Dialysis-Associated Amyloidosis in a Patient on Long-Term Post-Dilutional Hemofiltration

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Dear Sir,

Amyloidosis is a common complication found among long-term hemodialyzed patients [1, 2]. This type of pathology has not been reported, however, in patients with end-stage renal failure receiving continuous ambulatory peritoneal dialysis, or post-dilutional hemofiltration. Using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), Gejyo et al. [3] isolated a band at the 11-kilodalton level which was identified as β 2-micro-globulin (B2M) by N terminal sequence analysis. However, no correlation was found between serum B2M and the incidence of amyloidosis [4]. In this context we wish to report a case of amyloidosis in a patient treated mainly by hemofiltration.

A 54-year-old woman was followed for familial poly-cystic kidney disease. In 1975, she was started on home hemodialysis for 5 h three times weekly using cupro-phane membranes. In 1980, she was transferred to hemofiltration using polysulfone (TM30 Amicon Co, Lexington, Ma., USA), polyacrylonitrile (PAN 200 Asahi Co, Tokyo, Japan) and polyamide (FH 77 Gambro AG, Lund, Sweden) membranes. In January 1986, the patient developed carpal tunnel syndrome in her left wrist. Pain relief was immediately obtained after surgery, during which gelatinous-like material was removed. This material had the tinctorial characteristics of amyloid. Protein constituents were determined by SDS-PAGE (fig. 1 A) after trichloroacetic acid precipitation. In comparison with the gel electrophoresis profile of carpal amyloid deposits from another patient treated solely with cupro-phane membranes (fig. 1 B), the band isolated at 11 kilodaltons was very light and bands in the 10- to 30-kilodalton range were also light or missing. Most proteins in figure 1A were larger than 35 kilodaltons.

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Fig. 1. Sodium dodecyl sulfate polyacrylamide gel electrophoresis of 2 patients with amyloid deposits. A Sample from the patient presented in the text. B Sample obtained from a patient hemodialyzed solely with cuprophane membrane for more than 10 years. Methods used were the same for the two samples. Markers of molecular weight are (STD), from bottom to top: α -lactalbumin (14×10^3 daltons); soybean trypsin inhibitor (20×10^3 daltons); carbonic anhydrase (30×10^3 daltons); ovalbumin (43×10^3 daltons); bovine serum albumin (67×10^3 daltons), and phosphorylase b (94×10^3 daltons). Note that while B has predominant low molecular weight proteins (among which B2M), A has only light amounts of such proteins lower than 30×10^3 daltons.

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The patient reported here had a characteristic carpal tunnel syndrome despite the fact that she was continuously treated with hemofiltration for 6 years. (For the preceding 49 months this patient was treated by hemodialysis. We cannot ignore the possible influence of this period on the amyloidosis.) Polyamide, polyacrylonitrile and polysulfone membranes have a cut-off greater than 12 kilodaltons and B2M removal is considerably increased with synthetic membranes in comparison with cellulose membranes [5]. Nevertheless, our patient developed carpal tunnel syndrome in the absence of any known cause of primary or secondary amyloidosis. SDS-PAGE showed two different protein patterns in the 2 patients with amyloid deposits treated with different substitutive modalities: hemodialysis and hemofiltration. In contrast to the patient treated by hemodialysis, the protein pattern of hemofiltration associated amyloidosis lacked proteins smaller than 30 kilodaltons. This observation suggests that there are several protein patterns of hemodialysis/hemofiltration-associated amyloidosis and that this pathology can be due to the accumulation of different protein species. As demonstrated by Gejyo et al. [3] and Connors et al. [6], B2M is probably one of these proteins. However, our study shows that amyloid fibrils in long-term end-stage renal disease patients can be produced even if B2M is not the major protein constituent.

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