Brief Comunication

Change in Biometric Parameters after Deep Vitrectomy with Silicon Oil Tamponade

PJO – Official Journal of Ophthalmological Society of Pakistan

Mohsen Gohari[1], Esmaeil Babaei[2], Alireza Attar[3], Mohammad Shiravani[4], Laleh Salehi[5]

[1,2,5]Geriatric Ophthalmology Research Center, Shahid Sadoughi University of medical sciences, Yazd, Iran, [3,4]Poostchi Ophthalmology Research Center, Department of Ophthalmology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

ABSTRACT

Purpose: To determine change in biometric parameters after pars plana vitrectomy (PPV) with silicon oil (SO) tamponade.

Study Design: Quasi experimental study.

Place and Duration of Study: Shahid Sadoughi University of Medical Sciences, Yazd, Iran, from 2021 to 2023.

Method: This study included 50 patients of 50 to 85 years with vitreous hemorrhage and Proliferative diabetic retinopathy (PDR) who were referred to Yazd hospital for PPV. The study evaluated all patients before and three months after PPV with SO injection in terms of anterior segment biometric parameters including lens thickness (LT), axial length (AL), central corneal thickness (CCT), anterior chamber depth (ACD) and mean of keratometry. The IBM SPSS version 16.0 processor software was used to analyze the data. The Kolmogorov-Smirnov test was employed to evaluate the normality of the data distribution. The paired t-test was performed to evaluate the mean differences between datasets. The P-value of less than 0.05 was considered statistically significant.

Results: The study consisted of 50 participants, of which 28% (n=14) were females. Mean age was 65.92±9.58 years. Vitreous hemorrhage was present in 34% (n=17) participants and PDR was seen in 66% (n=33). Mean of each parameter was as follows after surgery: AL: 23.88±1.48, LT: 4.32±0.39, CCT: 527.63±39.38, ACD: 3.17±0.59 and keratometry: 44.0±1.32.

Conclusion: SO increased the axial length of the eye and caused a myopic shift in patients who underwent vitrectomy surgery with SO tamponade.

Key Words: Biometric Parameters, Deep Vitrectomy, Silicon Oil Tamponade, Ophthalmology.

How to Cite this Article: Gohari M, Babaei E, Attar A, Shiravani M, Saleh L. Change in Biometric Parameters after Deep Vitrectomy with Silicon Oil Tamponade. 2024;40(1):98-100. **Doi: 10.36351/pjo.v40i1.1663**

Correspondence: Laleh Salehi
Geriatric Ophthalmology Research Center, Shahid Sadoughi University of medical sciences, Yazd, Iran
E-mail: laleh.salehi10@gmail.com

Received: May 31, 2023
Accepted: November 14, 2023

INTRODUCTION

PPV is a surgical method used to remove total or part of the vitreous with the advantage of a closed area for surgery with intraocular pressure control. One of the main objectives of PPV is to ensure complete removal of the vitreous with sufficient scleral indentation. However, PPV has some complications, including infection, excessive bleeding, high pressure in the eye, new retinal detachment caused by the surgery, lens damage, increased rate of cataract formation, problems with eye movement after surgery and change in refractive error.[1,2] Silicon oil is used as a tamponade with multiple advantages. However, there is effect on biometric parameters, including lens thickness, axial length, central corneal thickness, anterior chamber

depth and keratometry.[2,3]

This study was designed to determine the effects of PPV with SO tamponade on biometric parameters.

METHODS

This study included 50 patients with vitreous hemorrhage and PDR who were referred to Yazd hospitals for PPV. Inclusion criteria were age between 50-85 years, both gender and suffering from vitreous hemorrhage and PDR. Patients with history of eye surgery or trauma (except cataract surgery) and corneal opacity were excluded. Complete ocular examination was performed including visual acuity, slit lamp examination and posterior segment evaluation. Anterior segment biometric parameters including LT, AL, CCT, ACD and mean of keratometry were determined using IOL MASTER (Lenstar LS 900 Haag Stereit). All surgeries were performed by a vitreo-retina surgeon. After dilatation of pupil with Tropicamide 1% eye drops, PPV ports were created under general anesthesia. Sclerostomies were created 4 mm from the limbus with Gauge 23 trocars without conjunctival incision as a standard method. After placing the infusion trocar in the lower temporal quadrant of the eye (with BSS injection), vitrectomy and endo-illumination trocars were placed in the supero-temporal and superonasal quadrants of the patients' eye. Triamcinolone was used to stain vitreous. After PPV, silicon oil (CHIMIA SR Company Oil Silicone) was used for intravitreal tamponade. The IBM SPSS version 16.0 processor software was used to analyze the data. The Kolmogorov-Smirnov test was employed to evaluate the normality of the data distribution. The paired t-test was performed to evaluate the mean differences between datasets. The P-value of less than 0.05 was considered statistically significant.

RESULTS

The study consisted of 50 participants, of which 28% (n=14) were female and 72% (n=36) were male. Mean age of the participants was 65.92±9.58 years (min/max: 50/85). In 34% (n=17) of the participants, there was vitreous hemorrhage and in 66% (n=33), PDR. Mean comparison between biometric variables before and after surgery are shown in Table 1.

There was a statistically significant increase in AL and LT after PPV with SO (<0.05) in patients with vitreous hemorrhage. The mean of CCT, ACD and keratometry were 511.94±32.74, 3.25±0.67 and 43.0±1.62 respectively post-operatively which were significantly lower than pre-operative values (<0.05). In PDR there was a significant difference between pre-operative versus post-operative biometric values (P<0.05) in terms of AL, LT, CCT, ACD and keratometry.

Table 1: *Mean comparison between pre-operative and post-operative biometry.*

Parameters	(Mean±SD)	After (Mean±SD)	P-value
Vitreous Haemorrhage	**Pre-operative**	**Post-operative**	
AL	23.61±0.89	24.58±0.89	<0.001
LT	4.13±0.42	4.25±0.43	0.011
CCT	525.76±31.4	511.94±32.74	0.001
ACD	3.35±0.68	3.25±0.67	<0.001
Keratometry	45.0±1.78	43.0±1.62	0.001
Proliferative diabetic retinopathy			
AL	23.61±2.06	23.88±1.48	0.003
LT	4.19±0.42	4.32±0.39	<0.001
CCT	533.72±38.26	527.63±39.38	<0.001
ACD	3.26±0.58	3.17±0.59	<0.001
Keratometry	46.0±1.06	44.0±1.32	0.001

*P-value was calculated by paired t-test at 95% levels of CI
SD: standard deviation, AL: axial length, LT: lens thickness, CCT: central corneal thickness, ACD: anterior chamber depth

DISCUSSION

The study evaluated biometric parameters after PPV with SO tamponade. It found that the mean of AL and LT three months after PPV with SO tamponade were significantly higher than before in both vitreous hemorrhage and PDR cases. PPV has made significant advancements during the past many years in addressing various diseases of posterior segment of the eye.[4,5,6] Other studies have also found that the mean AL and LT were significantly higher months after surgery.[7-9] However, CCT, ACD and keratometry were significantly lower after surgery. This requires alternative methods to evaluate biometric parameters after PPV with SO. SO deceases velocity of waves appearing as increased anterior-posterior length of the eye on biometry.

Limitations of the study included a lack of a control group, limited sample size and no division of participants based on refractive error or AL severity.

CONCLUSION

SO increased the axial length of the eye and caused a

myopic shift in patients who underwent vitrectomy surgery with SO tamponade.

ACKNOWLEDGMENTS

We would like to thank all participants of the study.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(**IR.ssu.medicine.rec.1400.347).

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Authors' Designation and Contribution

Mohsen Gohari; Associate Professor: *Concepts, Design, Literature Search, Data Acquisition, Data Analysis, Manuscript Preparation, Manuscript Editing.*

Esmaeil Babaei; Assistant Professor: *Statistical Analysis.*

Ali Reza Attar; Consultant Ophthalmologist: *Data Acquisition, Statistical Analysis, Manuscript Preparation, Manuscript Review.*

Mohammad Shiravani; Consultant Ophthalmologist: *Data Acquisition, Statistical Analysis, Manuscript Preparation, Manuscript Review.*

Laleh Salehi; Consultant Ophthalmologist: *Concepts, Design, Data Acquisition, Data Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review*.