Case Report

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Intralenticular foreign body: A case report and literature review

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Abstract:

The purpose of this manuscript was to provide a better understanding of patients with intralenticular foreign bodies (FBs) and also to review the reported cases, including clinical presentation, diagnosis, management, and visual outcome. A 50-year-old male was referred to our clinic with suspected intraocular FB. Under slit-lamp examination, a full-thickness corneal wound with localized corneal edema at the temporal lower peri-limbal area was revealed. Seidel test did not indicate any wound leakage. The corresponding iris was depigmented, but there was no penetrating hole. The anterior chamber was deep with cells, but the lens, vitreous, and fundus were normal. B-scan ultrasonography and orbital computed tomography were performed, but no intraocular FB was detected. On the 2nd day, a zonal cortical cataract and posterior subcapsular cataract formed rapidly. Left-eye bare vision dramatically decreased from 20/100 to counting fingers. One month later, the patient received elective extracapsular cataract extraction. A fine metal thread was completely embedded in the lens; the lens and FB were removed together during the operation. The posterior capsule was not injured; an intraocular lens was implanted in the capsular bag. Two months postoperatively, left-eye vision had returned to 20/25. No adverse events were noted during the follow-up period. In addition to the case report, some 28 previously reported cases of intralenticular FB are reviewed here. Patient demographics, time and course of management, and visual outcome are all summarized and compared.

Keywords:

Intralenticular foreign body, intraocular foreign body, metal foreign body

Introduction

Ocular trauma is a major cause of ocular morbidity in the working population. Penetrating ocular injury with an intraocular foreign body (FB) can lead to blindness or other severe ocular complications without appropriate diagnosis and treatment.[1] Usually, FBs are detected through slit-lamp examination, although some must be confirmed with B-scan ultrasonography or computed tomography (CT).[2] Here, we report a case of intralenticular FB. In this case, the FB's small size and concealed location prevented detection on any examination; its existence and exact location were only verified after surgery. In addition, we also review reported intralenticular metallic FB cases and discuss clinical management and prognosis.

Case Report

A 50-year-old male incurred a left-eye injury while working with cable wires. He visited a local ophthalmology clinic and was then referred to our clinic on suspicion of intraocular FB. Under slit-lamp examination, a full-thickness corneal wound with localized corneal edema at the temporal lower peri-limbal area was revealed [Figure 1a]. Seidel test did not indicate any wound leakage. Depigmentation occurred in the corresponding iris, but there was no penetrating hole [Figure 1b]. The anterior chamber was deep with cells, and the lens was clear [Figure 2a]. The vitreous and fundus were normal during indirect

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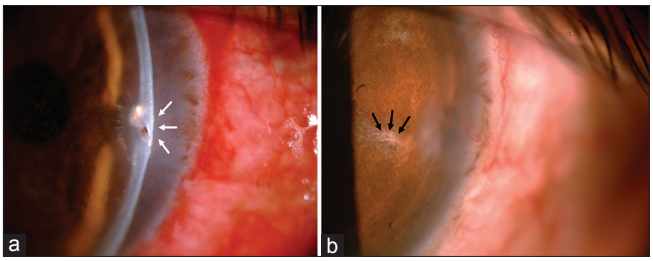

Figure 1: Slit-lamp examination of the left eye. (a) A full-thickness corneal wound with localized corneal edema at the temporal lower peri-limbal area was noted. (b) The corresponding iris of the lesion eye became de-pigmented, but there was no obvious penetrating hole detected

ophthalmoscopic examination. B-scan ultrasonography and orbital CT were performed, but no intraocular FB was noted. Bare visual acuity was 20/25 and 20/100 in the right and left eyes, respectively. Systemic and topical fortified antibiotics were prescribed. On the 2nd day, cell numbers in the anterior chamber decreased. However, a zonal cortical cataract formed from the side of the wound, and small particles, likely lens material leakages, appeared at the pupil margin [Figure 2b]. A posterior subcapsular cataract also developed [Figure 2c]. Intraocular pressure was 15 and 11 mmHg in the right and left eyes, respectively. Left-eye visual acuity decreased to counting fingers. Further, topical antibiotics and steroid treatment completely calmed the inflammation reaction. Intraocular pressure was within normal limits, but visual acuity remained unchanged. Although there was no definite proof, existence of an intraocular FB was suspected. The clinical findings suggested that the FB had penetrated the cornea and iris and ruptured the anterior capsule of the lens. It was thought that the FB was situated partially, or completely, within the lens. One month later, the patient received elective extracapsular cataract extraction. A fine metal thread had been completely embedded in the lens; FB and lens were removed together [Figure 2d]. The posterior capsule was not injured, and an intraocular lens (IOL) was implanted in the capsular bag. Three weeks postoperatively, left-eye bare vision returned to 20/50. Two months postoperatively, left-eye visual acuity improved to 20/25. No adverse events were noted during the follow-up period.

Discussion

Intralenticular FBs comprise a small portion of intraocular FBs.[1,2] We reviewed 28 previously reported cases of intralenticular FB, the clinical features and treatment outcomes of which are summarized in Table 1.[3-18] The mean age at injury was 30 years; nearly all patients were male (27/28); most FBs were metallic (20/28). The cornea was the most frequent FB entry site (24/28), although sclera (2/28) and limbus (1/28) were also reported. Most intralenticular FBs were detected by slit-lamp

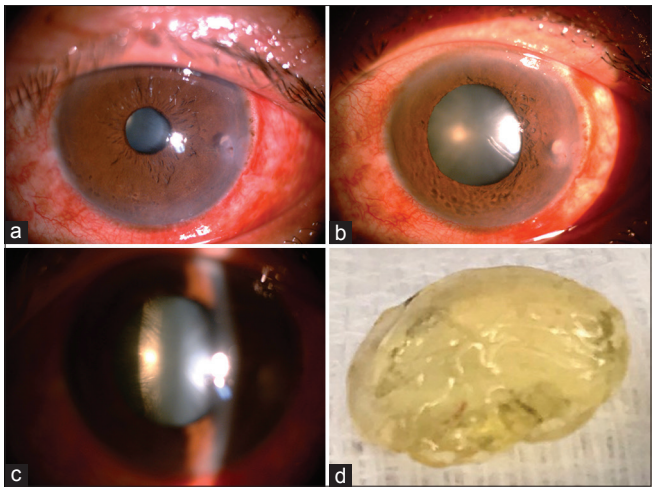

Figure 2: The clinical change of the lens of the lesion eye. (a) The lens was clear at the initial clinic visit. (b) Zonal cortical cataract formed quickly from the side of the wound, and small particles, likely lens material leakages, appeared at the pupil margin (c) Generalized posterior subcapsular cataract was also observed on the 2nd day clinic follow-up. (d) A fine metal thread had been completely embedded in the lens and was removed together with the lens 1 month later during the elective extracapsular cataract extraction surgery

examination (23/28), some by B-scan ultrasonography or CT (4/28), and two were confirmed only after operation. Twenty patients were diagnosed at the time of injury, seven had FBs that remained undetected for years (1.5–60 years), and one had no definite history of eye trauma. The time interval between injury and surgery differed widely, ranging from 2 days to 45 years. Three did not receive operations because the FB did not cause any ocular complications and vision was unaffected. Follow-up times were 1 year, 60 years, and 30 years in these three cases, respectively.[4,10,18] Taken together, these reports emphasize that intralenticular FBs might not cause significant ocular discomfort at the time of injury and, in some cases, can be tolerated for years without causing symptoms. The most common indication for surgery was cataracts (19/28). The nature of the cataracts varied greatly; some cases were total and some localized, and development was immediate or over several days or months. In other cases, the lens remained clear for >10 years. Other indications for surgery included anterior uveitis, glaucoma, lens subluxation, and ocular siderosis.[3-18] Four cases, described as follows, received surgery prior to any ocular complications developing: copper-containing FB that might have incited devastating inflammation; organic FB with a high risk of infection; patient drove heavy goods vehicles for which good vision was required; and patient's location was too far from the hospital preventing regular follow-ups. When making decisions regarding surgery, factors including FB characteristics, infection possibility, ocular complications, associated injuries, and patient's personal considerations were all assessed. The best timing of operation in intralenticular FB differs in each

Table 1: Clinical features, treatment, and visual outcomes for previously reported 28 intralenticular foreign body patients

Case number	Literature	Sex	Age at injury (time interval between injury and presentation)	Age at presentation	Nature of FB	Site (penetrating wound location)	Method for FB detection	Time interval between injury and surgery	Indications for surgery	Operation method	Final vision
1	Bishara *et al.*, 1985[3]	Male	50 (40 years)	90	Copper	Cornea	Slit lamp	45 years	Cataract	ECCE + PCIOL (FB in the nucleus)	Bare vision 6/9
2		Female	13 (1 and 1/2 years)	15	Stone	Cornea	Slit lamp	1 and 1/2 years	Cataract	ECCE + IOL (FB in the lens)	Corrected vision 6/9
3	Foss *et al.*, 1993[4]	Male	21	21	Slate	Cornea	Slit lamp	No operation			6/6 at 1 year
4	Macken *et al.*, 1995[5]	Male	47	47	Metallic	Cornea	Slit lamp	25 days	Cataract	Maneuver FB into AC with magnet+remove with forceps + ECCE+ PCIOL	20/20 at 7 months
5		Male	46	46	Metallic	Cornea	Slit lamp	4 days	Cataract	Manipulate the FB into AC with forceps + ECCE + PCIOL	20/20 at 5 months
6		Male	22	22	Copper -containing metallic	Cornea	Slit lamp	3 days	Copper -containing material may incite devastating inflammation	Manipulate the FB into AC with forceps + lens aspiration + PCIOL	20/20 at 12 months
7		Male	16	16	Organic (tree branch)	Cornea	Slit lamp	2 days	The possibility of harboring infectious organisms is high with organic material	Forceps to remove FB + lens aspiration + PCIOL	20/30 at 12 months (following YAG PC)
8		Male	61 (23 years)	38	Metallic	Pars plana	Remained not found, FB in the lens confirmed with pathology after lens extraction	23 years	Cataract	Cataract extraction + PCIOL	Corrected vision 20/30
9	Lee and Briner, 1996[6]	Male	24	24	Metallic	Cornea	Slit lamp	2 years	Anterior uveitis (clear lens)	Remove FB with magnet + phacoemulsification lens extraction with PMMA PCIOL implantation	6/5 at 3 months (following YAG PC)

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Case number	Literature	Sex	Age at injury (time interval between injury and presentation)	Age at presentation	Nature of FB	Site (penetrating wound location)	Method for FB detection	Time interval between injury and surgery	Indications for surgery	Operation method	Final vision
10	Arora *et al.*, 2000[7]	Male	22	22	Metallic	Cornea	6 by slit lamp 2 by radiographic/ ultrasonographic examination X-rays detected 3/5 metallic FBs Ultrasound unveiled one not detected by X-rays	6 months	Total cataract	FB removed with forceps in 7 and in one expressed with nucleus during ECCE Above 25 years: Lens expression Below 25 years: lens aspiration PCIOL implantation	6/9
11		Male	12	12	Wooden	Cornea		2 years	Total cataract		6/6
12		Male	20	20	Metallic	Cornea		1.5 months	Localized cataract Uveitis and glaucoma		6/9
13		Male	31	31	Metallic	Cornea		6 months	Total cataract		6/12
14		Male	16	16	Glass	Cornea		Same day	Localized cataract	Posterior capsular tears in 2/8	6/9
15		Male	35	35	Metallic	Cornea		3 months	Subluxated cataract		6/9
16		Male	25	25	Metallic	Cornea		2 months	Localized		6/6
17		Male	21	21	Wooden	Cornea		1 month	Total cataract		6/9
18	Cazabon and Dabbs, 2002[8]	Male	18 (40 years)	58	Metallic	Not mentioned	Slit lamp (radiography and B-scan ultrasound showed no FB)	40 years	Vision 6/9 with zonal cataract, to preserve the patient's eligibility for driving heavy goods vehicle	Remove FB + phacoemulsification lens extraction with PCIOL	6/5 postoperatively
19	Kumar *et al.*, 2005[9]	Male	48	48	Metallic	Limbus	Slit lamp, B-scan, and CT	7 days	White cataract	Phacoemulsification + FB removal + foldable IOL implant	6/6 at 12 months
20	Dhawahir -Scala and Kamal, 2005[10]	Male	17 (60 years)	87	?	Cornea	Slit lamp	No operation			6/60 at 60 years (dry ARMD with macular scarring)
21	Medina *et al.*, 2006[11]	Male	21	21	Metallic	Cornea	Slit lamp and B-scan	Immediate Exact time not mentioned	Patient resides far from hospital and cannot be followed up at frequent intervals	Remove FB with forceps + phaco-aspiration of lens + foldable IOL	20/20 at 6 months

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Case number	Literature	Sex	Age at injury (time interval between injury and presentation)	Age at presentation	Nature of FB	Site (penetrating wound location)	Method for FB detection	Time interval between injury and surgery	Indications for surgery	Operation method	Final vision
22	Lee *et al*., 2007[12]	Male	? (no definite history of trauma)	54	?	Cornea	Not identified on routine examination, detected by CT	No definite history of trauma	Mature cataract with phacolytic glaucoma	Remove FB with forceps + phacoemulsification + foldable IOL implantation	BCVA 20/30 at one month
23	Rofagha *et al*., 2008[13]	Male	49	49	Metallic	Sclera	Slit lamp	No operation (spontaneous resolution of cataract 1-4 months after trauma)			20/20 at 4 months
24	Chang *et al*., 2008[14]	Male	66	66	Metallic	Cornea	Slit lamp	6 months	Cataract	Viscoelastic to elevated FB into AC then removed with forceps + phacoemulsification + PCIOL	1.0 at 3 days
25	Wu *et al*., 2009[15]	Male	24	24	Metallic	Cornea	Not found pre-operatively with X-ray/orbital CT Postoperative histology revealed iron depositions in the lens capsule epithelium	2 months	Lens siderosis and cataract	Lens extraction + PCIOL implantation	6/6 1 day postoperation
26	Güler *et al*., 2010[16]	Male	22 (2 years)	24	Metallic	Cornea	Slit lamp	2 years	Cataract	FB removal + phacoemulsification + IOL implantation	BCVA 20/20 2 weeks after operative
27	Reddy, 2011[17]	Male	45	45	Metallic	Cornea	Slit lamp	6 months	Cataract	Removal of FB with forceps + ECCE + IOL implantation	BCVA 6/9 at 1 year
28	Lee *et al*., 2014[18]	Male	13 (30 years)	43	Assumed metallic	Cornea	Slit lamp	No operation			VA 20/20 at 30 years

FB=Foreign body, ECCE=Extracapsular cataract extraction, PCIOL=Posterior-chamber intraocular lens, ARMD=Age-related macular degeneration, AC=Anterior chamber, YAG PC=YAG laser posterior capsulotomy, BCVA=Best-corrected visual acuity, PMMA=Polymethylmethacrylate, ?=Uncertainty of the data according to the reference

condition. Arora *et al*. emphasize that the decision to remove intralenticular FB with cataract should be based on the degree of cataract; any complication, especially uveitis or glaucoma; and patient's visual needs. A small intralenticular FB with capsular tear and a localized lenticular opacity may be left undisturbed and closely followed up for the development of any complication. In the event of the development of problems of free floating lens matter in the anterior chamber, uveitis, or raised intraocular pressure, surgical intervention should be undertaken.[7]

All cases received tri-combined operations (removal of FB, lens extraction, and IOL implantation). Magnet, forceps, and viscoelastics were used to maneuver FBs into the anterior chamber. If phacoemulsification was used, lens debulking was performed first to mobilize the embedded FB, and the FB was then removed with forceps.[9] In four cases, FBs were removed with the whole lens. Lens extraction methods depend on patient's age, if the patient was young, and in case of soft lens, lens aspiration/phaco-aspiration was performed. If the patient had a hard lens, lens expression/phacoemulsification was employed.

Final visual acuity outcomes were good in all cases; nearly all (27/28) had vision better than 6/9. Only one individual suffered poor 6/60 final vision, and this was due to age-related macular degeneration, not FB-related injuries. Ehlers *et al*. analyzed 96 eyes with metallic intraocular FB injuries and found anterior-segment intraocular FBs to be related to an excellent visual outcome in univariate analysis. They also found that decreased wound length was a factor for an excellent visual outcome in multivariant analysis.[1] This explains the excellent visual outcomes in our review [Table 1]. Other possible reasons for a good visual outcome lie in certain injury-related characteristics. First, the FB did not cause any inflammation or toxic reactions due to it being embedded in the lens, and therefore completely isolated from other ocular tissue. Second, FB is <2 mm, meaning that the capsular tear on the lens might self-seal; only zonal cataracts, if any, formed in these cases.[11,13] Third, even when a cataract forms and vision deteriorates, modern advances in cataract surgery techniques mean that lens replacement is a viable and likely very successful option.

Our case was interesting since, although intraocular FB was suspected, it could not be identified preoperatively. In a study carried out by Costa *et al*., ultrasonographic measurements of fragments from iron-containing materials were significantly lower than noniron materials.[19] This might cause difficulties when searching for small iron FBs. Pokhraj *et al*. argued that CT was the most useful tool for precisely defining the location of metallic FBs.[20] Whereas, Loporchio *et al*. suggested that CT scan cuts miss small intraocular FBs.[2] Since there are limitations to all the examinations, and as all the clinical signs indicated FB existence (including penetrating cornea wound, iris depigmentation, small particles at pupil margin mimicking lens material leakage, and a zonal cortical cataract formed from the side of the wound), we concluded that FB possibility was very high. However, we could not definitively describe the exact size or location of the FB. We also did not know if there was a rupture in the posterior capsule, and this is why we chose to perform cataract extraction as the whole lens, rather than phacoemulsification. The major difference between these two surgical methods is hydrodissection, which is always performed first during phacoemulsification. If there were a posterior capsular tear, or if the FB were incarcerated at the posterior capsule, the water pressure caused by hydrodissection might cause the tear to enlarge. This might then cause the lens or FB to drop into the posterior segment. Arora *et al*. reported eight cases of intralenticular FBs; coexistent localized posterior capsular tears were evident in two eyes.[7] Wang and Shi reported 14 patients with lenticular magnetic FBs, of which three underwent suture fixation of the haptic in the ciliary sulcus during the operation due to posterior capsular tears.[21] The possibility of coexistent posterior capsular tears should always be kept in mind when constructing a patient's surgical plan. If a preexisting traumatic posterior capsular rupture is possible, a minimal and gentle aspiration or nuclear expression is recommended, and one should be prepared for posterior capsular tears and vitrectomy.[7]

The management of intralenticular FBs depends on many factors; however, evaluation of the FB and any associated injury is always necessary in deciding the best approach. Our review found that surgery to remove the FB is not always needed, and that the best timing for surgery varies with each case. Our case is interesting and clinically important due to its unusual nature where the FB was entirely undetectable until surgical removal. This report and literature review provides a better understanding of, and guidance for managing, cases of intralenticular FB. We show that with appropriate treatment, a good visual prognosis is more than likely.

Declaration of patient consent

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

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Conflicts of interest

The authors declare that there are no conflicts of interests of this paper.

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