2 cm is needed. A small amount of blood is spattered during
insertion of the venous inner needle, which incorporates a risk when used in HBAg positive patients. It is important that the needle is in the middle of the blood vessel to avoid suction and uneasy dialysis. The outflow pressure is 10 to 15 mmHg higher than in conventional dialysis.

We have not encountered clotting in the needle, and the post dialysis sealing time was normal.

Dialysis duration should be longer than for two needle dialysis if there is substantial recirculation.

Conclusion

The new double lumen single needle is a useful modification for single needle dialysis as no additional control equipment is needed. The recirculation in most patients was below 10 percent.

References

2 Kaplan, MS, McLaughlin, W, Mirahmadi, KS, Winer, R and Gorman, JT (1977) Dial. and Transpl., 6, 34
3 Hansen, SK and Rosen, SM (1977) Dial. and Transpl., 6, 45