SciMedCentral

JSM Ophthalmology

Research Article

Incidence of Retinal Detachment after Pars Plana Vitrectomy Associated with 360° Endolaser Treatment and Silicone Oil Tamponade for Idiopathic Macular Hole

Sophie C. Boeckx[1], Joachim van Calster[2], Joyce Jansen[2], Werner Spileers[3], and Peter Stalmans[2]*

[1]*Department of Ophthalmology, Universitätsklinikum Essen, Germany*
[2]*Department of Ophthalmology, University Hospitals Leuven, Belgium*
[3]*Department of Ophthalmology, AZ Diest, Belgium*

***Corresponding author**
Peter Stalmans, Department of Ophthalmology, University Hospitals Leuven, Herestraat 49, 3000 Leuven, Belgium, Tel: 32-16-33-2660; Email: peter.stalmans@uzleuven.be

Submitted: 11 April 2017

Accepted: 21 April 2017

Published: 23 April 2017

ISSN: 2333-6447

Keywords
- 360° Endolaser treatment
- Macular hole
- Pars plana vitrectomy
- Retinal detachment
- Silicone oil tamponade

Abstract

Purpose: To evaluate the incidence of retinal detachment after pars plana vitrectomy with dye-assisted internal limiting membrane peeling, combined with intraoperative 360° endolaser treatment and silicone oil tamponade for treatment of idiopathic macular holes.

Methods: Retrospective review of the occurrence of retinal detachment within one year after silicone oil removal in patients who underwent pars plana vitrectomy for macular hole between January 2004 and June 2013, at University Hospital Leuven, Belgium. All pars plana vitrectomies were associated with 360° endolaser treatment and silicone oil tamponade in patients with idiopathic macular hole. A comparison was made with peer-reviewed published literature.

Results: One case of retinal detachment was seen in the 480 eyes (459 patients) that fit the inclusion criteria. This is a statistically significant (p< 0, 05) lower rate than seen in studies using the simple pars plana vitrectomy technique. No statistically significant difference was found between gas and oil as tamponade.

Conclusion: Combining 360° endolaser treatment during pars plana vitrectomy with dye-assisted ILM peeling offers optimal prevention against the occurence of retinal detachment after surgery for idiopathic macular holes. However, no statistically significant difference between the use of oil and gas tamponades was found.

ABBREVIATIONS

MH: Macular Hole; PPV: Pars Plana Vitrectomy; RD: Retinal Detachment; ILM: Internal Limiting Membrane; IMH: Idiopathic Macular Hole; OCT: Optical Coherence Tomography; IOL: Intra-Ocular Lens; VA: Visual Acuity

INTRODUCTION

Macular hole (MH) is a cause of decreased central vision in the elderly. It is predominantly seen in women (72%) with a peak incidence occurring between 65 and 75 years of age [1-3]. It can occur as a result of trauma or other conditions, but is most often associated with age-related changes that involve liquefying and shrinking of the vitreous [3].

Kelly and Wendel [4] first described pars plana vitrectomy (PPV) in the treatment of MH more than 20 years ago, by which both anterior-posterior and tangential vitreomacular traction was relieved in order to enable glial tissue to bridge and close the hole. Since then, many new techniques have been developed to facilitate surgery, to improve visual outcome and to minimize complications. A surgical treatment through PPV with gas tamponade is the current 'gold standard' treatment for idiopathic MH [1-3,5], although the use of silicone oil has also shown to provide a successful tamponade for this treatment [2,6,7]. However, this treatment strategy still carries a risk of subsequent retinal detachment (RD), one of the most vision threatening complications after PPV [8,9].

The incidence of RD after PPV for MH cases has been reported as high as 14%, but most studies report an incidence of 1% - 5% [1]. Due to the surgical technique used, iatrogenic retinal breaks made by inserting surgical instruments are an important cause of RD after PPV. In addition, incomplete PPV and residual peripheral vitreous can create traction on the retina, resulting in retinal breaks [8,9].

This retrospective study was made to explore an alternative surgical strategy that potentially reduces the risk of RD. The primary objective of the study was to evaluate the incidence of RD after PPV with dye-assisted internal limiting membrane (ILM) peeling combined with intraoperative 360° endolaser treatment and silicone oil tamponade for treatment of MH.

MATERIALS AND METHODS

Study design

The study comprised a retrospective review of a cohort of patients who have received PPV for MH between January 2004 and June 2013 at the University Hospital of Leuven (UZ Leuven), Department of Ophthalmology, Leuven, Belgium. The study was based on data extracted from patient records retained by the hospital. Any RD occurring within 12 months after the initial PPV was considered as being related to the surgery.

Patient cohort

589 eyes from 561 patients received PPV to treat MH at UZ Leuven between January 2004 and June 2013.

Inclusion criteria were: patients who had PPV combined with 360° endolaser treatment and silicone oil tamponade for an IMH, including all stages of full thickness MH as defined by the International Vitreomacular Traction Study Classification System (Table 1) [10]. The presence and staging of MH was determined by biomicroscopy and the optical coherence tomography (OCT). 480 eyes from 459 patients were included in the patient cohort and study (Table 2).

A total of 109 MH's were excluded from the study: 78 MH's were found not to be idiopathic and were excluded based on the following criteria: post-traumatic development of MH (16 eyes), high myopia of greater than 8 diopters (30 eyes), laser treatment for proliferative diabetic retinopathy (7 eyes), patient's age younger than 50 years (4 eyes), RD prior to PPV treatment for MH (21 eyes). Another 5 eyes were excluded due to a follow-up time of less than one year caused by morbidity or mortality, and 26 more eyes were excluded due to the use of another tamponade than silicone oil.

Surgical procedures

All operations were done by one of the three surgeons (P.S., J.V.C. and W.S.) from UZ Leuven Hospital; all of them followed the same surgical policy.

The patients received complete PPV with vitreous base shaving either under local or general anesthesia. The majority of the surgeries were performed using smaller 23-gauge instrumentation to support faster, more efficient, sutureless procedures, to reduce risks and to enhance postoperative comfort. A minority of patients was treated using a 20-gauge vitrectomy (Table 2).

PPV was combined with phacoemulsification and implantation of an intra-ocular lens (IOL) in every phakic patient. In the absence of posterior vitreous detachment, elevation of the posterior hyaloid was induced by suction of the vitrectome. If present, any epiretinal membrane was removed (Table 2).

Peeling of the ILM was performed after staining using a dye, either Trypan Blue (DORC), ILM Blue (DORC) or Infracyanine Green (SERB laboratories). Optionally, endodrainage of the MH was carried out under perfluorocarbon liquid with a 30-gauge blunt-tipped needle mounted on a back flush hand piece to enable reduction of the size of large MH's or close smaller MH's perioperatively [7]. 360° endolaser treatment was carried out in three to four rows at the vitreous base. Finally, silicone oil was inserted as a tamponade after fluid/air exchange. The silicone oils used were either Siluron®1000, Siluron®2000, or Densiron®68 (all: Fluoron AG). Due to the silicone oil tamponade, patients were not required to assume a face down position for days after the surgery. The silicone oil tamponade was removed by a second PPV, on average three months after the initial PPV [11].

Literature study

A literature study was done in order to extract reference data for comparison against the data from the patient cohort. The primary search engine used for researching literature resources was PubMed. Appropriate articles were sourced using the following search terms: macular hole, retinal detachment, vitrectomy, macular surgery. Inclusion was based on: articles describing the surgical procedure and whether or not the numbers of eyes having had a PPV for an IMH and the number of RD after PPV were published. Eight articles were included in the comparison, published between 2004 and 2013.

Statistical analysis framework

Rates of RD's as published in this study and the included studies were statistically compared using contingency tables and the Chi-Square test (Prism®, version 6.0e, GraphPad). Differences with a p-value less than 0.05 were considered statistically significant.

Table 1: International Vitreomacular Traction Study Classification System.

Classification	Description
VMA	Vitreous adhesion to central macula with no demonstrable retinal morphologic changes
VMT	Vitreous adhesion to central macula with demonstrable changes by OCT but no full thickness tissue dehiscence; may include the following: tissue cavitation, cystoid changes in macula, loss of foveal contour, elevation of fovea above RPE
Small FTMH	Hole 250 mm, may be round or have a flap adherent to vitreous; operculum may or may not be present
Medium FTMH	Hole >250 but 400 mm; may be round or have a flap adherent to vitreous; operculum may or may not be present
Large FTMH	Hole >400 mm; vitreous more likely to be fully separated from macula

Abbreviations: VMA: Vitreomacular Adhesion; VMT: Vitreomacular Traction; OCT: Optical Coherence Tomography; RPE: Retinal Pigment Epithelium; FTMH: Full-Thickness Macular Hole

RESULTS AND DISCUSSION

480 eyes from 459 patients were included in the final analysis. An uneven gender distribution was found: 121 patients (128 eyes) were male, 338 were female (352 eyes). The median age of the patients was 69 years old (range 50 to 87). Twenty-one patients (4%) of the final patient cohort had received PPV for MH in both eyes. 253 right eyes and 227 left eyes were treated (Table 2).

Concurrent phacoemulsification and implantation of an IOL was performed in 365 eyes (76.04%). The remaining 115 eyes were already pseudophakic. The 23-gauge sutureless vitrectomy was used in 372 cases (77.5%) and 20-gauge vitrectomy in 43 cases (8.96%). The instrumentation size was not documented in the remainder of cases (65 cases, 13.54%). The intraocular silicon oil was removed after 91 days on average (Table 2).

At 12 months after initial PPV for MH, 1 eye (0.21%) had developed a RD. The patient was a 68-year-old male patient who received a combined phacovitrectomy in the left eye. The silicon oil was removed 105 days after surgery and the RD occurred 193 days after the initial PPV (Table 3).

Eight published articles, with a total of ten data sets, fit the inclusion criteria for comparison to the results of the current study. All included articles, describe the PPV surgical technique for IMH's and the postoperative incidence of RD (Table 4).

In all studies, except one, gas was used as tamponade in all eyes. Jackson et al. [2], inserted a silicon oil tamponade in 0.4% of their cases.

Table 2: Patient demographics and surgical variables.

Patients	Number	%
Sex (number of patients)		
Female	338	73,64
Male	121	26,36
Eye		
Right eye	253	52,70
Left eye	227	47,30
Mean age (years)	69	
Range (years)	50 - 87	
Surgery		
Phaco-PPV		
IOL	365	76,04
No IOL	115	23,96
Instrumentation size		
20-gauge	43	8,96
23-gauge	372	77,50
Not documented	65	13,54
Silicone oil removal		
*Mean time (days)**	91	

* Mean time between PPV for MH and PPV for silicone oil removal
Abbreviations: Phaco-PPV: Phacovitrectomy; IOL: Intraocular Lens; PPV: Pars Plana Vitrectomy; MH: Macular Hole

Table 3: Characteristics and data of the single patient with RD post PPV in this study.

Sex	M
Age	68y
Eye	Left
PPV MH	
Date	23/09/2011
Instrument size	23-gauge
Phacoemulsification	Yes
PPV oil removal	
Date	06/01/2012
Instrument size	23-gauge
Days after PPV MH	105
RD	
Date	03/04/2012
Days after oil removal	88
Days after PPV MH	193
Date: dd/mm/yyyy	

Abbreviations: M: male; y: Year of age; PPV MH: Pars Plana Vitrectomy for Macular Hole; PPV: Pars Plana Vitrectomy; RD: Retinal Detachment

Wimpissinger et al. [8], Guillaubey et al. [12], Rasouli et al. [13], and Jackson et al. [2], used the 'gold standard' technique: a PPV with gas tamponade. They published a RD incidence of 5.48%, 6.62%, 1.85% and 2.4% respectively. Those results have a statistically significant higher RD incidence than the results in this retrospective study (p-value < 0.05 using Chi-Square test).

Rizzo et al. [14], included 957 eyes in his study to compare 20-gauge vitrectomy with small gauge sutureless vitrectomy. A total of 21 eyes (2.19%) were found having a RD after six months of follow up, which is a statistically significant (p< 0.05) higher rate of RD compared to the current study.

Two studies, Chalam et al. [5], and Iwase et al. [9], compared a group treated with a 360° endolaser to a control group. With an incidence of RD in the control groups of 11.76% and 5.7%, respectively, those studies have a statistically significant higher RD incidence compared to the current study. No statistically significant difference was found, however, between the laser-treated group of Chalam et al., (1.32%) and this study (0.21%), nor between the laser-treated group of Iwase et al. (0%) and this study [5,9.]

Hager et al. [15], published in 2004 a study of 135 eyes, whereby every patient had received cryoretinopexy three to four weeks prior to PPV. Their incidence of RD after PPV counted 0,74% (1/135) at a follow-up period of 20.9 months, which is not a statistically significant different result compared to this study (Table 4).

In this study, only one RD (0.21%) was recorded after 12 months of follow-up within the patient cohort of 480 eyes. Comparisons to qualified published results for treatment of IMH with PPV, both 20-gauge or 23-gauge, show that the specific surgical technique (phacovitrectomy with 360° endolaser and silicon oil tamponade) used in this study leads to a statistically

Table 4: Comparison of this study to the published results.

N°	Article	Total eyes	RD (%)	Follow-up (months)	Instrumentation size	Endolaser 360°	Other retinopexy	ILM peeling	Tamponade	P-value*
1	Hager et al. (2004)	135	**0,74**	20,9	NA	No	Cryo, 3-4w before PPV	Yes	Gas	0,17
2	Wimpissinger et al. (2007)	73	**5,48**	12	20G	No			Gas	< 0,01
3	Guillaubey et al. (2007)	272	**6,62**	12	20G	No		Yes	Gas	< 0,01
4	Rizzo et al. (2010)	957	**2,19**	6	20G, 23G, 25G	No	Local Laser or Cryo	Yes	Gas	< 0,01
5	Chalam et al. (2012) (laser)	76	**1,31**	12	20G	**Yes**		Yes	Gas	0,07
	Chalam et al. (2012) (control)	68	**11,76**	12	20G	No		Yes	Gas	< 0,01
6	Rasouli et al. (2012)	108	**1,85**	12	23G	No				0,02
7	Jackson et al. (2013)	1078	**2,4**	7,2	NA	No		Yes	Gas	< 0,01
8	Iwase et al. (2013) (laser)	77	**0**	12	20G	**Yes**		Yes	Gas	0,34
	Iwase et al. (2013) (control)	35	**5,7**	12	20G	No		Yes	Gas	< 0,01
9	Our study (2014)	480	**0,21**	12	23G, 20G	**Yes**		Yes	Silicone oil	

* P-Value measured by Chi-Square Test
Abbreviations: **RD:** Retinal Detachment; **ILM:** Inner Limiting Membrane; **G:** Gauge; **NA:** not available; **PPV:** Pars Plana Vitrectomy

significant lower rate of postoperative RD compared to the 'gold standard' PPV with gas tamponade as used in the studies of Wimpissinger et al. [8], Guillaubey et al. [12], Rizzo et al. [14], Rasouli et al. [13], Jackson et al. [2], control group of Chalam et al. [5], control group of Iwase et al. [9], (Table 4).

Answering the question which of these factors (360° endolaser or silicon oil tamponade or the combination of both) is preventing for RD, a closer look on the published studies is required.

In 2013, Iwase et al. published already a small study in which they investigated the effectiveness of intraoperative 360° laser retinopexy as prevention of RD after phacovitrectomy. The total patient cohort included patients with a MH or a rhegmatogenous RD. A significant reduction in the rate of postoperative RD was only found in the group of patients with MH's. No RD occurred in the patient group (77 eyes) who received 360° laser retinopexy, compared to 5.7% in the group (35 eyes) that didn't receive 360° laser retinopexy (Table 4). This result confirmed data from Chalam et al., published earlier in 2012, using an equivalent patient cohort size. A RD incidence of 1.31% was recorded after PPV with laser retinopexy and RD incidence of 11.76% after PPV without laser retinopexy [5,9.]

These data confirm the statement of this study that 360° endolaser prevents for postoperative RD.

On the other hand, it was not possible to prove a statistically significant difference between the studies using 360° retinopexy (either laser- or cryotherapy) combined with gas tamponade (as used in the studies of Hager et al., Iwase et al., and Chalam et al.), and this study, in which 360° endolaser and oil tamponade were used (Table 4).

This may be due to the relatively small sample size of the studies in which gas tamponade was used [5,9,15]. In order to make a statement about which is better, oil or gas, a larger study population, treated with 360° retinopexy and gas, is needed as control group to compare to this study group.

To overview these data, Figure 1 shows a comparison of the surgical technique in relation to the amount of RD after PPV. From left to right, articles are ranked from 'gold standard' PPV to PPV with gas and retinopexy to PPV with Oil and retinopexy. In this chart, the line indicating the amount of RD shows a clear regression from left to right (Figure 1).

In this study, PPV was carried out using predominantly 23-gauge instrumentation with occasional use of 20-gauge instrumentation. Comparing these two techniques, it's common knowledge among vitreoretinal surgeons that 20-gauge PPV has a higher incidence of postoperative RD compared to 23-gauge PPV. Therefore, the two techniques should be evaluated separately and compared to studies using the same PPV technique.

This statement was confirmed by the study of Krishnan et al., [16]. They recorded an increased incidence of retinal breaks, short-term elevated intraocular pressure and a slightly longer procedure time with 20-gauge phacovitrectomy compared to the 23-gauge phacovitrectomy. However, in the study of Rizzo et al. [14], no statistically significant difference in the incidence of RD after MH surgery with the smaller sutureless vitrectomy compared to the 20-gauge vitrectomy was proven.

In this study, every phakic patient underwent a phacoemulsification combined with a PPV. This procedure seems to be very invasive and is doubt to be necessary by a lot of vitreoretinal surgeons. However, in pseudophakic eyes, it's easier to shave the vitreous base, resulting in less traction and therefore results in less risk of retinal breaks and RD [17].

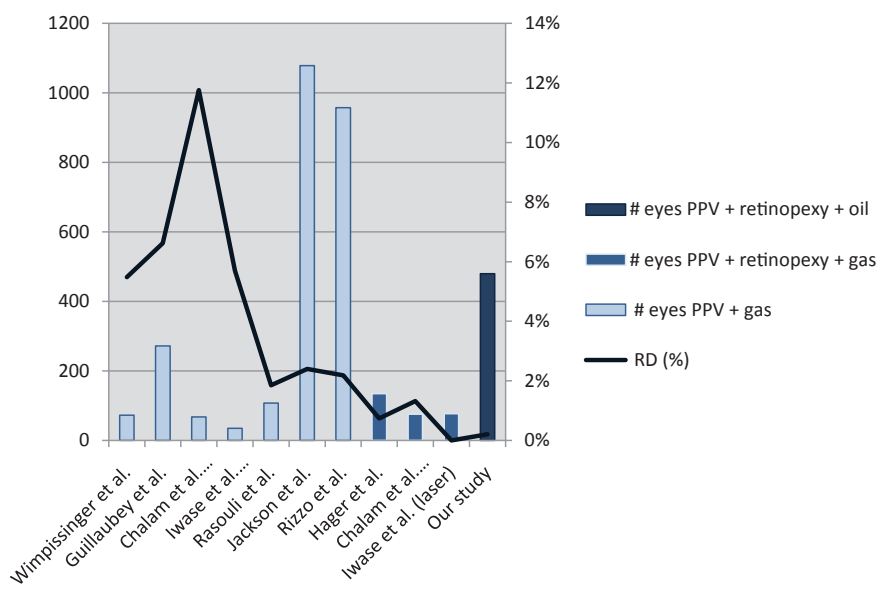

Figure 1 Comparison Chart: Total population in every group (bars, amount on the left side) compared to the RD after PPV (line, percentage on the right side). Study groups are ranked according the used surgical technique. From left to right, or from 'gold standard' to PPV + Retinopexy, the line shows a regression, meaning less RD by performing retinopexy.

Peeling the ILM was introduced as an additional maneuver in MH surgery to improve post-surgical anatomic and functional outcomes. In particular, it has been shown to produce a higher rate of anatomical closure and lower re-operation rates in treatment of idiopathic FTMH [3,6,18]. ILM peeling was assessed in every study, except two (Table 4).

Dyes, such as Indocyanine Green, ILM Blue and Trypan Blue, are used to facilitate the ILM peeling. However, controversial discussions about the safety and the utility of dyes have occured.

Use of the current goldstandard' gas tamponade requires patients to assume a face-down position for five to seven days following surgery [1,12]. The alternative, silicone oil tamponade, created with 'standard' or 'heavy' silicone oils, produces excellent visual results and avoids the need for face-down positioning of the patient for days after surgery [7]. On the other hand, the silicone oil tamponade does require removal from the eye during a second surgery, in general after three months.

Study limitations

This study does not focus on the functional outcome after the surgery, neither on the anatomical closure rates. However, a smaller trial carried out at the UZ Leuven Department of Ophthalmology and published in 2003 [7], evaluated the anatomical and visual outcome after PPV with silicon oil tamponade for MH surgery. In this smaller trial, PPV was performed with the same surgical techniques, including ILM peeling, endodrainage and silicone oil tamponade. However, 360° endolaser treatment was not applied. But since the 360° endolaser is performed peripher at the vitreous base, vision impairment is not expected due to the endolaser.

The results of the trial showed a significant improvement in visual acuity (VA) - Preoperative mean VA of 20/160 and postoperative mean VA of 20/50. It also recorded a high incidence of 98% of anatomical closure in acute macular holes, and 100% closure rate using heavy silicone oil [6].

This study has no control group to compare the data. Therefore, published articles with similar population groups were searched and used as control groups for this study. Unfortunately, some of those studies had a too small population group to prove statistical significance.

CONCLUSION

This study has shown that a significantly reduced incidence of RD can be achieved by performing 360° endolaser treatment during a PPV. Oil tamponade is suggested to attribute to this prevention, but no significant difference was proven between gas and oil tamponade. Furthermore, it is suggested to combine phacoemulsification in phakic patients to reduce postoperative RD. To improve the anatomical and functional outcomes, an ILM peeling was added to the procedure.

CONFLICT OF INTEREST

Peter Stalmans received a research grant from Thrombogenics, and is a consultant for Bausch & Lomb, DORC, Nano-Retina, Ophtec, Vitreq and Zeiss. None of these are relevant to the work in this article.

REFERENCES

1. American Academy of Ophthalmology Retina Panel. Preferred Practice Pattern® Guidelines. Idiopathic Macular Hole. San Francisco, CA: American Academy of Ophthalmology. 2013.

2. Jackson TL, Donachie PHJ, Sparrow JM, Johnston RL. United Kingdom National Ophthalmology Database study of vitreoretinal surgery: report 2, macular hole. Ophthalmology. 2013; 120: 629-634.

3. Steel DH, Lotery AJ. Idiopathic vitreomacular traction and macular hole: a comprehensive review of pathophysiology, diagnosis, and treatment. Eye. 2013; 27: 1-21.

4. Kelly NE, Wendel RT. Vitreous surgery for idiopathic macular holes: results of a pilot study. Arch Ophthalmol. 1991; 109: 654-659.

5. Chalam KV, Murthy RK, Gupta SK, Khetpal V. Prophylactic circumferential intraoperative laser retinopexy decreases the risk of retinal detachment after macular hole surgery. Eur J Ophthalmol. 2012; 22: 799-802.

6. Schurmans A, Van Calster J, Stalmans P. Macular hole surgery with inner limiting membrane peeling, endodrainage, and heavy Silicone oil tamponade. Am J Ophthalmol. 2009; 147: 495-500.

7. Van de Moere A, Stalmans P. Anatomical and visual outcome of macular hole surgery with infracyanine green-assisted peeling of the internal limiting membrane, endodrainage, and silicone oil tamponade. Am J Ophthalmol. 2003; 136: 879-887.

8. Wimpissinger B, Binder S. Entry-site-related retinal detachment after pars plana vitrectomy. Acta Ophthalmol Scand. 2007; 85: 782-785.

9. Iwase T, Jo YJ, Oveson BC. Effect of prophylactic 360° laser treatment for prevention of retinal detachment after phacovitrectomy:(Prophylactic 360° laser treatment for prevention of retinal detachment). BMC ophthalmology. 2013; 13: 77-83.

10. Duker JS, Kaiser PK, Binder S, de Smet MD, Gaundric A, Reichel E, et al. The international vitreomacular traction study group classification of vitreomacular adhesion, traction, and macular hole. Ophthalmology. 2013; 120: 2611-2619.

11. Stalmans P, Pinxten AM, Wong DS. Cohort Safety and Efficacy Study of Siluron 2000 Emulsification-Resistant Silicone Oil and F4H5 in the Treatment of Full-Thickness Macular Hole. Retina. 2015; 35: 2558-2566.

12. Guillaubey A, Malvitte L, Lafontaine PO, Hubert I, Bron A, Berrod JP, et al. Incidence of retinal detachment after macular surgery: a retrospective study of 634 cases. Br J Ophthalmol. 2007; 91: 1327-1330.

13. Rasouli M, Steed SM, Tennant MTS, Rudnisky CJ, Hinz BJ, Greve MDJ, et al. The 1-year incidence of rhegmatogenous retinal detachment post 23-gauge pars plana vitrectomy. Can J Ophthalmol. 2012; 47: 262-263.

14. Rizzo S, Belting C, Genovesi-Ebert F, di Bartolo E. Incidence of retinal detachment after small-incision, sutureless pars plana vitrectomy compared with conventional 20-gauge vitrectomy in macular hole and epiretinal membrane surgery. Retina. 2010; 30: 1065-1071.

15. Hager A, Ehrich S, Wiegand W. Vitreoretinale Zweiteingriffe nach elektiver Makulachirurgie. Ophthalmologe. 2004; 101: 39-44.

16. Krishnan R, Tossounis C, Fung Yang Y. 20-gauge and 23-gauge phacovitrectomy for idiopathic macular holes: comparison of complications and long-term outcomes. Eye. 2013; 27: 72-77.

17. Theocharis IP, Alexandridou A, Gili NJ, Tomic Z. Combined phacoemulsification and pars plana vitrectomy for macular hole treatment. Acta Ophthalmol Scand. 2005; 83: 172-175.

18. Lois N, Burr J, Norrie J, Vale L, Cook J, McDonald A, et al. Internal limiting membrane peeling versus no peeling for idiopathic full-thickness macular hole: a pragmatic randomized controlled trial. Invest Ophthalmol Vis Sci. 2011; 52: 1586-1592.

Cite this article

Boeckx SC, van Calster J, Jansen J, Spileers W, Stalmans P (2017) Incidence of Retinal Detachment after Pars Plana Vitrectomy Associated with 360° Endolaser Treatment and Silicone Oil Tamponade for Idiopathic Macular Hole. JSM Ophthalmol 5(1): 1050.