CASE REPORT

Posterior capsular rupture and spontaneous posterior dislocation of lens following electrical injury

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SUMMARY

Lenticular changes are often seen following electrical injury. We report an unusual case of electrical injury with late spontaneous posterior dislocation of lens nucleus with intact anterior capsule with ruptured posterior capsule in the right eye and anterior subcapsular cataract in the left eye. The right eye was managed with pars plana vitrectomy with cortical matter removal with multipiece intraocular lens insertion in ciliary sulcus. This report adds posterior capsular rupture and posterior dislocation of lens to the usual ocular complications of electrical injury.

BACKGROUND

Ocular injuries frequently occur following electrical shock, and cataract is a common sequelae. Posterior capsular rupture with late posterior dislocation of nucleus with intact anterior capsule has not been previously reported following electrical injury. This case expands the usual profile of ocular complications seen after electrical injury. It also emphasises that patients suffering electric injury should undergo serial ophthalmic examination as late ocular changes may occur.

CASE PRESENTATION

A 55-year-old man presented to the outpatient department with complaint of gradually progressive painless diminution of vision in both eyes since 3 months. He gave history of accidental electrical injury due to direct contact with a high tension wire (11 000 V) on his hands 18 months back. Patient was on the ground repairing a transformer when he had this accidental injury. He had loss of consciousness requiring hospital admission.

On examination, entry and exit wound scars were noted on the left palm and ventral aspect

of left leg, respectively (figure 1). Unaided visual acuity was hand movements close to face and finger counting at 4 m in right and left eye, respectively, which showed no improvement with refraction. Ocular adnexa was unremarkable in both eyes. Intraocular pressure (Goldman applanation tonometry) was 16 and 18 mm Hg in right and left eye, respectively. There was no evidence of anterior chamber reaction or angle recession. Also, the pupil was circular with no iris sphincter tear. Direct and consensual pupillary reflexes were brisk and sustained.

In the right eye, anterior chamber was deep with intact anterior lens capsule, cortical matter in capsular bag and hazily visible posterior capsule with a central irregular defect (figure 2A). Fundus was hazily seen with healthy optic disc, attached retina and posteriorly dislocated cataractous lens nucleus in the vitreous cavity. Left eye had an anterior subcapsular cataract with nuclear sclerosis (figure 2B). Retinal examination was unremarkable. A careful scleral indentation was performed, and peripheral retinal breaks/dialysis were ruled out.

INVESTIGATIONS

Ultrasonography B-scan revealed a globular echogenic structure (lens nucleus) in the posterior vitreous cavity (figure 2C). Retina and optic nerve head were unremarkable. Non-contrast CT of head and orbit did not show any intracranial pathology or orbital floor fracture. Visual evoked potential did not show any delay in latency of P100 wave.

DIFFERENTIAL DIAGNOSIS

A diagnosis of bilateral electric cataract with right eye posterior capsular rupture (PCR) with spontaneous posterior dislocation of nucleus was made.

TREATMENT

After informed consent, 25-gauge pars plana vitrectomy was performed in the right eye. Vitrectomy cutter was used to remove the cortical matter within the bag and make an anterior capsulotomy. After core vitrectomy, posterior vitreous detachment was induced, and lens nucleus was removed using vitrectomy cutter. A multipiece posterior chamber intraocular lens (IOL) was implanted in the ciliary sulcus through a standard 3.2 mm limbal incision. Standard postoperative medication consisting of topical 1% prednisolone acetate, 0.5% moxifloxacin hydrochloride and 1% tropicamide was prescribed and tapered over 4 weeks.

Figure 1 (A) Entry and (B) exit wound on palm and ventral aspect of leg in a case of electric shock injury.

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Figure 2 (A) Slit lamp photograph of the right eye shows an intact anterior capsule with cortical matter in capsular bag. (B) Left eye photograph shows an anterior subcapsular cataract, which is characteristically seen in electrical injuries. (C) Ultrasonography B-scan of right eye shows an echogenic globular structure (lens nucleus, yellow star) in posterior vitreous cavity. (D) Postoperative photograph shows a well-centred intraocular lens in ciliary sulcus over anterior capsular rim in right eye.

OUTCOME AND FOLLOW-UP

At 4-week follow-up, the patient had best corrected visual acuity (BCVA) of 20/30 with a stable and centred IOL (figure 2D) and normal posterior segment in the right eye. Macular optical coherence tomography did not show any abnormality (oedema/thinning/macular hole). Patient is now planned for left eye cataract surgery.

DISCUSSION

Ocular injuries frequently occur following electrical shock, namely subconjunctival haemorrhage, corneal perforation, iritis, hyphaema, cataract, macular oedema, choroidal ruptures, retinal detachment and optic neuropathy.¹ Cataract is a common sequelae of electrical injury.^{2,3} PCR after ocular trauma is well known.⁴ Postcontusion injury ruptured posterior capsule with posteriorly dislocated lens nucleus in the presence of an intact anterior capsule has been reported in literature.⁵ However, such an occurrence has not been reported after electric injury.

Our patient did not suffer from coup–countercoup injury and did not have any evidence of closed globe injury. Cataract developed 15 months after the electric injury, which is the usual time to presentation for a postelectrical injury cataract. Anterior capsule remained intact in the presence of PCR in our patient as it is reported to be more resistant to traumatic stress.^{5,6}

The characteristic of electric cataract (as seen in the left eye in our case) is that it starts as a group of fine vacuoles beneath the anterior and posterior capsule that are replaced over time with fine linear or mossy opacities, which migrate towards the visual axis.⁷ The progression of electric cataract shows a great variability. It may remain stationary or progress slowly over months to become mature cataract.

Various mechanisms have been proposed to account for lenticular damage in electrical injuries in experimental animal models.⁸ There occurs increased permeability and friability of

lens capsule, direct coagulation of lens proteins, disturbance in nutritional mechanisms of lens cells due to iritis or impaired circulation and fibrous metaplasia of lens epithelium leading to anterior subcapsular cataract. Also, sudden contraction of the ciliary muscle causes concussion-type injury as well. The sequence of events that is seen in the process of cataractogenesis include vacuole formation, cellular mitosis and differentiation, replication of lens epithelium and aggregation of midperipheral lens opacities.⁸

We herein hypothesise that following high-voltage electric shock, there occurred conduction of electric current to ocular structures with good neurovascular network and high water content like ciliary body and lens. This led to sudden spasm of ciliary muscle and concussion injury to the lens and its capsule. Also, passage of electric current through the lens resulted in altered metabolism of lens fibres, increased permeability and fragility of its capsule. All of these factors led to development and gradual progression of cataract. With increasing intralenticular pressure from ongoing hydration of lens, the compromised posterior capsule would have given away and led to late dislocation of nucleus.

This case expands the usual profile of ocular complications seen after electrical injury. It also emphasises that patients suffering electric injury should undergo serial ophthalmic examination as late ocular changes may occur.

Learning points

- Lenticular changes are commonly seen after electric injuries.
- Posterior capsular rupture and posterior dislocation of lens nucleus can occur following electrical injury.
- Electrical cataract usually occurs few months to years after injury, depending on the proximity of entry site to the eye.
- Patients suffering electric injury should undergo serial ophthalmic examination as late ocular changes may occur.

Contributors DK: conception and design, and acquisition of data; drafting the article and revising it critically for important intellectual content; and final approval of the version published; agreement to be accountable for the article and to ensure that all questions regarding the accuracy or integrity of the article are investigated and resolved. KR and AK: conception and design; drafting the article and revising it critically for important intellectual content; final approval of the version published; agreement to be accountable for the article and to ensure that all questions regarding the accuracy or integrity of the article are investigated and resolved. PS: conception and design; drafting the article and revising it critically for important intellectual content; final approval of the version published; and agreement to be accountable for the article and to ensure that all questions regarding the accuracy or integrity of the article are investigated and resolved.

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