ORIGINAL ARTICLE

23-gauge transconjunctival vitrectomy for posterior segment intraocular foreign bodies

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ABSTRACT

BACKGROUND: This study is a report of the outcomes of 23-gauge (G) transconjunctival vitrectomy (TV) performed to treat a posterior segment intraocular foreign body (IOFB).

METHODS: The data of 14 eyes of 14 patients who underwent 23-G TV for the removal of a posterior segment IOFB were reviewed in this study. Surgery was initiated with a 23-G system in each case and the posterior segment IOFB was removed through the enlarged sclerotomy site. All of the patients were male. The mean age of the patients was 36.6±11.0 years.

RESULTS: The foreign body (FB) was located in the vitreous in 11 eyes and in the retina in 3 eyes. Before the 23-G TV, complicated cataract was detected in 6 eyes, vitreous hemorrhage was detected in 5 eyes, and retinal detachment was detected in 1 eye. The size of the FB ranged from 3 mm to 7 mm; 12 of the FBs were metallic and 2 were glass. Silicone oil was used as a tamponade agent in 5 eyes and gas tamponade (C3F8) was used in 4 eyes. The mean follow-up time was 8.15±2.9 months. At the last examination, of the 14 eyes included in the study, the visual acuity (VA) was 0.1 or better in 10 eyes and less than 0.1 in 4 eyes because 2 eyes had perimacular scar, 1 eye had massive sub-epiretinal membrane and 1 eye had retinal re-detachment.

CONCLUSION: 23-G TV is seen as an effective and minimally invasive technique to remove posterior segment IOFBs.

Keywords: Intraocular foreign body; retina; transconjunctival vitrectomy; vitreous.

INTRODUCTION

Posterior segment intraocular foreign bodies (IOFBs) are one of the most common causes of vision loss. IOFBs may lead to devastating consequences, including toxic effects, chronic inflammation, development of fibrocellular proliferation, detachment of the retina and retinal traction, endophthalmitis, or phthisis bulbi. The main goals of treating posterior segment IOFBs are to remove the FB, retain globe integrity, and provide better anatomic and visual outcomes. Fundamental advances in microsurgical and vitreoretinal techniques have enabled direct visualization and controlled removal of posterior segment IOFBs, resulting in fewer complications and improved postoperative results.[1–3] Recently, sutureless vitrectomy systems have been developed for expanding surgical indications and have been used more frequently in complicated vitreoretinal diseases.[4–7] Sutureless systems can minimize surgically induced trauma to the conjunctiva and sclerotomy sites; therefore, they improve operative efficiency and hasten postoperative recovery. Also, diminished conjunctival scarring may result in higher success rates for future conjunctival-scleral surgical procedures.[8–11]

The aim of this study was to reveal the outcomes of 23-gauge (G) transconjunctival vitrectomies (TV) performed for the management of posterior segment IOFBs.

MATERIALS AND METHODS

This clinical, retrospective, descriptive study was performed at the retina unit of an Eye Training and Research Hospital from June 2015 to October 2016. The study included 14 eyes

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that underwent 23-G TV for the removal of a posterior segment IOFB. the study protocol was approved by the Ankara Numune Training and Research Hospital ethics committe. All of the patients provided written, informed consent prior to the surgery. In this study, all of the IOFBs were located in the posterior segment of the eye. Pars plana vitrectomy was performed in all cases, and additional surgical approaches were applied in some eyes. Examination details, vitreoretinal surgical techniques, and complications were evaluated.

All of the eyes had a complete preoperative ophthalmic examination, including testing of best-corrected visual acuity (VA) with Snellen charts, measurement of intraocular pressure, and biomicroscopic anterior segment and dilated fundus examination. B-scan ultrasonography and/or computed tomography of the orbita were performed in all eyes in which visualization of the posterior segment was not achieved.

Surgical Methods

Patients were operated on under retrobulbar lidocaine anesthesia. A sclerotomy was performed with the one-step method using 23-G trocars in the inferotemporal, superotemporal, and superonasal quadrants, and the vitrectomy was carried out using 23-G surgical instruments. After a core vitrectomy, the posterior hyaloid was removed in all of the patients with the aid of triamcinolone acetonide, and the vitreous base was cleaned. To protect the posterior pole, 1 mL to 2 mL perfluorocarbon liquid was injected, and after the location of the IOFB was determined, one of the superior microcannulas was removed. Then this sclerotomy was enlarged with a 20-G microvitreoretinal (MVR) blade to facilitate removal of the IOFB. All of the IOFBs were removed from the enlarged sclerotomy site using IOFB forceps. The infusion pressure was also increased to maintain intraocular pressure and/or the enlarged sclerotomy was partially closed with 6-0 vicryl sutures. No external or internal magnet was used. Cryoapplication, endolaser photocoagulation, or both were applied around the site of impact of the IOFB or the possible retinal damage. Silicone oil (5000 centistoke [cs] or 1000 cs) or gas tamponade (C3F8) was used if needed. The enlarged scleral and conjunctival wounds were closed using vicryl suture (6-0), and the entry site 23-G cannulas were removed from the other sclerotomies. Surgery was completed after no wound leakage occurred at the sclerotomy site. Scleral buckling was not performed in any of the study cases.

Combined cataract surgery (phacoemulsification or lens aspiration) with vitrectomy was performed when there was a significant opacity of the lens or if needed for another reason, and then an intraocular lens was inserted into the capsular bag or the posterior chamber. Postoperative follow-up examinations were performed weekly in the first month and monthly in the following months. The silicone oil was removed after a 6-month follow-up period. Visual acuity, intraocular pressure, findings about the anterior segment and the fundus, and complications were recorded for each patient.

RESULTS

All of the study patients were male. The mean age of the patients was 36.6±11.0 years (range: 18–55 years). The composition of the IOFB was metallic in 12 eyes and glass in 2 eyes. The interval between the time of injury and IOFB removal ranged from 5 to 30 days. The IOFB was found to be in the vitreous in 11 eyes (78.6%) and embedded in the retina in 3 eyes (21.4%). All of the eyes were phakic. Associated ophthalmic findings were cataract formation (6 eyes, 42.9%), vitreous hemorrhage (5 eyes, 35.7%), and retinal detachment (1 eye, 7.14%).

One of the superior sclerotomy sites was enlarged to remove the IOFB; at the beginning of the operation, this opening was enlarged through the conjunctiva and sclera together using a 20-G MVR blade. It turned out that passing the vitreoretinal instruments through the widened site was more difficult as a result of conjunctival chemosis. In subsequent operations, after a minimal conjunctival opening was created, the scleral opening was enlarged using a 20-G MVR blade. IOFBs were successfully removed from the enlarged sclerotomy site in all eyes. Endolaser photocoagulation, at a minimum of 3 sequences surrounding the site of impact of the IOFB, was applied to the eyes that had retinal injuries. A silicone oil tamponade (5000 or 1000 cs) was used in 5 eyes, and C3F8 gas tamponade was used in 4 eyes. The size of the FB ranged from 3 mm to 7 mm.

In 9 eyes, a pars plana vitrectomy was combined with cataract surgery. Adequate capsular support was observed in 6 eyes and an intraocular lens was implanted. No case of hypotony, endophthalmitis, or unsealed sclerotomy was observed in this study. The silicone oil was removed from the eye after a 6-month follow-up period.

The mean follow-up time was 8.15±2.9 months (range: 3 to 15 months). Preoperative VA ranged from light perception to counting fingers in 11 eyes (78.6%) and 0.1 to 0.4 in 3 eyes (21.4%). After the follow-up period, the VA was 0.1 LogMAR and better in 10 eyes (71.4%) and 0.1 or less in 4 eyes (28.6%) due to a perimacular scar in 2 eyes, massive sub-epiretinal membrane in 1 eye, and retinal re-detachment in 1 eye.

After silicone oil removal, recurrent retinal detachment was detected in 1 eye. Re-operation with silicone oil was performed and the retina attached during the 3-month follow-up period. The descriptive features and ocular findings are shown in Table 1.

DISCUSSION

Dramatic advances in vitreoretinal surgical instruments and techniques have enabled ophthalmologists to perform sutureless self-sealing sclerotomies for pars plana vitrectomy. Initially, 25-G transconjunctival sutureless vitrectomy (TSV)

Table 1. Demographic features and ocular and surgical findings of the patients who underwent 23-gauge transconjunctival vitrectomy for removal of posterior segment intraocular foreign bodies

No	Gender	Age	Preop-intraop findings	Surgical approaches	Follow-up (months)	Visual acuity		Final retinal findings
						Preop VA	Final VA	
1	Male	24	IOFB+VH	PPV+C3F8	12	CF	20/200	NRD
2	Male	32	IOFB	PPV	12	20/200	20/25	NRD
3	Male	46	IOFB+C+RT	PPV+CS+SO	9	CF	HM	RRD+Reop
4	Male	50	IOFB+RT	PPV+C3F8	7	20/200	20/50	NRD
5	Male	18	IOFB+C	PPV+CS+IOL	6	CF	20/30	NRD
6	Male	23	IOFB+C	PPV+CS+IOL	12	CF	20/20	NRD
7	Male	33	IOFB+C	PPV+CS+IOL	7	CF	20/25	NRD
8	Male	37	IOFB+VH	PPV+CS+SO	8	CF	CF	MS+NRD
9	Male	40	IOFB+VH	PPV+CS+SO+IOL	6	CF	20/25	NRD
10	Male	47	IOFB+C	PPV+CS+IOL	6	CF	20/30	NRD
11	Male	55	IOFB+C+VH+RD	PPV+CS+SO	3	CF	HM	MS+NRD
12	Male	35	IOFB+VH	PPV+ CS+IOL+C3F8	6	20/200	20/50	NRD
13	Male	36	IOFB	PPV+ C3F8	12	CF	20/30	NRD
14	Male	37	IOFB	PPV+ SO	8	CF	CF	RM

C:Cataract; CF: Counting fingers; CS: Cataract surgery; HM: Hand motion; Intraop: Intraoperative; IOFB: Intraocular foreign body; IOL: Intraocular lens; M: Male; MS: Macular scar; NRD: No retinal detachment; PPV: Pars plana vitrectomy; Preop: Preoperative; Reop: Re-operation; RM: Retinal membrane; RT: Retinal tear; RRD: Recurrent retinal detachment; SO: Silicone oil; VA: Visual acuity; VH: Vitreous hemorrhage.

systems became available, and later 23-G systems were described for vitreoretinal surgery.[8,9] While TSV had been performed previously for the management of simple vitreoretinal disease, it has been used recently in more complex surgical cases, such as retinal detachment with proliferative vitreoretinopathy, tractional retinal detachment, proliferative diabetic retinopathy, and removal of retained lens fragments and IOFBs.[4–7] Specifically, smaller surgical incisions have advantages, including not requiring sutures, reduced operation time, faster wound healing, diminished conjunctival scarring, less postoperative inflammation, and more rapid patient recuperation.[8–11] In some cases, combinations of 23-G, 25-G, and 20-G systems have been used to simplify the surgical procedures and take advantage of each system.[4,12] This study focused on revealing the outcomes of 23-G TV for the management of posterior segment IOFBs.

The optimal vitreoretinal surgical technique for extraction depends on the size, the composition, and the location of an IOFB.[1–3] Numerous studies have been conducted concerning the removal of posterior segment IOFBs using 20-G conventional vitreoretinal surgical methods and external or internal magnetic extraction.[13–17] Recently, several studies have reported sutureless vitrectomy techniques for the management of posterior segment IOFBs. Kiss and Vavvas[4] performed 25-G TSV for the removal of retained lens fragments and IOFBs. In their study, 25-G TSV was performed on 5 eyes for the removal of a posterior segment IOFB. They reported that an expanded sclerotomy site was used to remove posterior segment IOFBs. Removal of an irregularly shaped or large IOFB from a 23-G sclerotomy site and grasping these IOFBs with 23-G forceps can be quite difficult. In the present study, 1 of the superior sclerotomy sites was enlarged using a 20-G MVR blade, and the IOFB was removed successfully in all cases.

Long-acting internal tamponades have been used in eyes with a posterior segment IOFB and secondary complications. They limit retinal detachment and provide direct sealing of chorioretinal injuries.[1,3,4,14,15] In TSV, gas tamponade or silicone oil has been commonly used.[5–8] Kiss and Vavvas[4] reported that 2 of the 5 eyes with an IOFB had retinal detachment, and they performed surgery with silicone oil. They concluded that 25-G TSV was a safe and efficient approach for these cases. In the present study, silicone oil or gas tamponade (C3F8) was used as a long-acting endotamponade in the eyes with possible retinal injuries or tears and retinal detachment.

Despite these advantages of TSV, numerous studies have reported some drawbacks, such as hypotony and a possible increased rate of endophthalmitis due to unsutured sclerotomies. The increased rate of endophthalmitis after sutureless vitrectomy has been described in numerous studies. Scott et al.[18] found that endophthalmitis occurred at a rate of 0.84% (1 in every 119 cases) in 25-G TSV and 0.03% (1 in every 3,188 cases) in 20-G TSV. In recent studies, decreasing

rates of postoperative endophthalmitis have been reported after TSV. Parolini et al.[19] reported that the incidence of endophthalmitis was 0.03% in the 20-G group (3078 eyes), but no endophthalmitis cases were reported in the 23-G group (943 eyes). The development of postoperative hypotony has been reported in numerous studies. Hypotony is usually seen in the early postoperative period and is generally self-limiting, though it occasionally persists and requires an additional surgical method or placement of a suture.[10,20,21] In the current study, no postoperative hypotony or endophthalmitis was noted.

In this study, favorable results were obtained in the management of posterior segment IOFBs with 23-G TV. A 23-G sclerotomy was preferred to reduce surgically induced trauma to the sclerotomy site and hasten postoperative recovery in suitable eyes. It can be suggested that 23-G vitreoretinal surgery is an effective procedure in suitable eyes for the management of posterior segment IOFBs and associated complications. The small study sample of the present study is a limitation.

In conclusion, advanced vitreoretinal surgical techniques can save traumatized eyes with posterior segment IOFBs. TV reduces the surgical trauma and hastens postoperative recovery. Thus, 23-G TV is a safe and effective means of performing vitreoretinal surgery and can be effectively used to manage most cases with posterior segment IOFBs.

Disclosure

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ORİJİNAL ÇALIŞMA - *ÖZET*

Göz içi arka segment yabancı cisimlerinin yönetiminde 23-gauge transkonjonktival vitrektomi

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AMAÇ: Göz içi arka segment yabancı cisimlerinin (GİASYC) yönetiminde 23-gauge (G) transkonjonktival vitrektomi (TV) sonuçlarının bildirilmesi amaçlanmıştır.

GEREÇ VE YÖNTEM: Bu çalışmada GİASYC nedeniyle 23-G TV uygulanan 14 hastanın 14 gözü incelendi. Tüm olgularda cerrahiye 23-G sistem kullanılarak başlandı ve GİASYC'ler genişletilmiş sklerotomilerden çıkartıldı. Çalışmadaki tüm olgular erkek olup, ortalama yaş 36.6±11.0 yıldı.

BULGULAR: Yabancı cisim 11 olguda vitreus içerisindeyken, üç olguda retina içindeydi. 23-G TV cerrahisi öncesinde, altı hastada komplike katarakt, beş hastada vitreus içi kanama ve bir olguda retina dekolmanı tespit edildi. On ikisi metalik ve ikisi cam tipinde olan yabancı cisimlerin boyutları 3 mm ile 7 mm arasında değişmekteydi. Cerrahi tamponat olarak, beş olguda silikon yağı kullanılırken dört olguda gaz tamponat (C3F8) kullanıldı. Cerrahi sonrası ortalama takip süresi 8.15±2.9 aydı. Son muayenede, çalışmaya dahil edilen 14 gözün 10'unda görme keskinliği (GK) 0.1 veya üzerindeyken, dört gözde 0.1'in altındaydı ki bunlardan ikisinde perimaküler skar, birinde yoğun sub-epiretinal membran ve birinde nüks retina dekolmanı mevcuttu.

TARTIŞMA: Göz içi arka segment yabancı cisimlerinin çıkarılmasında 23-G TV etkin ve minimal invaziv bir yöntem olarak görünmektedir.

Anahtar sözcükler: Göz içi yabancı cisim; retina; transkonjonktival vitrektomi; vitreus.

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