Global Journal of Health Science; Vol. 9, No. 5; 2017
ISSN 1916-9736 E-ISSN 1916-9744
Published by Canadian Center of Science and Education

Intraocular Foreign Body Removal by 23-Gauge Micro Incision Vitrectomy Surgery and Back Flush Flute Needle: A Case Series Study

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Received: December 31, 2016 Accepted: August 18, 2016 Online Published: October 28, 2016

doi:10.5539/gjhs.v9n5p262 URL: http://dx.doi.org/10.5539/gjhs.v9n5p262

Abstract

Background: This study aimed to consider a new technique to extract an intraocular foreign body by 23-gauge micro incision vitrectomy surgery (23G-MIVS).

Method: This case series was done on Patients with intraocular foreign bodies and cataract during 2012-2015 in Tabriz University of Medical Sciences. Phacoemulsification and aspiration of lens nucleus, intraocular lens implantation, 23G-MIVS, and extraction of the foreign body were performed on patients. The foreign body was removed through a posterior capsulor hexis, anterior continuous curvilinear capsulorhexis, and a corneal incision. In all cases, the foreign body was safely removed through the corneal incision with back flush Flute Needle, and IOL was implanted and well positioned. The surgical incision did not require suturing.

Results: This technique was successful for the patients and the corneal endothelial cell density was maintained over 2000 cells/mm2 in all cases during recent follow-up examinations.

Conclusion: We found that 23G-MIVS with this technique is suitable to remove the foreign body. It is safe, without complications, and can be used without enlarging the 23-gauge sclerotomy.

Keywords: intraocular foreign body, 23-Gauge, vitrectomy, back flush flute needle

1. Introduction

Intraocular foreign bodies (IOFBs) are a common cause of serious ocular trauma. There are numerous factors which have been shown to be associated with a poor visual outcome because of IOFB injuries. These include a large diameter of IOFB, poor visual acuity on presentation, relative afferent pupil defect (RAPD) on presentation, corneoscleral entry wound, uveal prolapse, vitreous haemorrhage, and the presence of a secondary retinal detachment.

External magnets, intraocular forceps, and intraocular magnets are the three common instruments To remove intraocular foreign bodies.

The extraction of an IOFB isn't easy, though less invasive techniques that lead to the good postoperative vision from the early stage are being investigated.

If an IOFB is removed from the eye, an enlargement of the sclerotomy is needed, and intraoperative suturing is required. The suturing usually leads to corneal astigmatism.

23-gauge micro incision vitrectomy surgery (23G-MIVS) was first reported in 2003 (Eckardt, 2005). This technique is commonly used worldwide for various retinal diseases including rhegmatogenous retinal detachments (Kunikata and Nishida, 2010; Mura et al., 2009). The increase in the use of MIVS has been arisen by researches which found a significant decrease in postoperative astigmatism, conjunctival injection, pain, and discomfort (Tsang et al., 2008). The use of 23G-MIVS and 25G-MIV to extract a foreign body without an enlargement of the sclerotomy has been studied in some researches with the small size of participants (Kiss & Vavvas, 2008; Kunikata et al., 2011; Park et al., 2013). In this study, we aimed to evaluate the efficacy and safety of IOFB extraction with 23G-MIVS with back flush needle.

2. Method

This case series was done on Patients with intraocular foreign bodies and cataract enrolled during 2012-2015 in

Nikukary Hospital of Tabriz University of Medical Sciences. The entrance site (whether corneal or scleral) had been repaired previously in the first operation. Computed tomography showed a foreign body in the vitreous. The foreign body was a straight metallic or nonmetal, 1.0–2.0 mm in diameter and 2.0–4.0 mm long. The consent form was obtained from the participant. This study was confirmed by ethical committee of Tabriz University of medical sciences.

Patients with Intra-Globe Foreign Body were studied using the present technique. All surgeries were carried out by a single surgeon. STETELLARIS and 5000Cuts/minutes were used. The vitrectomy technique included Small Gauge Vitrectomy, Transconjunctival with 23–gauge. The presence of the foreign body was confirmed using CT-Scan. The length of FB was 2–4mm, and the diameter was 1–2 mm. Firstly, using appropriate techniques such as phacoemulsification or aspiration the cataracts of the patient is operated. Then, in-depth vitrectomy is carried out using Transconjunctival, small-gauge vitrectomy. After the completion of vitrectomy, the peripheral part of vitreous is removed (vitreous base shaving). In the next stage, the posterior capsule is removed, and the Intra globe pressure is raised. The foreign body is captured using a Backflush Flute Needle and placed in the anterior iris or anterior capsule. Then, using forceps the FB is grabbed and removed through the corneal cut. The appropriate lens is placed after a thorough examination of peripheral retina and reassuring of the absence of break. Using this technique, none of the cuts in cornea or vitrectomy need to be sutured.

One month after the surgery the BCVA was equal to 20/20-20/60. Lack of correction in vision in some patients was due to a corneal laceration or irregular astigmatism. Only 2 cases of the epiretinal membrane were observed which underwent in-depth vitrectomy surgery, removing the epiretinal membrane, and Internal Limiting Membrane (ILM). The vision was protected for 22 months after the surgery. No serious problem was reported after the post-surgery 22-month period.

3. Results

Totally 20 patients enrolled in this study. All of the participants had corneal or scleral full- thickness laceration with IOFB.

The Mean±SD of the age of patients was 30.25±7.46 (ranging 18–49). There were 14 patients with corneal full-thickness laceration and six patients with corneoscleral laceration as an entrance site. 17 patients had metallic IOFB while 3 had glass foreign body in their vitreous cavity. Mean time to the second operation was 12.1 days.

One month after the surgery, the BCVA was 20/60-20/20, and this BCVA was maintained for 22 months. No serious postoperative complications except two epiretinal membrane formation developed during the 22 months of follow-up. (Table 1)

Table 1. Patient information (patients underwent IOFB by 23-Gauge Micro Incision Vitrectomy Surgery and Back Flush Flute Needle)

Case Number	AGE	Time of operation (Day after trauma)	site of entrance	FB Material	Pre OP VA (snellen)	Post OP VA(After months)(BCVA)	Complications
1	25	8	Cornea	metallic	1mcf	8/10	none
2	15	13	Corneoscleral	Glass	HM	9/10	none
3	38	14	Cornea	metallic	HM	7/10	none
4	33	12	Cornea	metallic	HM	7/10	none
5	39	13	Corneoscleral	metallic	1MCF	8/10	none
6	48	13	Cornea	metallic	1MCF	9/10	none
7	24	10	Cornea	metallic	2MCF	7/10	none
8	28	11	Cornea	metallic	HM	5/10	ERM
9	32	14	Corneoscleral	metallic	HM	7/10	none
10	24	13	Cornea	metallic	2MCF	9/10	none
11	20	14	Cornea	Glass	HM	8/10	none

12	33	13	Cornea	metallic	HM	7/10	none
13	39	12	Cornea	metallic	1MCF	8/10	none
14	43	11	Corneoscleral	metallic	HM	7/10	none
15	30	12	Cornea	metallic	HM	8/10	none
16	49	8	Corneoscleral	metallic	2MCF	7/10	none
17	24	14	Cornea	metallic	HM	3/10	ERM
18	22	13	Cornea	Glass	2MCF	8/10	none
19	18	12	Corneoscleral	metallic	1MCF	7/10	none
20	21	12	Cornea	metallic	2MCF	8/10	none

4. Discussion

The removal of a foreign body typically needs a comparatively large sclerotomy and closing the sclerotomy with sutures which regularly results in postoperative complications such as postoperative astigmatism, endophthalmitis, and hypotonia. Moreover, removing a foreign body through the sclerotomy could harm the ciliary body and peripheral retina because the foreign body is hard to see during extraction. Therefore, we believe that removing IOFB by a small corneal wound without suturing could be a safer method to acquire reasonable vision after surgery.

In a recent study by Kumar et al. the move of a foreign body through a 6 mm sclerocorneal tunnel using 20-gauge conventional vitrectomy instruments was performed (Kumar et al., 2009); Although, the scleral incision needed suturing. The utilization of 25G-MIVS to extract foreign body has also been showed. However an associated enlargement of the sclerotomy was required in all patients (Schweitzer et al., 2009). Posterior capsulorhexis with micro incision cataract surgery (corneal incision 2.4 mm) and vitreous surgery (23G-MIVS) as a secure technique of removing a foreign body without postoperative complications and need to suture.

We conducted a new method to extract of intra ocular foreign body by using back flush needle to aspirate of fluid and ERM delamination. By the rule of Pascal (pressure= force/area), we maintained a desired intraocular pressure (35 mmHg) and attached the flute needle to the IOFB. Depending on the surface area of the IOFB a required force will attach the FB to the tip of the needle, and it would not detach or sweep toward retina which is a complication of using forceps or endomagnets.

In conclusion, two important advantages in this method were seen: firstly there is no need to enlarge the sclerotomy site, and secondly we can preset the IOP settings referring to the scale of IOFB.

Also, under favorable conditions of IOFBs, we recommend 23G-MIVS to extract foreign bodies safely without suturing. Further studies should be done to consider the postoperative visual quality and complications to determine how this surgery would be efficacy.

Competing Interests Statement

The authors declare that there is no conflict of interests regarding the publication of this paper.

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