ELECTRONIC CLINICAL CASE

Posterior capsule rupture, iridodialysis, hyphema, and macular hole after blunt ocular trauma☆

Rupture capsulaire postérieure, iridodialyse, hyphéma et trou maculaire après contusion oculaire

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KEYWORDS
Blunt posterior capsule rupture; Traumatic macular hole

Summary A 34-year-old man was examined 4 hours after blunt ocular trauma with a stone. Visual acuity was hand motions in the right eye and 10/10 in the left eye. Slit-lamp examination after resorption of a hyphema revealed 180° superior iridodialysis and a total white intumescent cataract precluding visualization of the posterior capsule. Phacoemulsification was undertaken after repositioning the iris with microretractors. Intraoperatively, we discovered that the central portion of the posterior capsule presented a 4-mm oval opening with thick and fibrosed edges. The posterior chamber lens was safely implanted in the bag with no enlargement of the posterior capsule rupture. Postoperatively, VA improved only to 1/20 and fundus OCT revealed the presence of a 400-micron, oval-shaped macular hole that was successfully closed with subsequent vitrectomy and gas tamponade. Visual acuity stabilized at 5/10, D3, and the lens was stable without decentration after 36 months follow-up.

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MOTS CLÉS
Rupture contusive de la capsule postérieure ;

Résumé Un homme de 34 ans examiné 4 heures après une contusion oculaire par projection d’un caillou présente une acuité visuelle limitée à voir bouger la main à l’œil droit et 10/10 à l’œil gauche. L’examen à la lampe à fente, après résorption d’un hyphéma, révèle une iridodialyse supérieure sur 180°, associée à une cataracte intumescente totale ne permettant pas

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Introduction

Hyphema, iridodialysis, and traumatic cataract are common lesions after severe, blunt ocular trauma found respectively in 73, 10, and 10% of inpatients at a university-affiliated hospital ophthalmology department [1]. Macular hole [2] and posterior lens capsule rupture [3] are both rare and may occur after blunt ocular trauma, but to our knowledge the association of hyphema, iridodialysis, posterior capsule rupture and macular hole during the same trauma has not been reported.

Case report

A 34-year-old man was referred to our department 4 hours after a blunt trauma to his right eye by projection of a stone. He had no ophthalmological history and was not wearing safety glasses at the time of the accident. The involved eye was painful with red conjunctiva and a hyphema was visible. Visual acuity was hand movement close to the face with accurate light projection and 10/10 in his left eye. Slit-lamp biomicroscopy revealed epithelial ulceration and moderately edematous cornea with few descemetic folds. Superior iridodialysis involving 180° was noted associated with grade 2 fresh blood hyphema. The anterior chamber showed normal depth with no perforation. The lens seemed opaque and the fundus was not visible. Intraocular pressure was 12 mmHg.

Two weeks after the trauma, the cornea was clear and the hyphema had disappeared, but the lens showed total white intumescent cataract with no visibility of the posterior capsule. The zonula was visible in the superior 180° with no defect or sign of lens subluxation (Fig. 1A). B-mode ultrasonography with a 10-MHz probe focused on the posterior segment did not show vitreous hemorrhage, retinal detachment. Cataract extraction and iris refixation were planned for the following day. The iris was first repositioned with transcorneal iris hooks at the 2 and 10 o’clock meridians; then a 5-mm anterior capsular rhexis was made through the pupil using trypan blue dye, forceps, and a 2.8-mm corneal incision. Phacoaspiration of the central core followed by cleaning of the cortex with an irrigation and aspiration handpiece was carried out. During this phase, we discovered that the central portion of the posterior capsule presented a 4-mm oval opening with thick and fibroed edges (Fig. 1B) and some cortical material was floating on the anterior hyaloid face. We removed this material with a vitrector probe without enlarging the capsular wound and implanted a three-piece, 6.5-mm, foldable acrylic IOL in the bag as previously described [3] (Fig. 1C). The iris hooks were removed and the iris sutured at the limbus with 10-0 Prolene. Postoperatively, VA only improved to 1/20 despite the excellent aspect of the anterior segment. Fundus examination (Fig. 2A) and OCT scans revealed the presence of an oval-shaped macular hole measuring 500 x 350 μm with no other traumatic aspect of the posterior pole (Fig. 2B) not detected on the ultrasonography initially performed. We waited 3½ months for spontaneous healing, which did not occur, and finally performed 20-gauge pars plana vitrectomy. The posterior hyaloid was actively detached with suction set at maximum of 250 mmHg and internal limiting membrane was peeled off using brilliant blue G dye (Geuder, Heidelberg, Germany). Internal tamponade with 25% SF6/air mixture was performed with the patient maintaining the prone position for 4 days after surgery.

Results

One month postoperatively, VA improved to 3/10 and the IOP was 12 mmHg without anterior segment cells, no flare and almost round pupil. Fundus biomicroscopy showed that macular hole was closed, but the OCT scan revealed the persistence of a serous detachment under the fovea. One year post operatively, the fundus remained stable with disappearance of the serous detachment on OCT (Fig. 2C) and visual acuity increased to 4/10. Twenty-four months postoperatively, the anterior segment showed a well-centered IOL and a nearly round pupil with mild fibrosis of the bag visible after dilatation (Fig. 3), normal IOP and VA improved to 5/10.

Discussion

Although severe blunt ocular trauma of the eyeball frequently causes hyphema or iridodialysis [1], the association with posterior capsular tear and macular hole has never been reported to our knowledge. Traumatic macular hole and posterior capsular rupture are rare complications of blunt trauma, but their association is not fortuitous and can be mechanically explained.

It was suggested that blunt trauma induced posterior capsular rupture by the combination of two forces: equatorial stretching pulling on the zonules and stretching the capsule.
Figure 1. Operating microscope view of the right eye. A. Superior 180° iridodialysis with total white intumescent cataract and no sign of lens subluxation. The iris is repositioned with transcorneal iris hook at 10 o’clock. B. 4-mm oval opening with thick fibrosed edges in the posterior capsule (arrows). C. Implantation of 3-piece 6.5 foldable acrylic IOL in the bag.

Figure 2. Postoperative fundus. A. Color retinal fundus showing an oval-shaped macular hole. B. OCT scan confirming the presence of 500 × 350 micron full thickness macular hole. C. OCT scan 1 year after macular hole surgery showing anatomical closure.

centrifugally with the anteroposterior force pushing it back, thereby increasing the probability of the capsule giving way, especially in a young patient in whom the lens matter is soft and the zonules are strong [4]. The lens capsule is thinnest in the central posterior region, which was the site of rupture in our case. A force greater than 200 mmHg is required to cause rupture [5]; this force could be easily obtained by a stone projected with high velocity. A mechanism based on the anatomic relationships of the posterior capsule to the vitreous body through the Wieger ligament, which is strong in the midperipheral region of the lens, is also possible [6]. In addition, rapid compression-expansion forces that are directed...
along the anteroposterior axis of the eye may avulse the central region of the posterior lens capsule. A similar hypothesis was postulated for the mechanism and time of formation of the macular hole even if the hole was not visible on ultrasoundography probably due to non systematic search and too low resolution. In this particular case, it is clear that blunt trauma produced sudden compression and expansion of the globe, producing significant stress on the retina at points of vitreous attachment, then followed by a sudden depression that may also have pulled on the fovea. Yanagiya and co-workers theorized that the force of the impact transmitted to the macula results in rupture of the fovea. In support of this theory, they observed that in their experience, most traumatic macular holes were elliptical, as in our patent, and not round [2]. The same compression-expansion forces may lead to posterior capsular rupture and macular hole formation. This phase is followed by depression, which may also affect on the fovea, inducing or completing the macular hole.

In the presence of hyphaema and iridodialysis, lens damage must be suspected and detected with slit-lamp examination echography or Scheimpflug imaging [7]. A rapid intumescent cataract precluding visualization of the posterior capsule might be the sign of posterior capsule rupture and an indication for water immersion ultrasonography to confirm the diagnosis. In the absence of hypertony, cataract surgery can be postponed for 2—6 weeks to allow the break in the capsule to develop a thick and fibrous margin. Extraction was possible through the cornea and implantation was made in the bag without enlarging the tear. Further rupture was prevented by the mild fibrotic change of the capsule and by careful phacoemulsification using low ultrasound power, low irrigation flow, and careful vitrectomy. After traumatic cataract removal, the fundus should be carefully examined to detect any macular lesion. In this patient, a macular hole was detected, which remained open with VA around 1/20. We decided to operate the macular hole after a watching period of 3½ months generally sufficient for spontaneous healing. We obtained good anatomical and functional recovery with 2 years follow-up.

In summary, we present the first reported case of traumatic posterior capsular rupture associated to macular hole, and emphasize the need of careful examination of the fundus after cataract surgery, since both lesions have the same mechanism of formation.

Disclosure of interest

The authors declare that they have no conflict of interest concerning this article.

References