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Hypertonic solutions for the treatment of diabetic patients in peritoneal dialysis

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Diabetes is the leading cause of kidney failure. To stay alive, most of kidney failure patients must go on dialysis. A significant proportion of diabetic kidney failure patients are treated with peritoneal dialysis (PD), an home-based therapy where the excess of fluid can only be removed by filling the peritoneal cavity with an hypertonic solution containing large amounts of glucose. The high glucose load along with insulin treatment, the only anti-diabetic therapeutic option available, result in survival rates much worse for diabetic kidney failure patients than for non-diabetic patients. Therefore, diabetic kidney failure is a condition with a significant unmet medical need. Our aim is to complete the development of proprietary anti-diabetic hypertonic PD solutions, containing different combinations of xylitol, L-carnitine and polydextrin. These innovative PD solutions will be characterized by osmotic strengths comparable to those commercially available, but with higher biocompatibility and able to ameliorate glycemic control in diabetic patients in PD therapy. Our hypertonic PD solutions are expected to improve dialysis efficiency and increase survival rates of diabetic patients in PD. In addition, insulin and non-insulin dependent diabetic kidney failure patients in PD may equally use our hypertonic solutions.

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Increase intraocular pressure (IOP) during hemodialysis, rare condition: Serious complication

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Introduction: For years, so many complications of hemodialysis have been well documented. However, elevated intraocular pressure (IOP) from HD is an extremely rare finding. In fact, this has led to eyeball evisceration in some cases that were refractory to treatment modalities.

Case: A 53 years old man with hypertension, DM and ESRD on hemodialysis presented to the ER with shortness of breath and edema. He reported failing to complete four sessions of dialysis due to headache and eye pain. The patient mentioned that during the dialysis he was having headache 9/10, which was relieved few hours after stopping dialysis sessions. Pain was associated with nausea and blurry vision. He denied any previous history of laser eye surgery or glaucoma, but has had bilateral cataract surgery within the past year. On examination, patient had generalized edema. Vitals were BP: 170/90, Temp 96.9F, PR: 70 and RR: 20. Lab findings; WBC: 12000, Hemoglobin: 9.8, Platelets: 219000, K = 6.5, BUN=92, Creatinine=12.40, Calcium: 10.4, Pro BNP=5760 and EGFR: 5.18. CT head was unremarkable. Urgent hemodialysis was initiated, during which patient became confused and agitated. He started complaining of bilateral eye pain with occipital headache. This prompted for ophthalmology consult. Measured IOP was 38 (right) and 34 (left) mmHg. Optic cups showed temporal pallor in both eyes. Gonioscopy revealed pigment dispersion in the right eye in the trabecular meshwork (part of the aqueous humor drainage system of the eye). Left eye anterior chamber showed no pigment deposition. IOP dropped down to 24 OD (right eye) and 22 OS (left eye) one hour after commencing Alphagan 0.15%, Xalatan and Timolol 0.5% OU, with further drop in IOP to 18 bilaterally in two hours. Diamox 500 mg PO TID was also added. After few days of treatment, he was able to tolerate hemodialysis with no more eye pain or headache.

Discussion: Few publications have cited the possibility of hemodialysis leading to elevated IOP especially in susceptible eyes as seen in our patient. However, the pigment deposition (that might be a complication of cataract surgery) was not observed on the left eye. This suggests the possibility of hemodialysis leading to elevated IOP even in a non-susceptible eye. This may happen due to the rapid decrease in serum osmolality leading to shift of fluid from plasma to the aqueous humor as a result of osmotic disequilibrium. Our patient had some occlusions of his trabecular meshwork in the right eye, which could explain the development of his symptoms recently, despite been on hemodialysis for years. Acetazolamide has been used with precautions of metabolic acidosis.

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