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## Intraocular foreign bodies: prognostic factors and visual outcomes

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- Objective** : *To determine prognostic factors and visual outcomes in patients with intraocular foreign bodies (IOFBs).*
- Setting** : *Department of Ophthalmology, Faculty of Medicine, Chulalongkorn University.*
- Design** : *Retrospective, non-comparative, interventional case series.*
- Materials and Methods** : *Thirty-seven patients seen at King Chulalongkorn Memorial Hospital with IOFBs from May 1990 through May 2000 were identified through a series of operative recorded from the operating room and clinic charts. Every patient had longer than six months of follow-up.*
- Results** : *We identified 37 patients (37 eyes) that had undergone surgical removal of IOFB. Among these 33 eyes (89 %) were injuries caused by metal, the rest were from glass, plastic and stone. Thirty-three (89 %) had/ pars plana vitrectomy (PPV) for removal of the foreign bodies, the electrical magnet was use in 4 eyes (10.8 %) without PPV. The foreign bodies could not be removed in 8 eyes (21 %). Final visual outcomes improved in 17 eyes (46 %). Final best correction of 20/40 or more was obtained in 7 eyes (18.9 %) and functional vision (> 5/200 %) was achieved*

*in 17 eyes (46 %). Prognostic factors for a final visual outcome included presenting visual acuity ( $p = 0.57$ ) by Mc nemar test, delayed presentation to the hospital ( $p = 0.314$ ) by Pearson chi-square test, the time between trauma and the removal of IOFB ( $p = 0.314$ ), by Pearson chi -square test, the foreign body can be removed ( $p = 0.24$ ) by Pearson chi - square test.*

**Conclusions** : *Prognostic factors for a final visual outcome were not found to be statistically significant because of the small study group but the presenting visual acuity was the best predictor of final visual outcome in this series.*

**Key words** : *Open globe injury, Intraocular foreign bodies, Pars plana vitrectomy.*

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เพชร พิศาลก่องสกุล, อลิศรา ทัดตากร. สิ่งแปลกปลอมในลูกตา : ปัจจัยที่มีผลต่อการพยากรณ์ระดับสายตาหลังการรักษา. จุฬาลงกรณ์เวชสาร 2545 ต.ค ; 46(10): 793 - 9

- วัตถุประสงค์** : เพื่อศึกษาถึงปัจจัยที่มีผลต่อการพยากรณ์ระดับสายตาหลังการผ่าตัดรักษาสิ่งแปลกปลอมในลูกตา
- รูปแบบของการศึกษา** : การศึกษาแบบย้อนหลัง
- สถานที่ทำการศึกษา** : ภาควิชาจักษุวิทยา คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
- วิธีการ** : ศึกษาย้อนหลังจากทะเบียนประวัติผู้ป่วยที่เข้ามารับการรักษานี้ เนื่องจากมีสิ่งแปลกปลอมในลูกตาตั้งแต่ พฤษภาคม 2528 ถึง พฤษภาคม 2538
- ผลการศึกษา** : ผู้ป่วย 37 ตาที่มีระยะติดตามภายหลังการรักษามากกว่า 6 เดือน เข้ารับการรักษานี้เนื่องจากมีสิ่งแปลกปลอมในลูกตา พบสิ่งแปลกปลอมเป็นโลหะ 33 ตา (89%), อโลหะ 4 ตา (11 %) ผู้ป่วยได้รับการผ่าตัดโดยใช้วิธี pars plana vitrectomy (PPV) 33 ตา (92 %), อีก 4 ตา (10.8 %) ใช้ Electrical magnet โดยไม่ต้องทำ PPV ไม่สามารถนำสิ่งแปลกปลอมออกจากตาได้ 8 ตา (21 %) หลังการผ่าตัดสายตาดีขึ้น 17 ตา (46 %) สายตาเลวลง 20 ตา (54 %) มีปัจจัยหลายอย่างที่จะพยากรณ์ถึงระดับสายตาหลังการผ่าตัด เช่น ระดับสายตาขณะผู้ป่วยมาถึงโรงพยาบาล ( $P = 0.57$ ) โดย Mc Nemar test ระยะเวลาก่อนที่ผู้ป่วยจะมาโรงพยาบาลเพื่อรักษา ( $P = 0.314$ ) โดย Pearson chi - square test ระยะเวลาที่ผู้ป่วยได้รับการผ่าตัดหลังเกิดอุบัติเหตุ ( $P = 0.314$ ) โดย Pearson chi - square test การที่สามารถนำสิ่งแปลกปลอมในลูกตาออกได้ ( $P = 0.24$ ) โดย Pearson chi - square test.
- สรุป** : ปัจจัยหลายอย่างที่จะมีผลต่อการพยากรณ์ระดับสายตาหลังการรักษาไม่มีนัยสำคัญทางสถิติ เนื่องจากจำนวนที่ศึกษาค่อนข้างน้อย แต่จากผลการศึกษาพบว่าระดับสายตาแรกรับก่อนการผ่าตัดน่าจะปัจจัยที่สำคัญ

Penetrating ocular injuries are one of the major reasons for permanent visual morbidity.<sup>(1)</sup> Although marked improvement in the management of open globe injuries has occurred, thanks to the advancement of microsurgical and vitreoretinal techniques,<sup>(2)</sup> intraocular foreign bodies represent a subset of ocular injury that present complex surgical operation to remove the intraocular foreign bodies successfully while attempting to preserve the vision and restore the ocular architecture.

The purpose of the study was to evaluate prognostic factors and visual outcomes in patients who had intraocular foreign bodies.

### Materials and Methods

Thirty-seven patients seen at King Chulalongkorn Memorial Hospital with IOFBs in May 1990 to May 2000 were identified through a series of operative recorded from the operating room and clinical charts. Each patients had more than 6 months of follow up.

### Results

We identified 37 patients (37 eyes) who had undergone surgical removal of the IOFBs. Patients' characteristics are listed in Table 1. These include a mean age of 28.5 years (ranged, 6 - 61); male 32 (86.5%); right eye injured 19 (51%) and no bilateral injuries.

The nature of the foreign bodies were metallic in 33 eyes (89%), wood in 1 eye (2.7%), plastic in 1 eye (2.7%), glass in 1 eye (2.7%) and stone in 1 eye (2.7%).

The location of the foreign body was in the anterior chamber in 2 eyes (5.4%), 4 embedded in the

**Table 1.** Patients characteristics.

Number of patients	37
Female / male	5/32
Age	28.5 (range, 6 - 61)
Right eye injured	19(51 %)
Ocular entrance of foreign body	Cornea in 30 eyes (81.1 %), Sclera in 4 eyes (19.8 %), Comeoscleral in 1 eye (2.7 %), No identified in 2 eyes (5.4 %)
Type of foreign body	Metallic: 33 patients Glass: 1 patient Plastic: 1 patient Stone: 1 patient

lens (10.8 %), 12 eyes in the vitreous (32.4 %), 19 eyes in retina / optic nerve head (51.4 %).

The initial best-corrected visual acuity was 20/20 to 20/40 in 4 eyes (10.8 %), 20/50 to 5/200 in 6 eyes (16.2 %) and less than 5/200 in 27 eye (72.9 %).

The final best-corrected visual acuity was 20/20 to 20/40 in 7 eyes (18.9 %), 20/50 to 20/200 in 10 eyes (27 %), less than 5/200 in 16 eyes (43.2 %) and no light perception in 4 eyes ( 10.8 %), Table 2.

**Table 2.** Initial and final best corrected visual acuity.

	Final VA			Total
	<5/200	20/50 - 5/200	20/20-20/40	
Initial VA				
< 5/200	18	7	2	27
20/50 - 5/200	2	2	2	6
20/20 - 20/40		1	3	4
<b>Total</b>	<b>20</b>	<b>10</b>	<b>7</b>	<b>37</b>

Patients who came with good initial visual acuity had a tendency to have a good final visual acuity but had no statistic significant ( $p = 0.57$ ) by Mc Nemar test.

Initial examination finding included cataract in 12 eyes (32.4 %), vitreous hemorrhage in 4 eyes (10.8 %), retinal detachment in 4 eyes (10.8 %), proliferative vitreoretinopathy in 3 eyes (8 %), and endophthalmitis in 3 eyes (8 %).

The interval between the trauma and the removal of the IOFB was less than 24 hours (1 day) in 8 patients (22 %); between 1 to 14 days (2 week) in 7 patients (19 %); and more than 2 week in 22 patients (59.4 %). The time between trauma and the removal of the IOFB had no statistical significance to final best-corrected visual acuity, ( $p = 0.176$ ) by Pearson Chi-square.

There was a tendency to have better visual outcome when the foreign body can be removed (Table 3), but there was no statistically significant relationship between a retained foreign body and the visual outcome, ( $p = 0.24$ ), by Pearson Chi-square test; furthermore, there was no statistically significant relationship between the presentation to the hospital by the patients or delayed referral by the physician

in 24 hours after accident or later than 24 hours, ( $p = 0.314$ ), by Pearson Chi – Square test.

The most common technique for the removal of foreign bodyies was pars plana vitrectomy with forceps or electrical magnet (33 eyes, 92 %). At the same time pars plana lensectomy was performed in 13 patients (35 %) to remove the opacity of the lens and to facilitate visualization and removal of the foreign body.

**Discussion**

Thirty-seven eyes from 37 patients in this series, the majority of the patients were young adult male. The most common mechanism of injury is hammering metal on metal. Factors associated with a prognostic visual outcome included presenting visual acuity, vitreous hemorrhage, retinal detachment and the prolapse of intraocular contents, but the most significant predictor is the present of visual acuity.

In the management of IOFBs, the primary goal is to restore the ocular integrity and to obtain a good vision. Secondary goals included minimizing intraoperative and postoperative complications.

In our series 75.7% (28 cases) of IOFBs were located in the posterior vitreous or retina/choroid.

**Table 3.** Final visual acuity according to the removal of foreign body and retained for eigh body.

		Unable to remove FB	Able to remove FB	Total
Final	VA no PL	1	3	4
	VA < 5 / 200	5	12	17
	VA 20 / 50 – 5 / 200	2	8	10
	VA 20 / 20 – 20 / 40	-	6	6
<b>Total</b>		8	29	37

Pars plana vitrectomy was employed in the rest of the 34 cases to remove IOFBs. The advantage of vitrectomy includes the ability to remove media opacities concomitantly, such as hemorrhage, cataract and direct visualized of the IOFB for forceps removal.<sup>(1-4)</sup>

Magnetic removal of IOFBs is a technique that we used to remove 9 IOFBs from the vitreous cavity through the pars plana. An advantage of this technique is its relatively simple which violates to the vitreous less than a complete vitrectomy.<sup>(5,6)</sup>

Endophthalmitis has been estimated to occur in 0% to 10.7% of patients with retained IOFBs.<sup>(7)</sup> Our series have 3 cases (8.1%) of endophthalmitis. All eyes received sub-conjunctival and short course of systemic antibiotics in the operation room, some patients received intravitreal antibiotics if the setting of the injuries were considered dirty with significant vitreous reactions.

Initial visual acuity was the most important predictable factor of visual outcome in patients with retained IOFBs. Previous studies have also identified the presenting visual acuity as a significant predictive factor.<sup>(8,9)</sup>

Since the number of patients in our series is small, it cannot achieve the level of statistical significance. However, it suggested that the present of visual acuity is an important predictive factor.

The direct comparison of the studies reporting the visual acuity of patients with IOFBs is difficult, because of the variability of circumstances involved in ocular trauma.

## Conclusion

The visual results in the series of patients

were not excellent. Seven patients (18.9%) achieved a final visual acuity of 20/40 or better. Seventeen patients (46 %) merely retained their functional vision (> 5/200).

Initial visual acuity seems to be the most important predictive factor of visual outcome. Addition factors predictive of a poor visual outcome include the presence of vitreous, retinal detachment and the prolapse of intraocular content.

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