Intraocular Pressure in Chronic Renal Failure Patients Treated with Maintenance Hemodialysis

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Key Words

Blood pressure
Body weight
Hemodialysis
Intraocular pressure

Abstract

Ocular complications are frequent in chronic renal failure patients treated with maintenance hemodialysis (HD) and in renal allograft recipients. Headache, nausea and fatigue sometimes develop in combination with a rise in intraocular pressure (IOP). We did not find statistically significant differences in IOP before and after HD. There was no correlation between changes in IOP during HD and the decrease in systolic and diastolic blood pressure or decrease in body weight. No patient had borderline or elevated IOP following HD. Due to improved dialytic techniques a significant rise in IOP during HD rarely occurs anymore.

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Introduction

Ocular complications are frequent in chronic renal failure patients treated with maintenance hemodialysis (HD) and are also frequent in renal allograft recipients [1-3]. HD patients sometimes complain of headache, nausea and fatigue, developing a few hours after HD has begun and disappearing some time after it is terminated. Sometimes these complaints develop in combination with a rise in intraocular pressure (IOP) and a simultaneous increase in cerebrospinal fluid pressure [3]. The aim of our study was to evaluate the IOP before and after HD and to determine the possible correlation with systolic and diastolic blood pressure before and after each HD and with body weight reduction after each HD.

Subjects and Methods

Thirteen patients (5 female and 8 male, chosen randomly from 55 of our patients) with chronic renal failure treated with HD were included in our study. The diagnoses of underlying renal disease are listed in table 1. No patient included in the study was diabetic. The average age of patients was 38 years (ranging from 17 to 55 years, SD $\pm$ 11 years) and average duration of HD treatment was 27 months (ranging from 2 to 81 months, SD $\pm$ 25 months). IOP was measured with Goldmann applanation tonometer in both eyes before and half an hour

Table 1. Diagnosis of end-stage renal disease according to the European Dialysis and Transplantation Association – European Renal Association in our patients

Patients, n

Diagnoses

after HD. Systolic and diastolic blood pressure were routinely measured with sphygmomanometer before and after HD. Predialytic blood pressure was measured after 15-min rest, before the dialysis needle was inserted. Postdialytic blood pressure was measured 15 min after the completion of the HD session. Student's t test for paired data and linear correlation were used in the statistical analysis.

Results

IOP before HD was 14.8 ± 2.7 mm Hg in the left eye and 15 ± 3.1 mm Hg in the right eye. After HD, IOP was 13.9 ± 2.1 mm Hg in the left eye and 14.3 ± 2.2 mm Hg in the right

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eye. The differences in the IOP before and after HD were not statistically significant in both eyes. No patient had borderline or elevated IOP following HD. Systolic blood pressure before HD was 142.3 ± 20 mm Hg and 131.9 ± 23.2 mm Hg after HD ($p < 0.03$). Diastolic blood pressure before HD was 85.4 ± 7.8 mm Hg and 76.9 ± 10.3 mm Hg after HD ($p < 0.01$). Following HD body weight decreased by 2.3 ± 0.6 kg. There was no correlation between the changes in IOP and systolic and diastolic blood pressure reduction or with body weight reduction.

Discussion

Ocular complications are frequent in chronic renal failure patients treated with maintenance HD. Conjunctival and corneal calcifications are frequent and generally asymptomatic [3-9]. Conjunctival irritation due to calcium deposits in the most superficial layer is possible and is known as 'red eyes of renal failure' [3,6, 7]. Conjunctival hemorrhages are sometimes seen in HD patients and are also generally asymptomatic [3,10]. Lens opacities are uncommon in HD patients and usually do not cause visual complaints [3]. Retinal vascular accidents may occur in HD patients disturbing visual acuity [3]. Ocular complications are also frequent in renal allograft recipients and are a significant cause of morbidity [1-3].

Increased IOP was observed during HD in uremic patients and dogs [11-13]. It was suggested that increased IOP

evolved from a decrease in plasma osmolality during HD and fluid shift into the eye. Ramsel et al. [14] and Rever et al. [15] did not find a significant rise in IOP pressure following HD sessions. Gafer et al. [16] found no correlation between the changes in IOP and osmolality following HD. They also did not find any correlation between changes in IOP and body weight and mean blood pressure reduction [16]. In our study we did not find any statistically significant differences in IOP before and after HD. There was also no correlation between changes in IOP during HD and the decrease in systolic and diastolic blood pressure or decrease in body weight. In our study no patient had borderline or elevated IOP following HD. The risk of severe IOP rise following HD seems to be remote. Due to improved dialytic techniques and better uremia control a significant rise in IOP during HD rarely occurs anymore [17]. But patients with occult glaucoma could meet with different risk on HD because their IOP can rise following HD [1,16]. Raised IOP is also a potentially dangerous complication of long-term steroid therapy in renal allograft recipients. Das et al. [2] reported an incidence of raised IOP in 5% of renal transplant recipients, Porter et al. [18] in 7.7% and Astle and Ellis [19] in 11.3%. Glaucomatous field

defects and optic atrophy may develop in those patients who remain untreated [2]. Raised IOP may be asymptomatic in HD patients who are also possible renal transplant recipients, so early detection and management of this potentially dangerous ocular complication is important. This highlights the importance of regular ocular screening of all HD patients and transplant recipients.

References

- Stein G, Strobel J: Augenveränderungen bei Patienten mit chronischer Niereninsuffizienz und Hämodialysepatienten. *Nieren und Hochdruck* 1994;23:309-314.
- Das T, Gupta A, Sakhuja V, Gupta KL, Minz M, Chugh KS: Ocular complications in renal allograft recipients. *Nephrol Dial Transplant* 1991; 6:649-655.
- Polak BCP: Ophthalmological complications associated with haemodialysis; in Maher JF (ed): *Replacement of Renal Function by Dialysis: A Textbook of Dialysis*. Dordrecht, Kluwer Academic Publishers, 1989, pp 987-991.
- Parfit AM: Soft-tissue calcification in uremia. *Arch Intern Med* 1969;124:544-556.
- Kuzela DC, Huffer WE, Conger JD, Winter SD, Hammond WS: Soft tissue calcification in chronic dialysis patients. *Am J Pathol* 1977;86: 403-417.
- Berlyne GM, Shaw AB: Red eyes in renal failure. *Lancet* 1967;i:4-7.
- Porter R, Crombie AL: Corneal and conjunctival calcification in chronic renal failure. *Br J Ophthalmol* 1973;57:339-343. 14
- Klaassen-Broekema N, van Bijsterveld OP: Limbal and corneal calcification in patients with chronic renal failure. *Br J Ophthalmol* 1993;77:569-571.
- 16
- 17
- Pahor D, Hojs R, Gracner B: Conjunctival and corneal changes in chronic renal failure patients treated with maintenance hemodialysis. *Ophthalmologica* 1995;209:14-16.
- Pambor R, Pap I: Netzhautveränderungen unter der Hämodialyse. *Folia Ophthalmol* 1977;2: 114-116.
- Sitprija V, Holmes JH, Ellis PD: Changes in intraocular pressure during hemodialysis. *Invest Ophthalmol* 1964;3:273-284.
- Watson AG, Greenwood WR: Studies on the intraocular pressure during hemodialysis. *Can J Ophthalmol* 1966;1:301-307. 19
- Burn RA: Intraocular pressure during haemodialysis. *Br J Ophthalmol* 1973;57:511-513.
- Ramsel JR, Ellis PP, Peterson CA: Intraocular pressure changes during hemodialysis. *Am J Ophthalmol* 1971;72:926-930.
- Rever B, Fox L, Bar-Khayim Y, Nissenson A: Adverse ocular effects of acetate hemodialysis. *Kidney Int* 1981; 19:157.
- Gafter U, Pinkas M, Hirsch J, Levi J, Savir H: Intraocular pressure in uremic patients on chronic hemodialysis. *Nephron* 1985;40:74-75.
- Gutman SM, Vaziri ND: Effect of hemodialysis on intraocular pressure. *Artif Organs* 1984;8: 62-65.
- Porter R, Crombie AL, Gardener PS, Uldall RP: Incidence of ocular complications in patients undergoing renal transplantation. *Br Med J* 1972;iii: 133-136.
- Astle JN, Ellis PP: Ocular complications in renal transplant patients. *Ann Ophthalmol* 1974; 6:1269-1273.

326

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Hojs/Pahor