

Novel Approach in the Treatment of Intravitreal Foreign Body and Traumatic Cataract: Three Case Reports

Goran Benčić, Zoran Vatauvuk, Zdravko Mandić

Eye Clinic, Sisters of Mercy University Hospital, Zagreb, Croatia

We present a novel surgical technique of simultaneous traumatic cataract extraction, internal magnet removal of the intraocular foreign body, and implantation of a posterior chamber intraocular lens in the eyes of three patients with traumatic cataract and ferrous intraocular foreign body retained in the anterior part of the vitreous body. Primary corneal wound repair, cataract extraction, anterior vitrectomy, removal of the intraocular foreign body through the corneoscleral limbal incision by using intraocular magnet, and intraocular lens implantation were performed. All intraocular foreign bodies and corneal entry sites were not larger than 3 mm. After a median follow-up of 13.6 months (range, 9-21 months), visual acuity ranged from 0.6 to 1.0. There were no early or late postoperative complications. According to our experience, an anterior approach in the surgical technique of simultaneous cataract extraction, intraocular foreign body extraction and implantation of an intraocular lens in the capsular bag is possible in selected patients with intraocular foreign bodies positioned in the anterior vitreous, behind the lens, with no associated retinal pathology.

Key words: cataract; cataract extraction; cornea; eye foreign bodies; eye injuries, penetrating; lens, crystalline; vitreous body

Penetrating ocular trauma with a retained intraocular foreign body is a severe injury with poor prognosis. Magnetic removal of ferrous intraocular foreign bodies has been used for more than 100 years. Even though it has been criticized lately for causing more complications in comparison with vitrectomy, it still has its place in treating selected cases (1-3). Its main advantage over vitrectomy is that the technique is relatively simple to perform, and it traumatizes vitreous body less than a complete vitrectomy (3).

With the invention of vitrectomy, ophthalmologists have an increased number of surgical techniques at their disposal to remove intraocular foreign bodies. Pars plana vitrectomy is the leading method for the management of intraocular foreign bodies (4,5). Moreover, combining cataract surgery and intraocular lens implantation with vitrectomy in patients with traumatic cataract and intraocular foreign body reduces the number of surgical interventions, and allows faster visual rehabilitation (6,7).

In three patients with traumatic cataract and intraocular foreign body that was retained in the anterior part of the vitreous body, we decided to perform a combined operation of primary corneal wound repair, extraction of the traumatic cataract with the implantation of an intraocular lens, and removal of the intraocular foreign body with an intraocular magnet through the same corneoscleral limbal incision.

MEDLINE search (with MeSH terms *eye injuries, penetrating, and eye foreign bodies*) yielded no article describing a similar approach in the treatment of traumatic cataract and intraocular foreign body at the time of writing this article. The aim of this article is to present our surgical technique and experiences with the extraction of intraocular foreign bodies with an intraocular magnet through an anterior approach.

Case Reports

The three patients had penetrating corneal injury, traumatic cataract, and metallic intraocular foreign body in the anterior part of the vitreous body. In two of them, laceration of the iris was also observed. Patients sustained all injuries at work, while hammering on metal without wearing protective goggles. Preoperative evaluation of the patients included a general ophthalmological examination, B scan ultrasound of the orbit, and/or computerized tomography (CT). The mean delay between the time of injury and the time of surgery was 7.4 hours.

Case No. 1

A 22-year-old man was working in a metalwork shop, hammering a piece of metal without wearing eye protection goggles when he felt a sudden sharp blow to his right eye. He was referred immediately to our Eye Clinic. He presented with a visual acuity of 0.8 in his right eye. There was a 2-mm penetrating corneal wound paracentrally at 8 o'clock position,

with a concomitant iris laceration and corresponding lens opacification. Pupil reactions were normal. An intraocular foreign body was visualized in the anterior part of the vitreous body toward the 9 o'clock position with the indirect ophthalmoscopy. No abnormalities were found on fundus examination. Ultrasound examination and CT scan of the orbit confirmed the initial findings. Keratometry and biometry were performed on the left, unaffected eye and intraocular lens power was calculated from those data. The surgery was performed as an emergency procedure under general anesthesia.

A combined surgical procedure was carried out as follows. The corneal laceration was carefully explored and sutured with interrupted 10-0 nylon sutures. Corneoscleral limbal incision was created at 12 o'clock position and continuous curvilinear capsulorhexis was performed with a bent needle and Utrata forceps (Rhein Medical Inc., Tampa, FL, USA) with extreme caution. Anterior capsule was removed with a toothed forceps. Corneal endothelium was protected with Sodium hyaluronate (Healon 5, Pharmacia, Uppsala, Sweden). Hydrodissection was carefully performed, followed by the extraction of traumatic cataract by using the aspiration mode and very low phaco energy due to the softness of the nucleus. Posterior capsule was partially ruptured, with prolapsed vitreous. Vitreous cutter was used for the anterior vitrectomy. Removal of the intraocular foreign body was achieved with the intraocular magnet that was passed into the anterior chamber through the corneoscleral limbal incision (Fig. 1). Intraocular for-

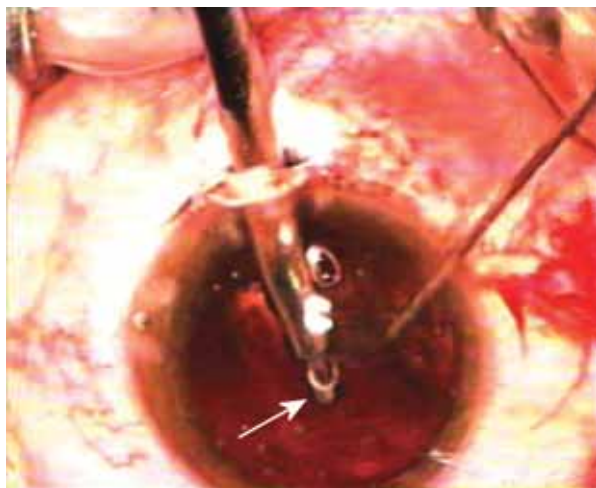


Figure 1. Intraocular foreign body (arrow) under the tip of an intraocular magnet.

ign body was carefully extracted without exerting traction on the vitreous. The size of the extracted foreign body was 2 mm. Retinal periphery was carefully checked for traumatic breaks by indirect ophthalmoscopy. Finally, sodium hyaluronate (Healon 5, Pharmacia) was injected in the anterior chamber and capsular bag in order to protect the ruptured posterior capsule. Intraocular lens (Acrysof, Alcon Inc. Forth Worth, TX, USA) was implanted in the capsular bag, sodium hyaluronate was flushed out of the anterior

chamber, and corneoscleral limbal incision was closed with a single interrupted suture.

Postoperative treatment consisted of a course of topical antibiotics and topical corticosteroids for 4 weeks, which were then tapered. In addition, the patient received a therapeutic contact lens for a relief of discomfort of corneal sutures. Corneal sutures were removed 6 months after the surgery.

The patient was followed-up once a week for the first month, at monthly intervals for the next 6 months, and every three months later on. The total follow-up period was 21 months. Best corrected visual acuity at the last follow-up visit was 1.0, and the intraocular pressure was 16 mm Hg. There was a 2-mm corneal scar paracentrally at 8 o'clock position and a small iris defect also at 8 o'clock position. Intraocular lens was well positioned in the capsular bag and fundus examination revealed no abnormalities.

Case No. 2

A 26-year-old man was hammering a piece of metal, wearing no eye protection, when he felt a sharp blow in his right eye. He presented with a visual acuity of 0.4, a 3-mm penetrating corneal wound at a 5 o'clock position paracentrally, rupture of the iris at the 4 o'clock position, normal pupil reactions to light, corresponding local opacification of the lens and intraocular foreign body situated in the anterior part of the vitreous body visualized with the indirect ophthalmoscopy. Fundus examination revealed no abnormalities. Those findings were confirmed with a careful ultrasound examination (Fig. 2). Biometry and intraocular lens power were measured and calculated in the fellow, unaffected eye. A combined procedure was also carried out in the emergency setting under general anesthesia.

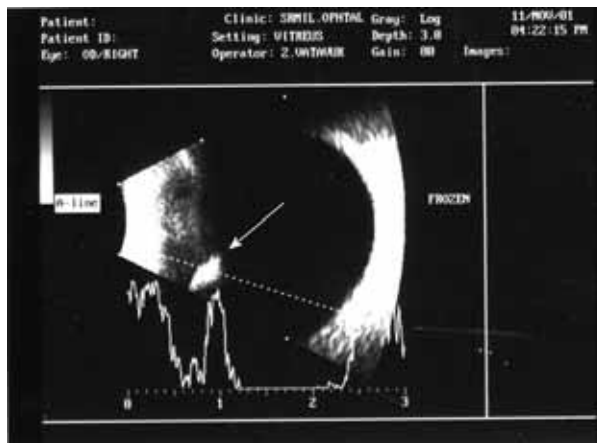


Figure 2. Ultrasound scan clearly showing an intraocular foreign body (arrow) located in the anterior part of the vitreous body.

The operative technique was the same as in the case No. 1, except for the operation of the traumatic cataract, which was extracted by using the extracapsular extraction technique. Acrylic intraocular lens (Acrysof) was implanted in the capsular bag. Postop-

erative treatment was the same as in the case No. 1. The total follow-up period was 14 months.

The patient developed a posterior capsule opacification 5 months after the surgery. Nd:YAG laser capsulotomy was performed without any complications. At the last visit, the best corrected visual acuity was 1.0, intraocular pressure was 15 mmHg, a 3-mm corneal scar was present paracentrally at 5 o'clock position, and a small iris defect also at 4 o'clock position. Intraocular lens was well positioned in the capsular bag and fundus examination revealed no abnormalities.

Case No. 3

A 40-year-old plumber hammering a pipe on a construction site, wearing no eye protection, suffered a sudden sharp blow in his left eye. He presented with a visual acuity of 0.2, a 3-mm centrally located penetrating corneal wound, corresponding lens opacification, normal pupil reactions to light and an intraocular foreign body located in the anterior part of the vitreous body. Intraocular foreign body was again visualized with indirect ophthalmoscopy. Fundus examination revealed no abnormalities. An ultrasound examination was performed, as well as a CT scan, which confirmed the initial findings. Biometry and intraocular lens power were measured and calculated in the fellow unaffected eye.

The surgery was carried out as an emergency procedure under retrobulbar anesthesia. The operative technique and postoperative treatment were the same as in the case No. 2. The total follow-up period was 9 months. At the last visit, the best corrected visual acuity was 0.6, due to a centrally located corneal scar, and intraocular pressure was 17 mm Hg. Intraocular lens was well positioned in the capsular bag and fundus examination revealed no abnormalities.

Discussion

Combined procedure of cataract extraction, removal of intraocular foreign body with the intraocular magnet through the same incision, and "in the bag" intraocular lens implantation were performed in three patients with a traumatic cataract and a retained intraocular foreign body in the anterior part of the vitreous body. In one case cataract was extracted by using phacoemulsification, and in two cases by using the extracapsular extraction technique.

In all cases, the injuries were sustained while hammering on metal, which is the most common cause of such injuries. These findings are consistent with the results of previous studies (8,9). We had neither operative nor postoperative complications. Postoperative visual acuity was excellent in two patients (1.0), and good in the third patient (0.6), but this was due to the centrally located corneal scar.

We decided to use this approach because the intraocular foreign body was located in the anterior vitreous, and there was no associated retinal pathology. We think that this approach resulted in smaller surgical trauma and faster visual rehabilitation of the injured patients than would have vitrectomy.

There are several reasons for such a good visual outcome in our patients. The delay between the time of injury and the surgical procedure was less than 8 h in all three patients. According to some studies (8,10), removal of a retained intraocular foreign body within the first 24 h after the injury reduces the risk of complications such as an infectious endophthalmitis or proliferative vitreoretinopathy.

The initial visual acuity in all three cases was ≥ 0.2 . Initial visual acuity is the most important predictor of final visual outcome, as stated by several studies (8,11-13).

Finally, there were no additional factors predictive of a poor visual outcome, such as intraocular foreign body larger than 3 mm, the presence of vitreous hemorrhage, or retinal detachment.

Also, the removal of the intraocular foreign body with an internal magnet in our three patients was an elegant procedure because the intraocular foreign body was conveniently located in the anterior vitreous and the magnet exerted no vitreous traction. We think that in these cases, pars plana vitrectomy would have been more traumatizing procedure requiring the removal of the posterior vitreous base, which is more difficult to achieve in young patients immediately after the trauma. Retinal tamponade either with silicone oil or with intraocular gas would also have been needed after vitrectomy, prolonging the time of recovery.

It is also important to emphasize that none of the patients wore eye protection at the time of injury. It is very likely that all those described injuries would have been avoided, if the patients had worn protective eye gear at their workplace.

Overall, the results of a combined cataract extraction and magnetic extraction of the intraocular foreign body through the same incision followed by "in the bag" intraocular lens implantation were very good. To the best of our knowledge, this is the first time that such an operative technique has been described in the literature. In our experience, this is a viable approach in selected patients with small intraocular foreign body situated immediately behind the lens, without any signs of infection and with no related retinal pathology.

References

- 1 Chow DR, Garretson BR, Kuczynski B, Williams GA, Margherio R, Cox MS, et al. External versus internal approach to the removal of metallic intraocular foreign bodies. *Retina*. 2000;20:364-9.
- 2 Coleman DJ, Lucas BC, Rondeau MJ, Chang S. Management of intraocular foreign bodies. *Ophthalmology*. 1987;94:1647-53.
- 3 De Souza S, Howcroft MJ. Management of posterior segment intraocular foreign bodies: 14 years' experience. *Can J Ophthalmol*. 1999;34:23-9.
- 4 Mester V, Kuhn F. Ferrous intraocular foreign bodies retained in the posterior segment: management options and results. *Int Ophthalmol*. 1998;22:355-62.
- 5 MacCumber MW, de Juan E Jr. Progress in the treatment of posterior segment trauma. *Curr Opin Ophthalmol*. 1994;5:44-9.

- 6 Tyagi AK, Kheterpal S, Callear AB, Kirkby GR, Price NJ. Simultaneous posterior chamber intraocular lens implant combined with vitreoretinal surgery for intraocular foreign body injuries. *Eye*. 1998;12:230-3.
- 7 Pavlovic S. Primary intraocular lens implantation during pars plana vitrectomy and intraretinal foreign body removal. *Retina*. 1999;19:430-6.
- 8 Greven CM, Engelbrecht NE, Slusher MM, Nagy SS. Intraocular foreign bodies: management, prognostic factors, and visual outcomes. *Ophthalmology*. 2000;107:608-12.
- 9 Williams DF, Mieler WF, Abrams GW, Lewis H. Results and prognostic factors in penetrating ocular injuries with retained intraocular foreign bodies. *Ophthalmology*. 1998;95:911-6.
- 10 Jonas JB, Budde WM. Early versus late removal of retained intraocular foreign bodies. *Retina*. 1999;19:193-7.
- 11 Chiquet C, Zech JC, Gain P, Adeleine P, Trepsat C. Visual outcome and prognostic factors after magnetic extraction of posterior segment foreign bodies in 40 cases. *Br J Ophthalmol*. 1998;82:801-6.
- 12 Chiquet C, Zech JC, Denis P, Adeleine P, Trepsat C. Intraocular foreign bodies. Factors influencing final visual outcome. *Acta Ophthalmol Scand*. 1999;77:321-5.
- 13 Karel I, Diblik P. Management of posterior segment foreign bodies and long-term results. *Eur J Ophthalmol*. 1995;5:113-8.

Received: January 2, 2004

Accepted: April 22, 2004

Correspondence to:

Goran Benčić

Eye Clinic

Sisters of Mercy University Hospital

Vinogradska cesta 29

10000 Zagreb, Croatia

goranbencic@hotmail.com