

COMPARISON OF ALUMINIUM REMOVAL ON AN AN69-S MEMBRANE AND A CHARCOAL FILTER

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Summary

In three patients with aluminium intoxication the efficacy of aluminium removal during haemodialysis was studied using alternating in each patient AN69-S membrane dialyser and a cuprophane fibre filter combined with a charcoal filter. The AN69-S membrane is favoured for its lower costs, fewer side effects and equal efficacy of aluminium removal.

Introduction

Aluminium intoxication is an increasing frequently recognized complication in patients on haemodialysis. The use of desferrioxamine and a dialysate with a low aluminium concentration are important therapeutic measures.

The standard method of treatment for aluminium intoxication employs, in addition, the use of a charcoal filter to increase the aluminium removal during dialysis. However, this method also adds to costs and complications (thrombosis, increased blood loss, ether taste etc).

Simon et al [1] reported higher aluminium clearances obtained with a polyacrylonitrile dialyser (AN69-S) compared to a cuprophane hollow fibre dialyser, both in combination with desferrioxamine treatment. However, information is not available comparing the efficacy of aluminium removal by the standard method of treatment (cuprophane combined with a charcoal filter) to that of the AN69-S membrane. Equal or better performance by the AN69-S membrane might result in the termination of the use of charcoal filters with the inherent problems, costs and complications. This study compares these two methods of treatment in patients with aluminium intoxication.

Methods

We studied three patients (2 females, 1 male) aged 35, 61 and 74 years, on chronic haemodialysis, in whom a diagnosis of aluminium intoxication was made based on the presence of increased blood aluminium and of stainable aluminium in bone biopsies. The three patients were treated with weekly intravenous injections of 1g desferrioxamine at the end of a dialysis session, followed in the next

dialysis session by the alternating use of a cuprophane hollow fibre filter (AM720, 1.3m², Asahi) combined with a charcoal filter (70g, Dia-Kart®) or an AN69-S (Biospal 2400, 1m², Hospal) artificial kidney. Dialysis was performed twice weekly for four-and-a-half hours with a blood flow of 200ml/min, a dialysate flow of 500ml/min and an open circuit single patient unit (Monitral). Measurements of aluminium were performed by flameless atomic absorption spectrophotometry [2].

During 24 dialyses pre-and post-dialysis blood samples were taken for determination of aluminium and all results were corrected for total protein content. The dialysate aluminium was always <2µg/ml.

Results and discussion

The mean serum aluminium pre-dialysis and post-dialysis are shown in Table I for each of the two different artificial kidneys. Since the clearance of aluminium during the course of a haemodialysis session with charcoal filters decreases [3] results are expressed as the differences between pre- and post-dialysis values.

TABLE I. Aluminium serum (µg/ml) pre- and post-dialysis using two different artificial kidneys (mean ± SD)

	Cuprophane + charcoal (n=14)	AN69-S (Biospal 2400) (n=10)
Pre-dialysis	186±21	194±30
Post-dialysis	91±25	109±34
Δ aluminium	91±17	84±15

No significant differences between these mean aluminium levels were found.

With each system an equal decrease in serum aluminium (Δ aluminium) was obtained. Furthermore, the AN69-S membrane was better tolerated by the patients and led to fewer complications than those encountered by the use of the charcoal filter.

The combined costs of the cuprophane and charcoal filter exceeds the costs of the AN69-S membrane kidney.

In conclusion, this study shows that during treatment with desferrioxamine the aluminium removal obtained with the AN69-S membrane is identical to that of a cuprophane filter combined with a charcoal filter. Since the latter is associated with high costs, side effects and several complications the use of the AN69-S membrane is preferred in patients with aluminium intoxication.

References

- 1 Simon P, Allain P, Ang KS et al. *Proceedings symposium Aluminium and Renal Failure*, Antwerpen, December 1983
- 2 Wolff FA de. *Clin Nephrol* 1985; in press
- 3 Simon P, Ang KS, Cam G et al. *Lancet* 1983; ii: 1489