Transient Cataract Formation Related with Pars Plana Vitrectomy with Gas Tamponade

Pars Plana Vitrektomi ve Gaz Tamponatı ile İlişkili Geçici Katarakt Oluşumu

Mehmet Yasin TEKE[1], Ufuk ELGİN[2], Pınar YÜKSEKKAYA[1], Pınar ÖZDAL[2], Emine ŞEN[1], Faruk ÖZTÜRK[3]

ABSTRACT

Our aim in this case series was to report and discuss the clinical findings of three eyes of three cases that developed transient lens opacities after vitreoretinal surgery with gas tamponade. Three cases were referred to the retina department of our hospital for the decreased visual acuities related with rhegmatogenous retinal detachment in two cases and macular hole in one case with Behçet's disease. 23 gauge transconjunctival PPV with perfluoropropane (C3F8) tamponade was performed. Lens opacities were detected clinically in the early postoperative period in all of the eyes. All of the lenses regained their transparency after a while. In conclusion, transient lens opacities can be seen after vitreoretinal surgery with intraocular gas tamponade.

Key Words: Transient cataract, perfluoropropane, vitreoretinal surgery.

ÖZ

Bu vaka serisinde, göz içi gaz tamponatı kullanılan pars plana vitrektomi (PPV) ameliyatı sonrası geçici lens kesafetleri gelişen üç olgumuzu sunmayı amaçladık. Görme azlığı şikayeti ile Retina birimine başvuran üç hastanın ikisinde regmatojen retina dekolmanı, Behçet hastalığı olan bir olguda ise maküler delik saptandı. Tüm olgulara, perfloropropan (C3F8) gazı kullanılarak 23 gauge (G) transkonjonktival dikişsiz PPV yapıldı. Olguların hepsinde cerrahi sonrası erken dönemde lens opasiteleri izlendi. Ancak bir süre sonra lensler tekrar şeffaflaştı. Sonuç olarak, göz içi gaz tamponat kullanılan PPV ameliyatları sonrasında, geçici lens opasiteleri görülebilmektedir.

Anahtar Kelimeler: Geçici katarakt, perfloropropan vitreoretinal cerrahi.

INTRODUCTION

Cataract is one of the most important complications of vitreoretinal surgery (VRS) and the surgical extraction is more difficult than usual cases.[1] Progressive nuclear opacification after pars plana vitrectomy (PPV), transient feathering of the lens after intraocular gas tamponade and permanent subcapsular opacification after silicone oil injection may occur in some cases.[1-4] Although these cataracts are similar with age-related cases morphologically and histologically, their progression is more rapid especially in cases older than 50 years of age. Almost half of the patients need cataract surgeries within the two years after PPV. [1-4]

Perfluorocarbons (PFCs) are compounds made of carbon and fluorine and are usually liquid at room temperature.[3-6] They are routinely used in rhegmatogenous retinal detachment (RD), giant retinal tears, proliferative vitreoretinopathy and some other conditions.[3-6] Generally they are exchanged with gas or silicone oil at the end of the surgery. Intraocular gas-related feathering of the lens and vacuoles are usually seen in the upper part and posterior subcapsular region of the lens.[1] This complication especially occurs when the gas volume exceeds 2/3 of the vitreous volume.[1] This complication is thought to be related with impaired capability of oxygen use of the vitreous due to the destroyed structure of its gel form and ascorbate concentration after gas tamponade.[7]

Herein, we report our clinical observations of three eyes of three cases that developed transient lens opacities after vitreoretinal surgery with perfluoropropane (C_3F_8) tamponade.

1- M.D., Ulucanlar Eye Training and Research Hospital, Ankara/TURKEY
TEKE M.Y., mehteke@gmail.com
YUKSEKKAYA P., drpnarnalca@yahoo.com
SEN E., eminesentr@yahoo.com
2- M.D. Associate Professor, Ulucanlar Eye Training and Research Hospital, Ankara/TURKEY
ELGIN U., ufukelgin@superonline.com
OZDAL P., pinarozdal@hotmail.com
3- M.D. Professor, Ulucanlar Eye Training and Research Hospital, Ankara/TURKEY
OZTURK F., drfaruk2@yahoo.com

Geliş Tarihi - Received: 05.08.2012
Kabul Tarihi - Accepted: 30.10.2012
Glo-Kat 2012;7:249-252

Yazışma Adresi / Correspondence Adress: M.D. Associate Professor, Ufuk ELGİN
Ulucanlar Eye Training and Research Hospital, Ankara/TURKEY

Phone: +90 532 432 09 69
E-Mail: ufukelgin@superonline.com

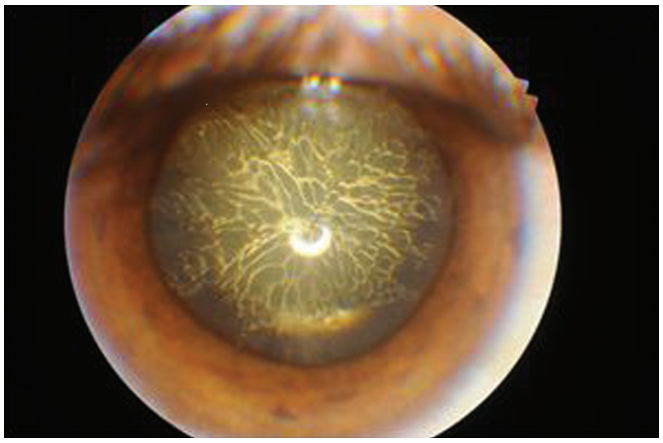

Figure 1: *Slit lamp examination shows feathering of posterior capsule of the central and superior region of lens and meniscus of gas in the inferior region at the postoperative first week (first case).*

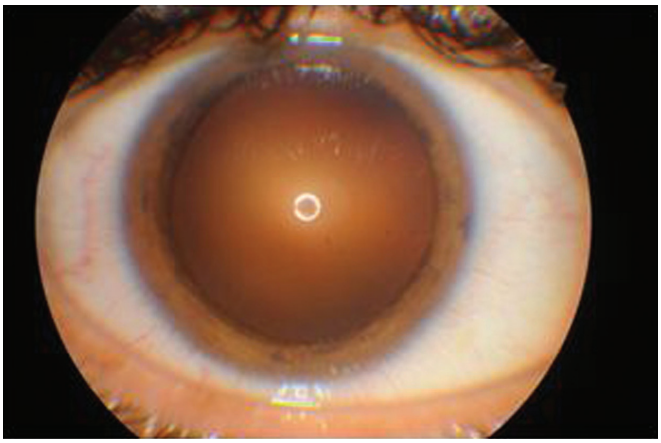

Figure 2: *Slit lamp examination shows clear lens at the postoperative first month (first case).*

CASE REPORT

Case 1

A 32-year-old female was hospitalized at our hospital for retinal detachment (RD) and vitreous hemorrhage (VH) in her right eye. The visual acuity (VA) was counting fingers at 2 meters in the affected and 10/10 (Snellen chart) in the left eye. Fundoscopy revealed VH with blurred retinal details while ocular ultrasound showed VH and RD.

After the 23 gauge (G) transconjunctival PPV procedure, a retinal-flap tear was detected at 11 o'clock, the retina was attached by PFC, and endolaser was performed around it. Finally 15% C_3F_8 was used to tamponade the retinal tear. At the first postoperative week, the VA was counting fingers at 1 meter and slit lamp examination revealed feathering of the posterior capsule of the lens (Figure 1). At the first postoperative month, the lens opacity had disappeared (Figure 2) with attached retina and intraocular C_3F_8 in the superior part. The patient's VA was 1/10. The IOP (intraocular pressure) was within normal limits at all visits.

Case 2

A 28-year-old female with high myopia was hospitalized at our hospital for decreased VA due to total RD in her right eye. The VA was counting fingers at 3 meters in the affected and 8/10 in the left eye with 9- dioptre spherical lens for both eyes.

Fundoscopy revealed total RD with two retinal tears at 9 and 11 o'clock in the right and lattice degeneration with partial-thickness retinal holes in all parts of peripheral retina in the left eye. 360-degree laser photocoagulation was performed for the left eye.

After the 23 G transconjunctival PPV procedure, the retina was attached by PFC and 360-degree endolaser photocoagulation was performed. Finally after PFC-gas exchange, 15% C_3F_8 was used to tamponade the retinal tear.

At the first postoperative week, the VA was counting fingers at 1 meter and slit lamp examination revealed feathering of the posterior capsule of the lens with posterior capsule vacuoles (Figure 3). The peripheral part of the lens was seen to be clear, especially when the patient looked down (Figure 4).

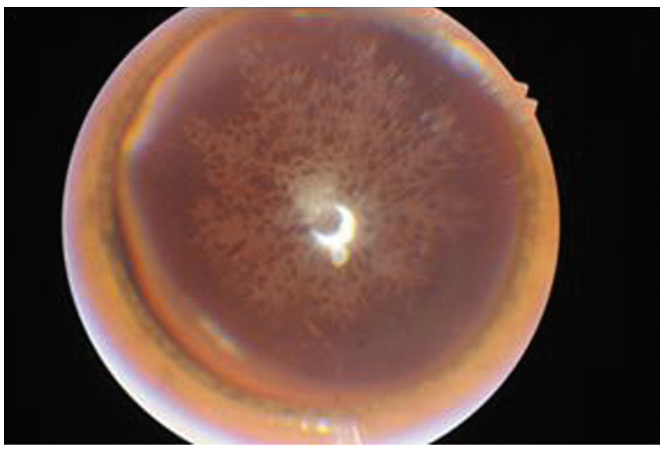

Figure 3: *Slit lamp examination shows feathering of posterior capsule of the central region of lens at the postoperative first week (second case).*

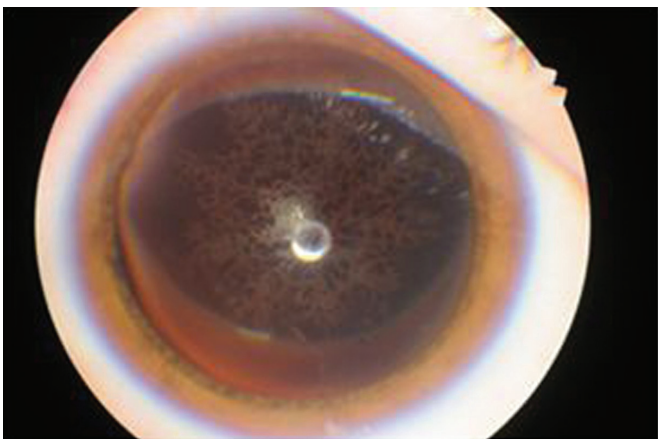

Figure 4: *Slit lamp examination shows clearance of the peripheral lens when the patient looks down at the postoperative first week (second case).*

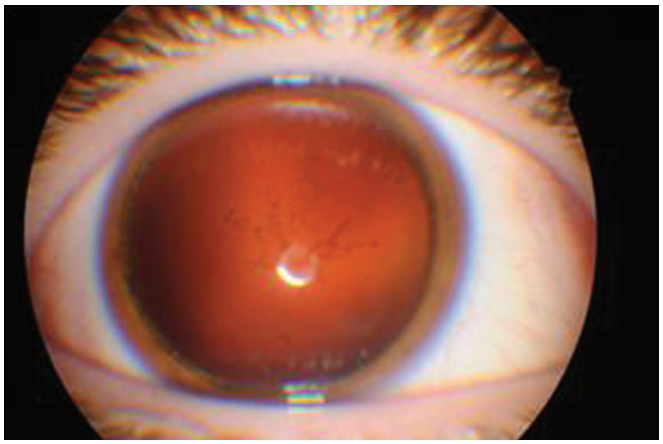

Figure 5: *Slit lamp examination shows constant central posterior cortical opacities (second case).*

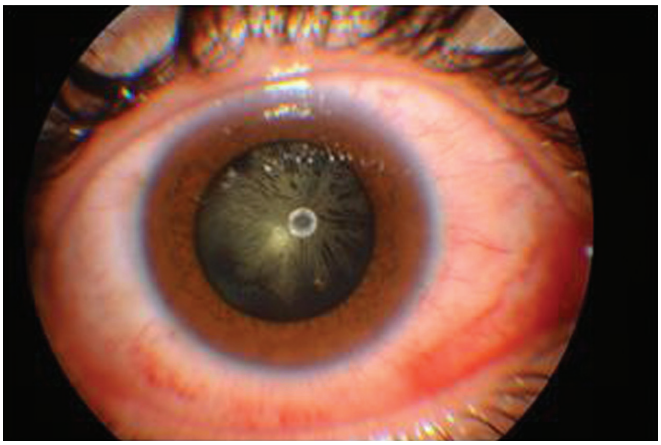

Figure 6: *Slit lamp examination shows feathering of posterior capsule of lens at the postoperative first week (third case).*

At the first postoperative month, the retina was attached with a VA of counting fingers at 5 meters. The lens vacuoles had disappeared (Figure 5) but central posterior cortical opacities remained constant. IOP measurements were normal at the visits.

Case 3

A 24-year-old male case with Behçet's disease was hospitalized for macular hole and vasculitis in his right eye. The VA was counting fingers at 4 meters in the right eye and 6/10 in the left eye and the intraocular pressure was 14 mmHg in both eyes. Slit-lamp examination showed vitreous cells in both eyes. Widespread retinal vasculitis in both eyes and full-thickness macular hole in the right eye were detected on fundus examinations. Systemic corticosteroid and antimetabolite treatment were begun for vasculitis and 23 gauge transconjunctival PPV was planned. After posterior hyaloid and internal limiting membrane peeling, liquid-gas exchange was performed. Finally, 15% C_3F_8 was used to tamponade. At the first postoperative day, the VA was counting fingers at 1 meter and slit lamp examination revealed feathering of the posterior capsule of the lens with vacuoles (Figure 6).

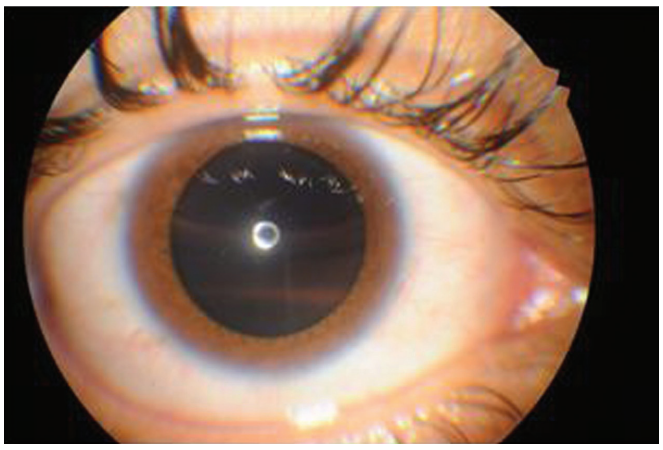

Figure 7: *Slit lamp examination shows clear lens and meniscus of gas at the postoperative third week (third case).*

At the third postoperative week, the lens vacuoles disappeared (Figure 7), with intraocular C_3F_8 in the superior part and a VA of counting fingers at 1 meter. No IOP elevations were observed at the visits.

DISCUSSION

Recent evolutions in imaging, illumination and sutureless techniques can facilitate all steps of VRS and lead to these surgeries being preferred more frequently with undesirable complications. These complications may occur in the early or late postoperative period due to silicone or gas tamponade in addition to intraoperative complications like iatrogenic retinal tears.[1-5]

Cataract formation is one of the most important complications of VRS. Silicone oil (SO) tamponade is the main cause with an 80% incidence of cataract within two years after the surgery. The contact of SO with the posterior capsule of the lens may impair the metabolism and nutrition of the lens. The mechanical pressure of SO is thought to be more important than its toxic effects in the pathogenesis of cataract formation.[6]

Intraocular gas tamponade may cause posterior subcapsular feathering and vacuoles, especially in the upper part of the lens.[1-5] In our study, we present three cases with temporary lens opacities due to C_3F_8 tamponade. All our cases had undergone 23 gauge transconjunctival PPV with non-expendable 15% C_3F_8 tamponade.

Vacuoles of posterior lens capsule were present in the central and upper regions of the lens in all of our cases but especially in the second one. We thought these regions were the zones of more contact of lens with the meniscus of gas related with their kinetic properties. Although the pathogenesis of intraocular gas-related lens opacities is not clear, long-term gas and lens contact is thought to be important.[1-5]

The impairment of lens metabolism by the mechanical effect of gas may also be a factor in SO cataract as the prevention of this contact may decrease the incidence of gas-related lens opacities. The face-down position may be a factor for the disappearence of lens vacuoles by changing the contact-zone of the lens and gas meniscus and repairing the impaired lens metabolism.[4] The incidence of gas-related opacities decreases if drainage of the aqueous can be maintained between the gas and the posterior capsule.[4] The lens opacities in our cases were thought to be caused by long-term contact of lens and gas due to noncompliance with the face-down position. Almost 50% of the cases developed permanent lens opacities related with gas. Our second case also had permanent central opacities in spite of disappearing vacuoles.

There are few reports on intraocular VRS-related cataract formation.[8-10] de Bustros S et al.[8] found a relationship between lens changes occurring after PPV and presence of preoperative nuclear sclerosis, length of follow-up period, and the surgeon in their study. Ogura et al.[9] Measured the amount of autofluorescence in the lens to evaluate lens changes quantitatively after vitrectomy. They found a significant correlation between the increase of autofluorescence and the age at time of vitrectomy but not intraocular air usage. However, Hsuan et al.,[10] detected transient posterior subcapsular cataract in the immediate postoperative period related with both PPV and gas tamponade and accelerated nuclear opacification after the resolution of acute changes. We also believe that the transient lens changes in our cases were related to C_3F_8 tamponade as the opacities were localized on the contact zone of lens and gas. The progression of preoperative nuclear sclerosis was also found to be related with intraocular gas tamponade and the age of the cases.[11] Cases older than 50 years of age had a 6-fold risk for the progression of nuclear sclerosis.[11] However, all our cases were young and none of them had preoperative or postoperative nuclear sclerosis. Chung et al. investigated the duration and pattern of cataract formation after pars plana vitrectomy in their study.[12] They found the interval between PPV and permanent cataract formation to be 8 to 13.3 months and they postulated that vitreous micro environmental changes, post-vitrectomy uveitis, intravitreal gas, and patient age may be the key points of cataract formation after surgery.

The vitreous concentration of ascorbic acid, an antioxidation agent, is higher than the plasma concentration and it protects the lens from oxidative stres.[7] Oxidative stress induces destruction of proteins in the lens nucleus.[7] A nuclear cataract develops within 1-3 years in 50% of the patients who undergo long-term hyperbaric oxygen therapy.[13] After PPV, the intraocular oxygen concentration increases significantly. Shui et al.,[7] stated that the concentration of ascorbate decreases when vitreous loses its gel form by vitrectomy or vitreous degeneration, and the increased exposure of the lens to oxygen promotes the progression of nuclear cataracts.

In conclusion, PPV even without intraocular tamponade may promote nuclear cataract development due to oxidative stress by decreasing ascorbate level. Intraocular tamponade, which can directly affect the course and outcome of VRS, may also impair lens metabolism by mechanical contact and cause clinical conditions from transient posterior subcapsular feathering in gas tamponade to permanent cataract in SO tamponade. This report also emphasizes the importance of the face-down position after PPV with PFC, as it may cause a rapid regression of lens opacities. The patient should be informed about this complication properly and encouraged to maintain the face-down position.

KAYNAKLAR/REFERENCES

1. Petermeier K, Szurman P, Bartz-Schmidt UK, et al. Pathophysiology of cataract formation after vitrectomy .Klin Monbl Augenheilkd 2010;227:175-80.
2. Lott MN, Manning MH, Singh J, et al. 23-gauge vitrectomy in 100 eyes: short-term visual outcomes and complications. Retina 2008;28:1193-200.
3. Kim SS, Smiddy WE, Feuer WJ, et al. Outcomes of sulfur hexafluoride (SF_6) versus perfluoropropane (C_3F_8) gas tamponade for macular hole surgery. Retina 2008;28:1408-15.
4. Tranos PG, Peter NM, Nath R, et al. Macular hole surgery without prone positioning. Eye 2007; 21:802-6.
5. Chang S, Özmert E, Zimmerman N. Intraoperative perfluorocarbon liquids in the management of proliferative vitreoretinopathy. Am J Ophthalmol 1988;106:668-72.
6. Leaver PK. Complications of intraocular silicone oil. In Glasser BM, Michels RG, eds. Surgical Retina St Louis CV Mosby 1989;293-306.
7. Shui YB, Holekamp NM, Kramer BC, et al. The gel state of the vitreous and ascorbate-dependent oxygen consumption: relationship to the etiology of nuclear cataracts. Arch Ophthalmol 2009;127:475-82.
8. de Bustros S, Thompson JT, Michels RG, et al. Nuclear sclerosis after vitrectomy for idiopathic epiretinal membranes. Am J Ophthalmol 1988;105:160-4.
9. Ogura Y, Takanashi T, Ishigooka H, et al. Quantitative analysis of lens changes after vitrectomy by fluorophotometry. Am J Ophthalmol 1991;111:179-83.
10. Hsuan JD, Brown NA, Bron AJ, et al. Posterior subcapsular and nuclear cataract after vitrectomy. J Cataract Refract Surg 2001;27:437-44.
11. Thompson JT. The role of patient age and intraocular gas use in cataract progression after vitrectomy for macular holes and epiretinal membranes.Am J Ophthalmol 2004;137:250-7.
12. Chung CP, Hsu SY, Wu WC. Cataract formation after pars plana vitrectomy. Kaohsiung J Med Sci 2001;17:84-9.
13. Palmquist BM, Philipson B, Barr PO. Nuclear cataract and myopia during hyperbaric oxygen therapy. Br J Ophthalmol 1984;68:113-7.