Journal of Clinical & Experimental Ophthalmology

Hosny et al., J Clin Exp Opthamol 2018, 9:4
DOI: 10.4172/2155-9570.1000741

Research Article Open Access

Incidence of Posterior Vitreous Detachment in Myopes Undergoing Femtosecond Laser-Assisted *In-situ* Keratomileusis Using a 200 kHz Femtosecond Laser System

Mohamed Hosny , Mohamed Ashraf , Sarah Azzam*, Mohamed Anis and Ramy Riad

Department of Ophthalmology, Cairo University, Egypt

***Corresponding author:** Sarah Azzam, Department of Ophthalmology, Cairo University, Egypt, Tel: +20 1227425601; E-mail: sarahazzam@ymail.com

Received date: June 06, 2018; **Accepted date:** July 11, 2018; **Published date:** July 25, 2018

Abstract

Introduction: This is a Prospective non-randomized interventional clinical trial conducted to determine the incidence of posterior vitreous detachment (PVD) in myopes following femtosecond laser-assisted *in-situ* keratomileusis(FS-LASIK) using Wavelight FS200 (Alcon Laboratories Inc.).

Methods: This prospective clinical trial was conducted on 30 eyes of 15 patients in the interval between June 2017 and March 2018. Patients who showed no evidence of preoperative PVD using dynamic B-scan ultrasound (US) underwent FS-LASIK using Alcon wavelight FS-200. Postoperative dynamic B-scan US was performed 3 weeks later to determine whether or not PVD will develop.

Results: Only three eyes developed PVD postoperatively equivalent to an incidence of 10%.

Conclusion: Incidence of PVD following FS-LASIK using Alcon wave light FS-200 is lower than that reported with other femtosecond laser systems with lower frequencies.

Keywords: Myopia; Posterior vitreous detachment; Femtosecond-assisted laser *in situ* keratomileusis

Introduction

Posterior vitreous detachment (PVD) can result in many retinal complications including retinal tears, retinal detachment and epiretinal membranes (ERM) [1]. PVD can occur after Laser assisted *in situ* keratomileusis (LASIK) as a result of the suction applied during flap creation [2]. This is higher with mechanical microkeratomes compared to femtosecond laser systems [3]. The development of higher frequency femtosecond laser systems has shortened the flap creation times compared to older lower frequency femtosecond laser systems [4]. Several studies were conducted to determine the incidence of PVD after LASIK, with a reported incidence between 9.5% and 21% [5,6] with mechanical microkeratomes, between 16% [7] and 27.5% [8] with INTRALASE FS 60 and 85% with INTRALASE FS150 femtosecond laser systems [9].

Patients and Methods

This is a prospective non randomized interventional clinical trial that was conducted on 30 eyes of 15 patients (12 females and 3 males) who underwent FS-LASIK in a private eye hospital, Cairo, Egypt, in the interval between June 2017 and March 2018. The study was approved by local ethical committee and followed the principals of the declaration of Helsinki. Subjects included were between 18 and 45 years of age; myopes up to -8.0 diopters without astigmatism or with astigmatism up to -4.0 diopters; with central corneal thickness of 500 microns or more; with normal corneal tomography, with a D value of less than 1.6 in the Belin/Ambrosio Enhanced Ectasia Display of the Pentacam (Pentacam®,Oculus) and an expected post-LASIK residual stromal bed of 300 microns or more with completely attached vitreous detected by dynamic B scan ultrasonography using VuPad™ (SonomedEscalon™).

WaveLight® FS200 femtosecond laser (Alcon, Fort Worth, TX, USA) was used for the creation of the flap. The surgery was performed in both eyes and under topical anesthesia using three drops of topical Benoxinate Hydrochloride 0.4% applied 2-3 minutes before surgery. Once appropriate centration was achieved, the suction ring was applied to the sclera followed by corneal applanation. We used 200 kHz with pulse energy of 0.7 μJ, spot separation of 7.5 μm, and line separation of 7.5 μm for the flap bed and pulse energy of 0.85 μJ, spot separation of 5.5 μm and line separation of 3.5 μm for the side cut. The flap diameter was adjusted according to the intended treatment zone. The intended flap thickness was 120 μm with a side cut angle of 115 degrees. After femtosecond laser flap creation, the bed moves to excimer laser Alcon WaveLight EX500 (Alcon, Fort Worth, TX, USA) for laser ablation. All patients received a topical antibiotic moxifloxacin hydrochloride (Vigamox, Alcon), a topical steroid (Prednisolone acetate) and artificial tears eye drops for 3 weeks and systemic steroids (Solupred 20 mg) for 5 days. Postoperative dynamic B Scan Ultrasound using VuPad™ .(SonomedEscalon™) with high to maximal gain was performed 3 weeks later to evaluate whether PVD had occurred or not.

Statistical Analysis

Statistical analysis was performed with the aid of Microsoft Excel, version 14.0. Results were expressed as mean ± SD or number (%).

Citation: Hosny M, Ashraf M, Azzam S, Anis M, Riad R (2018) Incidence of Posterior Vitreous Detachment in Myopes Undergoing Femtosecond Laser-Assisted *In-situ* Keratomileusis Using a 200 kHz Femtosecond Laser System. J Clin Exp Opthamol 9: 741. doi: 10.4172/2155-9570.1000741

Results

Our study included 30 eyes of 15 patients with age range of 18-43 years (Table 1 and Figure 1). Patients underwent FS- LASIK using Alcon Wavelight FS200 between June 2017 and March 2018.

Gender	Count	Percentage
Male	3	20%
Female	12	80%

Table 1: Gender distribution of study subjects.

The study subjects had a mean preoperative manifest refraction spherical equivalent (MRSE) of 3.93 ± 2.16 Diopters with a range of -9.25 to -1.5 Diopters (Table 2). Dynamic B-scan US was performed 3 weeks postoperatively. Only 3 eyes of 2 subjects developed PVD postoperatively with an incidence of 10% (Table 3 and Figure 2).

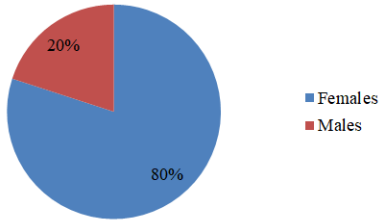

Figure 1: Gender distribution of study subjects

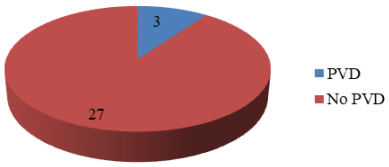

Figure 2: Eyes with postoperative PVD and eyes with no postoperative PVD

Discussion

PVD results from weakening of the vitreous cortex and internal limiting membrane adhesion, in conjunction with liquefaction within the vitreous body. Myopic subjects usually exhibit excess vitreous liquefaction for the degree of vitreo-retinal adhesion, resulting in anomalous PVD and undue traction at the vitreo-retinal interface [1]. This can lead to many complications as retinal tears, epiretinal membranes, macular holes and others [10,11].

It has been reported that LASIK can cause PVD in myopic subjects, though the exact mechanism has been debated [6]. In our study we evaluated the incidence of PVD in 30 myopic eyes with no preoperative PVD that underwent femtosecond assisted LASIK using dynamic B-scan ultrasonography 3 weeks postoperatively. To our knowledge this is the first study to evaluate such outcome using the Alcon Wave light FS-200 femtosecond laser system.

	Mean	Standard Deviation	Median	Minimum	Maximum
Age (years)	25.47	7.55	23	18	43
Preoperative MRSE (D)	-3.93	2.16	-3	-1.5	-9.25

Table 2: Age and preoperative MRSE distribution of subjects.

Several studies evaluated the incidence of PVD after microkeratome assisted LASIK. The incidence varied between 9.5% and 21.4% in literature. In our study, only 10% of cases developed PVD and all subjects were high myopes. This is similar to the incidence reported by Mirshahi et al. (9.5%) using Hansatome microkeratome in patients with mean age 36.3 years and mean spherical equivalent -4.85 diopters (14%) [5,6].

Subject	Age	Preoperative MRSE OD	Preoperative MRSE OS
1	24	-8.125	-7.75
2	18	-9.25	-9.25

Table 3: Age and preoperative MRSE distribution of subjects who developed PVD postoperatively.

In the study by Luna et al. the Automated corneal shaper was used for flap creation. Our study had a lower incidence of PVD than that reported by Mirshahi et al. (21.4%); they conducted their study on 21 eyes using Hansatome microkeratome for flap creation [2]. The similar incidence with FS-LASIK in spite of longer suction duration compared to mechanical microkeratome can be explained by the lower suction imparted by the FS 200 during flap creation (Figures 3 and 4).

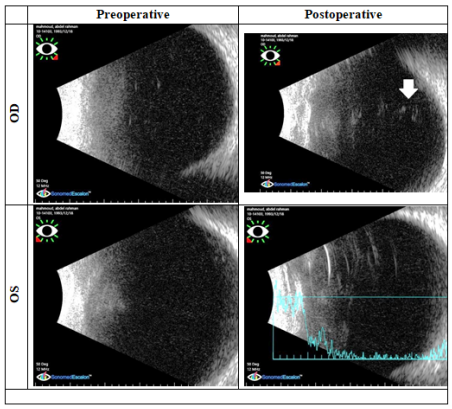

Figure 3: B-Scan Ultrasonographic evaluation of subject 1 showing development of PVD OD only

The incidence of PVD after FS-LASIK was evaluated in several studies. It ranged between 16% and 85%. Our study found the incidence to be lower than that reported by Gavrilov et al. (16%). In his study Ultrasonography was performed 48 hours after femtoLasik which might have led to lower incidence of post-LASIK PVD in their study as PVD usually needs a longer time to occur [7]. However it is lower than that reported by Wang et al. (27.5%). Both studies were

conducted using the iFS-60 which has a lower frequency, higher suction applied and longer flap creation time. In addition Wang et al. included patients with preoperative partial PVD and had a longer follow up duration which can account for the higher incidence [8].

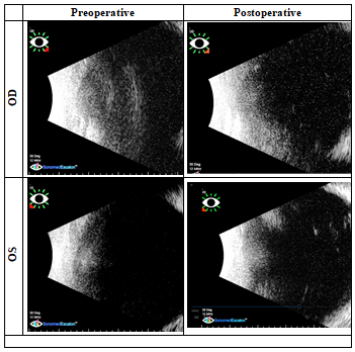

Figure 4: B-Scan Ultrasonographic evaluation of subject 2 showing development of PVD in both eyes.

The incidence was found to be significantly lower than that reported by Osman et al. with 85%. This study was the first to use the iFS-150. It had a similar gender (70% females), age distribution (25.7 ± 3.3 years), preoperative MRSE (4.24 ± 1.65 D) and a follow up duration of 1 month as our study (Osman et al.); though our study had larger sample size (30 compared to 20 eyes). The lower incidence in our study can be explained by the lower suction imparted by the FS-200 as well as the shorter flap creation time compared to the iFs-150 which averaged at 63 seconds.

Financial Disclosure

None of the authors have any financial interest in materials mentioned in this study

References

1. Sebag J (2004) Anomalous posterior vitreous detachment: A unifying concept in vitreo-retinal disease. Graefes Arch Clin Exp Ophthalmol 242: 690-698.
2. Mirshahi A, Kohnen T (2005) Effect of Microkeratome Suction during LASIK on Ocular Structures. Ophthalmology 112: 645-649.
3. Aristeidou A, Taniguchi E , Tsatsos M, Muller R, Mcalinden C, et al. (2015) The evolution of corneal and refractive surgery with the femtosecond laser. Eye Vis 2: 12
4. Soong HK, Malta JB (2009) Femtosecond Lasers in Ophthalmology. Am J Ophthalmol 147: 189-197
5. Luna JD, Artal MN, Reviglio VE, Pelizzari M, Diaz H, et al. (2001) Vitreoretinal alterations following laser in situ keratomileusis: Clinical and experimental studies. Graefes Arch Clin Exp Ophthalmol 239: 416-423.
6. Mirshahi A, Schöpfer D, Gerhardt D, Terzi E, Kasper T (2006): Incidence of posterior vitreous detachment after laser in situ keratomileusis Graefes Arch Clin Exp Ophthalmol 244: 149-153.
7. Gavrilov JC, Gaujoux T, Sellam M, Laroche L, Borderie V (2011) Occurrence of posterior vitreous detachment after femtosecond laser in situ keratomileusis: Ultrasound evaluation. J Cataract Refract Surg 37: 1300-1304.
8. Wang TT, Wang Y, Zhao SZ (2013) Comparison of posterior vitreous detachment after femtosecond laser and microkeratome-assisted laser in situ keratomileusis. Zhonghua Yan Ke Za Zhi, 49: 309-314.
9. Osman MH, Khalil NM, El-Agha MS (2017) Incidence of Posterior Vitreous Detachment after Femtosecond LASIK Compared With Microkeratome LASIK. Cornea 36: 1036-1039.
10. Johnson MW (2010) Posterior Vitreous Detachment: Evolution and Complications of Its Early Stages. Am J Ophthalmol 149: 371-382
11. Tokoro T (1998) Atlas of Posterior Fundus Changes in Pathologic Myopia. Tokyo: Springer-Verlag.