

Phacoemulsification on Previously Vitrectomized Eyes

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Abstract

Purpose: To evaluate the patient characteristics and to determine the factors affecting the development time and type of cataract occurring after pars plana vitrectomy (PPV) as well as the possible difficulties and/or complications encountered during and after this cataract surgery by phacoemulsification.

Setting: Department of Ophthalmology, Military hospital of instruction Mohammed V, Rabat, Morocco.

Methods: It is a monocentric retrospective study of 35 eyes previously vitrectomized and having been operated cataract between January 2013 and December 2015.

Results: The mean patient age was 57 years. The etiology of the PPV ($p=0.136$), and the type of tamponade used ($p=0.305$) had no statistically significant effect on the type of cataract. The median interval between PPV and phacoemulsification was 11,2 months and there was no statistically significant difference in this interval in relation to age (inferior or superior than 50 years) ($p=0.485$), presence of diabetes ($p=0.236$), scleral buckling ($p=0.72$), etiology of vitrectomy ($p=0.46$) or the type of tomponade used ($p=0.449$). The main operational difficulty was the deep fluctuating anterior chamber (70%). Intraoperative complications included a capsulorhexis leak (5.7%), posterior capsular rupture (11.4%), zonular dialysis (2.85%) and dropped nucleus (2.85%). In postoperative, the most frequent complication was posterior capsule opacification, the other complications appear to be no more frequent and significant than on a non-vitrectomized eye.

Conclusion: Cataract surgery after PPV is a challenge that requires special considerations from the cataract surgeon. To avoid intraoperative complications, the operator must know the different traps of this procedure and adapt his surgical technique.

Keywords: Cataract; Vitrectomized eye; Phacoemulsification

Introduction

The development of a cataract, mostly nuclear, represents a classical evolution after pars plana vitrectomy (PPV), mainly due to changes in oxygenation of the lens. This complication is even so common, that some surgeons systematically propose a combined vitrectomy-cataract surgery, especially in macular diseases [1]. In more than 80% of cases, this cataract will require surgery within 2 years after vitrectomy. However, this well-standardized surgery can reserve traps on a vitrectomized eyes with a rate of intraoperative complications of up to 12.5% in the literature [2,3]. This will force the surgeon to adapt his speech and technique before, during and after this surgery.

Patients and Methods

It is a monocentric retrospective study of 35 eyes previously vitrectomized and having been operated cataract between January 2013 and December 2015.

The purpose of this study is to evaluate the patient characteristics and to determine the factors affecting the development time and type

of cataract occurring after pars plana vitrectomy (PPV) as well as the possible difficulties and/or complications encountered during and after this cataract surgery by phacoemulsification. Preoperative dilation was achieved with Tropicamide 0.5% and phenylephrine hydrochloride 10%. The anesthesia was performed by sub-tenon's injection of lidocaine on 24 eyes and topical (tetracaine) on 11 eyes. We used The Bausch & Lomb Stellaris Phaco Machine. The corneal incisions were: 2.75 mm in 60% of the cases, 2.2 mm in 30% and 1.8 mm in 10% of the cases. Two techniques of phako-emulsification (PKE) were used: stop and chop and phaco chop. The mean follow-up after cataract surgery was 11 months. We used the program SPSS 18 for the statistical analysis.

Results

The mean patient age was 57 years (range: 23-78); 80% of the patients was older than 50 years. There was no clear predominance of sex (sex ratio=1.19). 32% of patients had diabetes type 2.

The PPV was performed for Rhegmatogenous Retinal Detachment (23 patients) with scleral buckling in 8 cases, intravitreal hemorrhage (9 patients) and epimacular membrane (3 patients) (Figure 1).

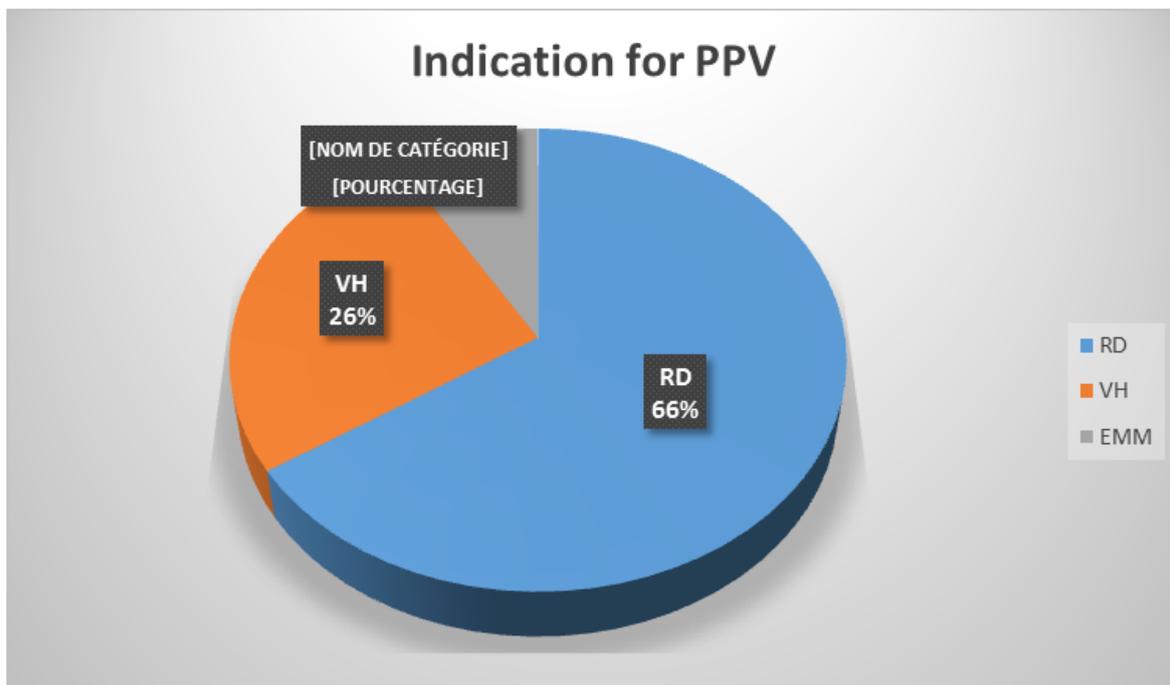


Figure 1: PPV Indication. PPV: Pars Plana Vitrectomy; RD: Retinal Detachment; VH: Vitreous Hemorrhage; EMM: Epimacular Membrane.

An intraocular tamponade with expansile gas or silicone oil was used in 28 patients (80%) (Figure 2). Cataract was nuclear (N) in 9 cases, posterior subcapsular (SCP) in 3 cases, combined (N+SCP) in 19 cases and total in 4 cases. The etiology of the PPV ($p=0.136$), and the type of tamponade used ($p=0.305$) had no statistically significant effect on the type of cataract.

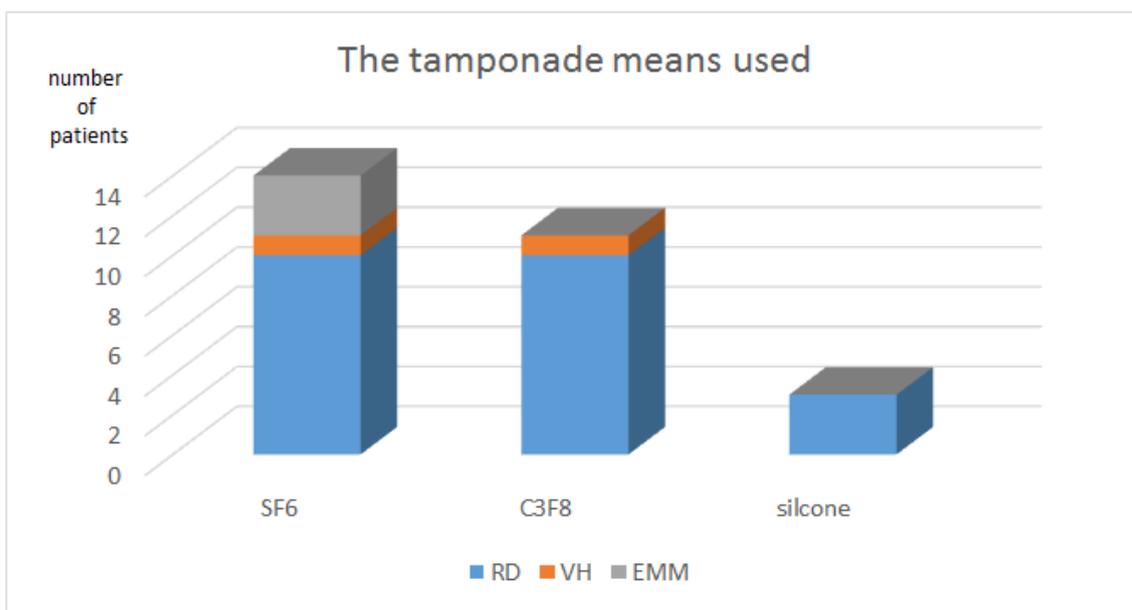


Figure 2: The graph of tamponade means used.

The median interval between PPV and phacoemulsification was 112 months with extremes ranging from 2 months to 3 years (Table 1). The shortest median interval was observed in the RD group: 10 months.

Group of patients/Etiology of PPV	Median interval
Retinal detachment	10 months
Vitreous Hemorrhage	12 months
Epimacular menbrane	19 months
PPV: Pars Plana Vitrectomy	

Table 1: The median interval between PPV and phacoemulsification.

There was no statistically significant difference in this interval compared to the patient age: inferior or superior than 50 years ($p=0.485$); the presence of diabetes ($p=0.236$); the scleral buckling ($p=0.72$); the etiology of vitrectomy ($p=0.46$) or the type of tomponade used ($p=0.449$).

The main difficulties encountered during PKE were deep fluctuating anterior chamber in 70% of cases; poor dilation in 8 cases (22.9%) requiring the use of iris hooks in 2 cases (5.7%); an anterior fibrosed capsule in 2 cases (5.7%) making the realization of capsulorhexis more delicate; and a posterior fibrosed capsule in one case, treated secondarily by the laser ND-YAG.

Intraoperative complications were a capsulorhexis leak in 2 cases (5.7%), posterior capsular rupture in 4 cases (11.4%), zonular dialysis

in one case (2.85%) obliging the operator to convert to intra-capsular extraction, and dropped nucleus in 1 case (2.85%).

Postoperative complications were inflammation in 2 cases having evolved well under treatment, ocular hypertension in 2 cases, hyphema in 2 cases, and posterior capsule opacification in 12 cases (34%) requiring ND-YAG laser capsulotomy.

The postoperative AV was limited in most cases by the underlying retinal pathology (Table 2). The best visual recovery was observed in patients who had previously been operated for MEM or DDR with ON macular and in whom PKE was performed without complications.

Visual acuity	Preoperative (%)	Postoperative (%)
$\leq 1/10$	91,4	44.8
$1/10 > VA < 5/10$	8,6	27.6
$\geq 5/10$	0	27.6

Table 2: The postoperative AV underlying retinal pathology.

Discussion

Vitrectomy is an invasive surgical procedure, which presents in the list of its possible and classic complications the development of a cataract.

The pathogenesis of cataract formation after PPV is still unclear; the presumed factors that may be predisposing are advanced patient age, preexisting nuclear sclerosis, light toxicity from the operating microscope, use of intravitreal gas or silicone oil, mechanical trauma and duration of exposure to irrigating solution [4].

In our study, the mean interval between PPV and cataract surgery was 11.2 months, which is included in the interval reported by other authors [3,5-7]. The operative difficulties and complications that can be observed during cataract surgery on a vitrectomized eye are mainly related to the absence of vitreous support and the resulting eye collapse. This syndrome of irido-lenticular plane retropulsion occurs with a variable frequency in the literature (25 to 100%) 70% in our study.

PPV may also have induced a zonular fragility with a risk of peroperative dialysis of 3 to 5% (2.85% in our study) [2,5]. Other factors may cause difficulties for the surgeon [8]: Preoperative dilation is often moderate at the beginning of the operation, sometimes due to iridocapsular synechiae [4].

The capsules can also be modified with:

An elastic and rigid anterior capsule making the realization of capsulorhexis more delicate; A posterior capsule more mobile with an intraoperative rupture rate of 3 to 9% according to the series with risk of nuclear drop of 2%. Presence of indissociable posterior capsule plaques in almost 20% of cases, especially after tamponade by silicone oil [6,9-11].

We summarize in Table 3 the various difficulties and complications reported in the literature.

All these complications make the cataract surgery after the PPV a challenge, requiring special pre, intra and postoperative precautions and considerations.

	Grusha et al. [6]	Biro et al. [9]	Chang et al. [3]	Mitana et al. [12]	Suarez et al. [10]	Ahfat et al. [7]	Pardo et al. [5]	Szijarto et al. [11]	Our study
Number of patients	44	41	31/116	26	25	45	100	143	35
Deep fluctuating anterior chamber	5%	-	-	-	24%	13%	-	93%	70%
Zonular dialysis	4,5%	7,3%	-	-	-	2,2%	5%	2%	2,8%
miosis	-	-	2%	15%	28%	13%	-	6%	-
posterior capsule plaques	23%	27%	6,5%	8%	28%	-	-	19%	2,8%
Capsular tear	2,3%	12,2%	-	-	-	-	4%	9%	11,4%
Dropped nucleus	2,3%	7,3%	-	-	-	-	2%	2%	2,8%

Table 3: Difficulties and complications during cataract surgery after the PPV.

For patients who have undergone PPV, performing phacoemulsification under local anesthesia might be safer [7]. Topical anesthesia could be used with caution in selected patients who are certain to be cooperative during surgery.

During surgery, many techniques have been proposed to facilitate the surgical procedure [4,8,9,13]:

Lower the irrigating fluid bottle height and decrease flow.

Promote leaks (making a less sealed incision, leave the micromanipulator in the service incision);

Use of iris hooks or pupil expansion devices in case of miosis;

Positioning of a pars plana infusion (23 or 25G) pending or connected to a bottle adjusted between 10 and 15 mmHg;

Hydrodissection of the lens nucleus should be performed slowly and cautiously.

Use of Capsular tension ring in cases of zonular deinsertion.

In cases of a dense plaque, surgeons can perform a posterior capsulorhexis or defer the management to a postoperative ND-YAG laser capsulotomy depending on their judgment of the density of the plaque.

After vitreoretinal pathology, it is preferable to use an acrylic implant with large diameter (at least 6 mm), and adding 0.50 diopter to the calculated power to anticipate postoperative hyperopia secondary to the increase in depth of the anterior chamber.

Even after an intervention without incidents, postoperative follow-up may be more difficult than in a non-vitrectomized eye surgery.

The most commonly reported complication is posterior capsule opacification which will necessitate an Nd: YAG laser capsulotomy. On the other hand, recurrence or retinal detachment is the most serious complication (4 to 6% in the literature) [2-5].

Other complications (cystoid macular edema, ocular hypertension, hyphema, choroidal detachment, implant decentration) appear to be no more frequent and significant than on a non-vitrectomized eye.

A closer postoperative follow-up is therefore necessary to control not only the visual acuity but also the state of the posterior capsule and the retinal periphery.

Conclusion

Cataract surgery after PPV is a challenge that requires special considerations from the cataract surgeon. To avoid intraoperative complications, the operator must know the different traps of this procedure and adapt his surgical technique.

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