

Case Report

Acute Angle closure Following Hemodialysis in a 34-Year-Old Nigerian Female

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ABSTRACT

Studies have reported that intraocular pressure (IOP) might change markedly during hemodialysis. We report the case of a 34-year-old Nigerian female with a 3-year history of chronic kidney disease secondary to chronic glomerulonephritis who presented with acute symptomatic elevation of IOPs following hemodialysis. She had no ocular complaints immediately before undergoing hemodialysis. She presented with a history of pain, redness, and mild blurring of vision in the left eye about 15 min after hemodialysis. Examination revealed circumciliary injection, shallow anterior chambers, and closed angles on gonioscopy in both the eyes. She was treated with pilocarpine (4%) four times daily and dorzolamide/timolol (2%/0.5%) twice daily combination eye drops with subsequent relief of symptoms and IOP reduction from an initial 48 and 74 mmHg to 10 and 12 mmHg for the right and left eyes, respectively. This case highlights the need for sensitization and awareness among renal physicians and ophthalmologists of the possibility of extremely high IOP during or immediately following hemodialysis. It also emphasizes the importance of gonioscopy and treatment of at-risk patients with narrow angles before hemodialysis.

KEYWORDS: Angle closure, hemodialysis, intraocular pressure

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INTRODUCTION

Several ocular alterations such as refractive changes, retinal nerve fiber layer thickness changes, intraocular pressure (IOP) changes, and central corneal thickness changes have been associated with hemodialysis.^[1] Studies have evaluated the relationship between hemodialysis and intraocular (IOP). Some reported an increase in IOP^[2] while others have reported a decrease or no change in IOP.^[3,4]

Significant rise in IOP, however, has been reported during hemodialysis in patients who have compromised outflow facility such as patients with narrow angles and exfoliative glaucoma.^[2,5] De Marchi *et al.* in an earlier study reported an excessive rise in IOP in patients with narrow angles whereas IOP remained unchanged in patients with normal angles.^[6]

Patients with predisposed narrow angles and consequent impaired aqueous outflow may have intolerable IOP

rise which can lead to blindness. We report a case of a woman with predisposed anterior chamber outflow facility who had very high spike in IOP immediately after hemodialysis.

CASE REPORT


The ophthalmology unit received a referral from the renal physicians about a 34-year-old female being managed for acute exacerbation of chronic kidney disease secondary to chronic glomerulonephritis. She complained of redness, pain, blurry vision, and halos around light in the left eye with associated left-sided headache and vomiting immediately after her fourth session of hemodialysis. She had a similar episode following her first session of hemodialysis 3 weeks prior for which she did not

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receive any ophthalmology consultation but had gradual resolution of symptoms over 48 h. There were no other previous similar complaints or eye treatments. The patient was otherwise normal and had no personal or family history of migraines or headaches. There was also no family history of glaucoma or other blinding eye disease.

The patient had been managed conservatively with antihypertensives, iron supplements, erythropoietin, phosphates, and Vitamin D for chronic kidney disease secondary to chronic glomerulonephritis for 3 years. She, however, had an acute exacerbation of kidney disease which necessitated hemodialysis and hospital admission.

Ocular examination revealed slightly reduced vision in the left eye (visual acuity right eye: 6/5 and left eye: 6/9), circumciliary injection of the conjunctiva, and slight corneal edema of the left eye. The conjunctiva in the right eye was white, and the cornea was clear. The central and peripheral anterior chambers in both the eyes were shallow (Van Herrick's Grade 2). Gonioscopy with the Posner gonioleus revealed closed angles with no view of any of the structures of the anterior chamber angles in all quadrants with an iridocorneal angle of 10° and a convex iris approach in both the eyes (Shaffer's Grade 0). The pupil in the right eye was briskly reactive and had a pink optic disc with a cup-to-disc ratio of 0.3. The pupil in the left eye was round, slightly dilated approximately 4 mm, and sluggishly reactive to light. Fundoscopy revealed a hazy view of a mildly pale disc in the left eye. Goldmann's applanation tonometry revealed IOPs of 48 and 74 mmHg in the right and left eyes, respectively.

An assessment of bilateral acute angle closure (worse in the left eye) was made. She was placed in the supine position and commenced on fixed combination of dorzolamide/timolol (2%/0.5%) eye drops twice daily and pilocarpine (4%) four times daily. Following commencement of medications, symptoms gradually subsided and IOPs on the 2nd day of treatment were 4 and 21 mmHg in the right and left eyes, respectively. Medication was discontinued in the right eye about 72 h after hemodialysis as pressures became very low.

On the 4th day of treatment, vision in the left eye had improved (visual acuity in each eye was 6/5) with a clear cornea. The anterior chamber angles in both the eyes were still closed on gonioscopy (Shaffer's Grade 0), and IOPs were 10 and 16 mmHg in the right and left eyes, respectively. Pupillary size was equal in both the eyes, but there was a subtle relative afferent pupillary defect in the left eye with a slightly pale optic disc and cup-to-disc ratio of 0.4. The patient had never had an ocular examination before this time.

She was maintained on dorzolamide/timolol (2%/0.5%) twice daily in the left eye and pilocarpine (4%) twice daily to both the eyes and planned for a laser iridotomy and follow-up evaluation at subsequent hemodialysis sessions.

Clinical evaluation during a subsequent hemodialysis session about 4 weeks later revealed a mean IOP of 10 and 12 mmHg, respectively (mean of 3 IOP readings), in the right and left eyes predialysis with no change during and after the dialysis. A Medtronic Tono-Pen XL Applanation Tonometer (Jacksonville, Florida, USA) was used as IOP had to be checked in the supine position pre-, intra-, and post-hemodialysis. The plasma osmolality measurements pre-, intra-, and post-dialysis were not remarkable (283.5, 288.9, and 273.9 osm/l, respectively), and the solution used for the hemodialysis was dialysate. The pre- and post-dialysis osmolality measurements at her first ophthalmic visit were 285.4 and 270.1 osmol/l, respectively.

DISCUSSION

Hemodialysis has been shown to cause a reduction in plasma osmolality which leads to an osmotic gradient between the plasma and intraocular fluids at the nonpigmented ciliary processes. This results in an osmotic fluid shift with a resultant increase in aqueous volume.^[2,7] In eyes with normal aqueous outflow facility, increased aqueous volume is met by adaptive outflow mechanisms, thus maintaining a normal IOP.^[8]

Any compromise, however, in aqueous outflow would lead to an elevation in IOP.^[2,9] It has also been suggested that an increase in vitreous volume which results from the fluid shift due to osmotic disequilibrium leads to anterior bowing of the iris–lens diaphragm, iridotrabecular contact, and elevated IOP.^[10] Significant shallowing of the anterior chamber during hemodialysis has been reported.^[9] Anterior chamber shallowing occurring in a patient with already narrow angles could lead to acute angle closure with marked elevated IOP.^[2,9]

We opine that our patient had previously undiagnosed and asymptomatic occludable anterior chamber angles and probably developed elevated IOP due to compromised aqueous outflow resulting from further shallowing of the anterior chamber and acute angle closure during hemodialysis. It is also possible that the acute increase in aqueous volume in a patient with compromised aqueous outflow facility (narrow anterior chamber angles) may have caused the acute rise in IOP. This can be inferred from the lower posthemodialysis osmolality observed in our patient.

This case highlights the importance of awareness among physicians and ophthalmologists regarding IOP changes during hemodialysis, especially among patients with glaucoma and narrow/closed anterior chamber angles and other at-risk patients. It also highlights the importance of complete ocular examination including gonioscopy in patients with a significant increase in IOP. We recommend that all nephrologists can be trained on how to assess for “the eclipse sign” to roughly estimate the anterior chamber depth and anyone with shallow angle by this method should have an ophthalmic evaluation before dialysis. We also suggest urgent ophthalmology referrals for patients who have ocular complaints during or following hemodialysis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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