A case with electric shock maculopathy and cataract secondary to high-voltage electrical injury

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ABSTRACT

A 34-year-old male patient presented with loss of vision in both eyes who sustained a high-voltage electrical shock six months ago. The visual acuity was 8/20 bilaterally. Ophthalmic examination revealed bilateral posterior subcapsular cataract and electric shock maculopathy. In the third month, cataract surgery with phacoemulsification on the left eye was performed, because his vision had not increased. Three months after surgery, his visual acuity was 16/20 in his right eye and 12/20 in his left eye. The right eye showed spontaneous resolution of the maculopathy and the left eye showed persistence. In conclusion, cataract surgery seems to delay the recovery of maculopathy and affect anatomic and functional prognoses after an electrical injury. Therefore, we suggest that cataract surgery should not be performed in patients with electric shock maculopathy in the early period.

Keywords: Electrical injury, Retina, Electric shock maculopathy, Cataract, High voltage.

INTRODUCTION

Electrical injuries can be seen after exposure to low-voltage and high-voltage sources as well as lightning strikes. In an electric shock, the energy follows the path between the entry and exit points. Voltage, type of the current, current intensity, duration of the contact, contact area of the current, the path taken through the body by the current and varied tissue resistance to electricity determine the severity of the clinical presentation.[1]

Electrical injuries can affect every organ system. Electricity induced eye injuries mostly occur because of accidents originating from the head and orbital regions. Effects in the eye may develop immediately after an electric shock or days and years later.[2] Ocular complications from electric shock injuries include eyelid skin burns, cataracts, uveitis, optic neuropathy, electric shock maculopathy and retinal changes.[2-5] The aim of this study is to report a case of high voltage electrical injury with bilateral posterior subcapsular cataract and bilateral impending macular hole.

CASE REPORT

A 34-year-old male patient sustained a high-voltage electrical shock six months prior to presentation. Electrocution resulted from a work-related accident with hand being the entry point and feet being the exit point. He also reported a brief period of unconsciousness. Based on his medical record, it was learned that head trauma was not detected in physical and radiological examinations. He had no previous systemic or ocular disease history.

The patient complained of gradually diminished eyesight in both eyes with best-corrected visual acuity of 8/20 and 8/20 bilaterally. Pupils were isocoric and no relative afferent pupillary defect was observed. There was no obvious limitation in eye movements. Color vision was evaluated as 12/12 in both eyes with the Ishihara test. Intraocular pressures with a Goldmann applanation tonometer were 18 mmHg in the right eye and 17 mmHg in the left eye. Anterior segment biomicroscopic examination revealed bilateral posterior subcapsular cataracts and opacities in the lens. No anterior chamber reaction or synechiae was

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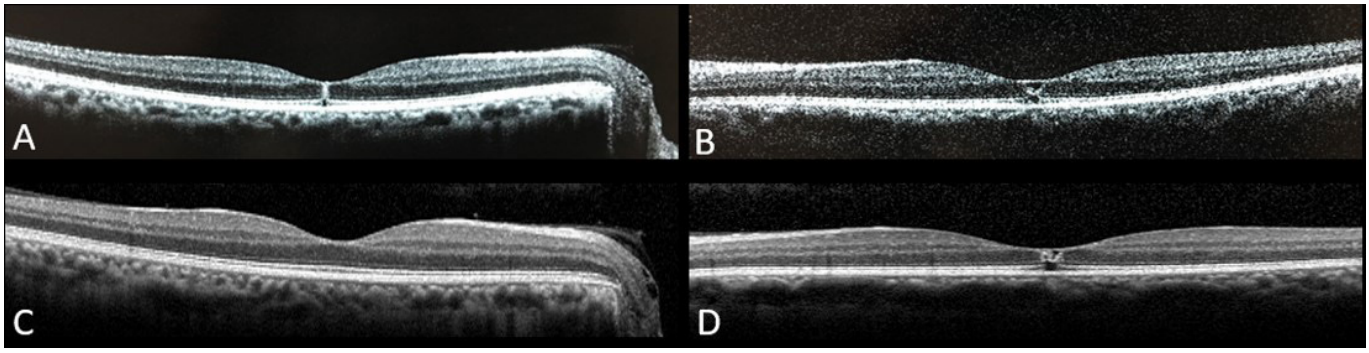

Figure 1: *Optical coherence tomography image of right (A) and left eye (C) at the first visit demonstrating disruption of ellipsoid zone and retinal pigment epithelium layer and impending macular hole. At 3-month after cataract surgery of the left eye, optical coherence tomography image showing spontaneously recovery of the non-operated right eye (B), while disorganized ellipsoid zone and retinal pigment epithelium layer of the operated left eye (D).*

determined. The corneas were transparent bilaterally. Dilated fundus examination showed that abnormal foveal reflex in both eyes. The optic discs were normal. There was no peripheral retinal tears or detachment. The macular optical coherence tomography (OCT) images of the right (Figure 1A) and left eyes (Figure 1B) showed impending macular hole and a disruption of the retinal layers at the fovea in both eyes. Visual evoked potentials did not show significant differences.

During the next 3 months, the patient's vision did not change in the examinations performed at different times. The biomicroscopic examination findings were normal and no progression was detected in the degree of cataract of both eyes. Bilateral fundus and OCT findings remained the same. Therefore, we performed uneventful cataract surgery with phacoemulsification and intraocular lens implant on the left eye. Three months after surgery, his visual acuity was 16/20 in his right eye and 12/20 in his left eye. OCT images of the right eye (Figure 1C) showed spontaneous resolution of the macular hole while the left eye (Figure 1D) showed a persistent macular hole during the next 6 months after surgery.

DISCUSSION

Systemic and ocular findings may occur after exposure to electrical current.[1] With more than half of all electric shock victims suffer from some form of ophthalmic injury, the most common are cataracts and macular edema.[6] In addition, eyelid skin burns, eyelid edema, thermal keratopathy, corneal opacities, corneal scars, chemosis, uveitis, midriasis, hyphema, anterior and posterior subcapsular cataract, lens dislocation, optic neuropathy, electric shock maculopathy and retinal changes have been reported after electrical injury.[2-5,7] Most of the electrical injuries affecting the eye are caused by exposure to electric shock from the head and orbit area.[2] In our case, which was sustained to high voltage electrical shock, ocular complications develop even if the trauma occurred away from the head region.

Macula is highly sensitive to electrical injury, because the melanin-rich retinal pigment epithelium (RPE) is highly susceptible to thermal damage from the resistance to the electrical current.[8] Melanin produces thermal denaturation of the outer retina and RPE. Localized inflammation causes RPE dysfunction and electric shock maculopathy such as intraretinal edema, cyst, and macular hole.[2,5,9,10] There are different approaches regarding electric shock maculopathy. Notably, the severity of the maculopathy determines which approach is best. There are conditions such as macular cyst or macular edema that only recover spontaneously.[5,9] However, there are other conditions that require surgery, such as a macular hole or detachment.[4,10] Lakosha et al.[3] reported a case of unilateral macular cyst after severe electrical injury and followed conservatively. In another study, bilateral macular cysts improved in one eye, and persisted in the fellow eye at 1 month follow-up after electrical burn.[9] On the other hand, Ouyang et al.[10] planned pars plana vitrectomy with the diagnosis of impending macular hole in a patient who presented at the 3rd month after high-voltage electrical shock and reported that early surgical intervention should be performed in order to restore normal anatomical macular structure.

Cataract surgery induces intraocular inflammation and macular edema.[11] Increased aqueous flare and macular inflammation have been expected after cataract surgery, even if it is uneventful. In our case, the impending macular hole in the right eye not undergone cataract surgery recovered spontaneously, while the operated eye did not

improve. Therefore, we thought that the maculopathy did not recover due to the prolonged intraocular inflammation with cataract surgery. In another studies, the development of macular edema or cyst formation after cataract surgery has been reported to pose a risk for reopening a successfully closed macular hole or progress to higher stage ones.[12,13] Besides, transmission of antero-posterior mechanical forces or vitreofoveal traction might have been contributed to the pathophysiology of this situation.[14] We believe that prolonged inflammation and vitreofoveal disturbances may play a role in the delay of the electric shock maculopathy recovery, especially in the early period. Unfortunately, there is limited information about the timing of cataract surgeries for patients with electric shock maculopathy and cataracts.

This is a case of bilateral cataract and impending macular hole associated with high voltage electrical injury. Cataract surgery may prolong the recovery of maculopathy and affect anatomic and functional prognoses after an electrical injury. Additionally, unless mandatory, we do not suggest cataract surgery, especially within the first six months of electric shock maculopathy.

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