



Late Choroidal Effusion after Phacoemulsification in Eyes with Previous Trabeculectomy

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Received: 22 June 2019 ♦ **Accepted:** 01 Aug 2019 ♦ **Published:** 31 Dec 2019

Citation: Konareva-Kostianeva M, Kostianeva-Zhelinska S, Stoyanova N. Late choroidal effusion after phacoemulsification in eyes with previous trabeculectomy. *Folia Med (Plovdiv)* 2019;61(4):506-11. doi: 10.3897/folmed.61.e48259.

Abstract

Aim: To present 5 cases of late choroidal detachment occurring spontaneously in pseudophakic glaucomatous eyes with previous trabeculectomy before cataract surgery. We discuss the causes, risk factors, frequency, diagnostic methods, differential diagnosis, and treatment of this disease.

Materials and methods: In the presented 5 cases the choroidal effusion is proved by ophthalmoscopy and echography. Late choroidal detachment occurs after phacoemulsification 6 months at the earliest and 9 years at the latest (mean period 2.5 years) in glaucomatous eyes with previous trabeculectomy. To prove choroidal detachment we accomplished routine ophthalmological examination including medical history, visual acuity, tonometry, examination of anterior segment (AS) and fundus. We have done B-scan echography using A/B Ocular Ultrasound Aviso Quantel Medical.

Results: One of the patients had hemorrhagic detachment confirmed by B-scan echography, the other four patients had serous detachment. The examined patients had the glaucomatous disease for 10.4 ± 6.11 years (mean \pm SD). Mean age at the time of choroidal effusion diagnosis was 76.8 ± 7.6 years (68-87 years). The period between the trabeculectomy and the following phacoemulsification was 6 ± 3.08 years (from 1 to 9 years). All patients received anti-glaucomatous topical therapy, including carbonic anhydrase inhibitors, before the occurrence of the effusion. In all cases conservative treatment with corticosteroids and cycloplegics was enough to overcome the detachment and restore visual acuity.

Conclusion: Late choroidal effusion after phacoemulsification in eyes with previous trabeculectomy is associated with an application of unjustified powerful hypotensive topical medications after cataract surgery associated with an additional reduction of intraocular pressure in most cases.

Keywords

choroidal effusion, glaucoma, phacoemulsification, trabeculectomy

INTRODUCTION

Choroidal effusion that leads to choroidal and retinal detachment presents as accumulation of fluid in the suprachoroidal space – serous or hemorrhagic. It can be a complica-

tion of several intrabulbar surgical interventions (cataract, glaucoma and retinal detachment surgeries), where the hypotony is combined with postoperative inflammation, but it can be also associated with non-surgical conditions (UES - uveal effusion syndrome) or inflammatory diseases such

as scleritis, sympathetic ophthalmia, pars planitis, Harada's disease, etc.¹

Choroidal effusion most often occurs immediately after trabeculectomy (TE) as an early complication. Alternative surgical methods at first place microshunt antiglaucomatous surgery (minimally invasive glaucoma surgery - MIGS) give less surgical complications including choroidal effusion.² Trabeculectomy is attributed to serous detachment and suprachoroidal hemorrhage as well. The frequency of hemorrhagic choroidal detachment is bigger in shunt anti-glaucomatous surgery (tube shunts) compared to classic TE: 1.2 – 2.7%^{3,4} Tuli et al., Jeganathan et al. versus 0.6 – 1.4% Varizi et al. (2015)⁵. According to Tuli et al.³ in use of tube shunts the frequency of choroidal effusion is three times higher than that observed in trabeculectomy. Hemorrhagic detachment can occur not only after anti-glaucomatous surgery, but also spontaneously after trauma or as complication of other ocular procedure: cataract surgery, secondary implantation of IOL, pars plana vitrectomy, scleral buckle, penetrating keratoplasty.

Risk factors for choroidal effusion: 1. Low postoperative IOP; 2. Higher preoperative IOP that leads to sudden bigger lowering during the surgery and after it; 3. Use of anti-metabolites – mitomycin C, 5-fluorouracil. Characteristic signs for choroidal detachment are:

1. Shallow to missing anterior chamber (AC)
2. Low intraocular pressure (IOP)

Hypothalamia (shallow anterior chamber) and/or athalamia (missing anterior chamber) occurs in up to 10% of filtering surgeries. This condition may cause visual acuity deterioration due to cataract development or may lead to corneal decompression. When posterior segment is affected, the serous (or hemorrhagic) fluid appears as a barrier between the pigment epithelium and the sclera and leads to rising and folding of the retina and decrease of visual acuity. In differential diagnostic plan, choroidal detachment should be distinguished from glaucoma with wrong drainage direction of the intraocular fluid (IOF) – so called malignant glaucoma or pupillary block. We should also consider the uveal effusion syndrome (UES), which is associated with nanophthalmos and rarely – with concomitant optic neuropathy. In UES, idiopathic serous choroidal detachment is observed caused by scleral abnormalities, associated with hypoplasia or partial absence of vorticos venous system.¹ Causes for hypotony (low IOP) besides serous choroidal detachment can be overfiltration, leakage from the surgical wound, and cyclodialysis.

The following methods are used to prove choroidal detachment:

- Fundoscopy – indirect or direct ophthalmoscopy, fundus biomicroscopy
- Ultrasound – B scan
- Optical Coherence Tomography (OCT)

Objective: To present 5 cases of late choroidal detachment occurring spontaneously in glaucomatous pseudophakic eyes with previous trabeculectomy before cataract surgery.

MATERIALS AND METHODS

We present 5 cases of late choroidal detachment occurring after phacoemulsification 6 months at the earliest and 9 years at the latest (mean period 2.5 years) in glaucomatous eyes with previous trabeculectomy. Deterioration of vision is the reason why patients seek ophthalmological help. Besides decreased visual acuity, strongly reduced intraocular pressure is observed, without clearly shallow anterior chamber. Choroidal effusion is proved by ophthalmoscopy and echography. To prove choroidal detachment in the examined patients we accomplished routine ophthalmological examination including medical history (for present and former eye diseases, general diseases, previous ophthalmological and general surgeries, general treatment or locally applied), visual acuity, tonometry, examination of anterior segment (AS) and fundus. We did B-scan echography using A/B Ocular Ultrasound Aviso Quantel Medical. Standard ultrasound in transversal approach presents choroidal effusion as smooth or defined as festoon thick membrane in the periphery with little mobility during movement.

RESULTS

Three patients had exfoliative glaucoma and two – primary open-angle glaucoma. One patient had hemorrhagic detachment confirmed by B-scan echography, and the other four had serous detachment. The examined patients had the glaucomatous disease for 10.4 ± 6.11 years (mean \pm SD). Mean age at the time of choroidal effusion diagnosis was 76.8 ± 7.6 years (68-87 years). The period between the trabeculectomy and the following phacoemulsification was 6 ± 3.08 years (from 1 to 9 years).

Table 1 shows the age, glaucoma duration, period from trabeculectomy to cataract surgery, period from phacoemulsification to choroidal effusion for all examined patients.

Case 1: Female, 77 years old, treated for glaucoma (primary open-angle glaucoma – POAG) since 2006. In 2006, her left eye underwent trabeculectomy and in 2015 – phacoemulsification. In 2016, brinzolamide/timolol fixed combination was included for the treatment of the left eye and 6 months later the same year we found spontaneous choroidal effusion of the left eye. **Fig. 1** presents B-scan of the left eye.

Case 2: Female, 68 years old, with non-insulin-dependent diabetes mellitus, treated for POAG since 2012. In 2013 – TE of right eye, in 2014 – phacoemulsification of the same eye. Since 2015 – both eyes have been treated with brinzolamide/timolol fixed combination, travoprost and brimonidine – and 6 months later – choroidal effusion of right eye occurred. **Fig. 2** shows the B-scan of the right eye.

Case 3: a 71-year-old female patient, treated for exfoliative glaucoma since 2006. In 2006, her right eye underwent trabeculectomy, and in 2014 – phacoemulsification.

Table 1. Characteristics of examined patients

Case Number	Glaucoma duration (years) (mean 10.4±6.11 yrs)	Age at the time of choroidal effusion (years) (mean 76.8±7.6 yrs)	Period between TE and cataract surgery (years) (mean 6.0±3.1 yrs)	Period between phacoemulsification and choroidal effusion (years) (mean 2.5±3.6 yrs)
1	10	77	9	1
2	3	68	1	1/2
3	39	71	8	1
4	20	87	6	9
5	10	81	6	1

In 2015 – both eyes were treated with dorzolamide/timolol fixed combination and bimatoprost and 3 months later we observed choroidal effusion of right eye. **Fig. 3** presents the B-scan of the right eye.

Case 4: Male, 87 years old, treated for exfoliative glaucoma since 1996. In 1999 – TE of left eye. Six years later (2015) – phacoemulsification of the same left eye. Recently the patients was treated with travoprost and dorzolamide/timolol fixed combination. In 2016 – hemorrhagic choroidal detachment of left eye was observed. **Fig. 4** presents the B-scan of the left eye.

Case 5: Female, 81 years old, treated for exfoliative glaucoma since 2005. In 2008 – TE of right eye, in 2014 – phacoemulsification of the same eye. The same year, dorzolamide/timolol fixed combination and travoprost were included as local treatment of both eyes. In 2015 – choroidal effusion of right eye (marked with arrow at the photo below). **Fig. 5** shows the B-scan of the right eye.

All patients, in the period before the choroidal effusion, were treated with anti-glaucomatous eye drops, including carbonic anhydrase inhibitors. The anti-glaucoma medication was discontinued after the diagnosis of choroidal effusion. The patients improved after the conservative treatment with corticosteroids (drops and subconjunctival injections) and cycloplegics. Local therapy was enough to overcome the detachment and to restore the visual acuity without any surgical intervention.

and 15 months after combined surgery (anti-glaucomatous and cataract). Postoperatively, patients received lowering IOP therapy. The authors suggested that in these cases there was not a shallow anterior chamber and leakage of fluid from the filtering bleb as well or signs of inflamma-



Figure 1. B-scan of left eye of case 1.

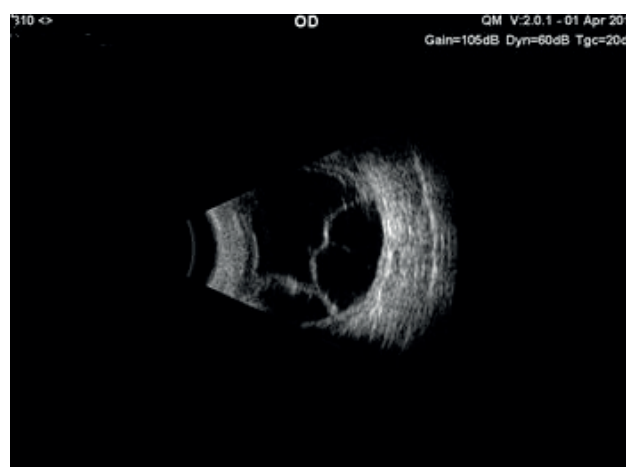


Figure 2. B-scan of right eye of case 2.

DISCUSSION

Late choroidal effusion after trabeculectomy and cataract surgery has been reported by other authors.⁶⁻⁸ T Zarnowski et al.⁶ described cases similar to our cases. T Sharma and JF Salmon⁷ observed as a rare complication choroidal effusion that occurred 3 months after cataract surgery in eye with prior TE. They related it to the conduction of local suppressive therapy with timolol and dorzolamide in relatively low intraocular pressure, maintained years after filtering surgery. R Rachmiel et al.⁸ found hypotony and choroidal detachment in two patients, respectively 7 months

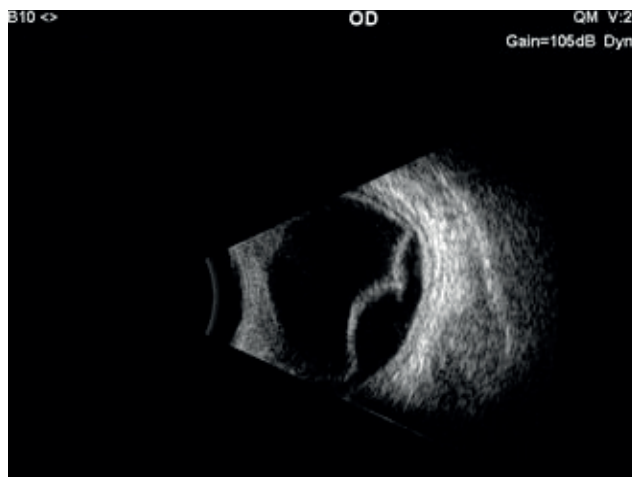


Figure 3. B-scan of right eye of case 3.

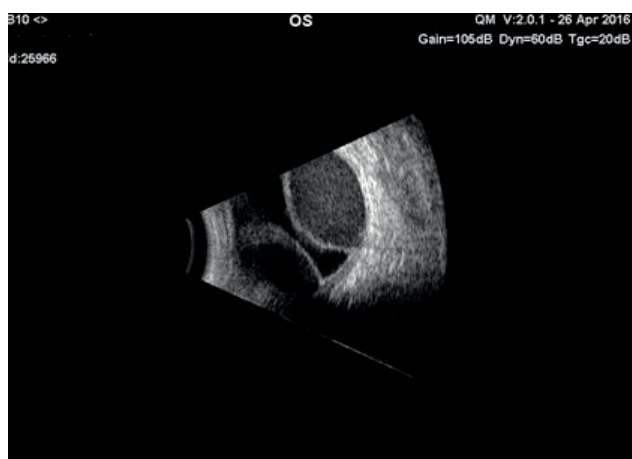


Figure 4. B-scan of left eye of case 4.

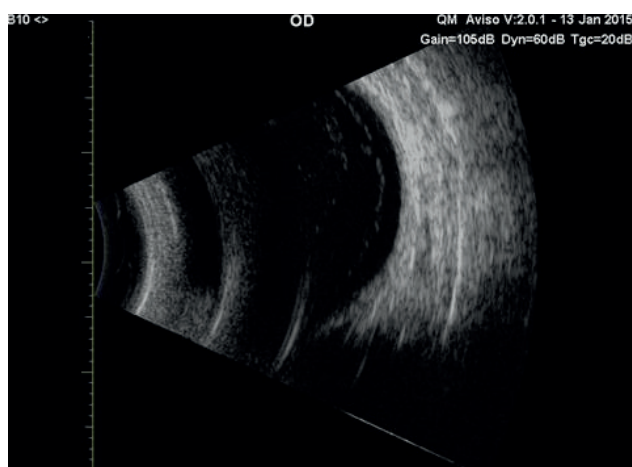


Figure 5. B-scan of right eye of case 5.

tion. We also did not observe a shallow anterior chamber in the described cases. Nevertheless, we found hypotony in all presented patients. Callahan et al.⁹ supported the same idea that hypotensive therapy with timolol and dorzolamide (which lowers the production of intraocular fluid) may lead to choroidal effusion in a late postoperative phase in patients with glaucomatous surgery and drainage shunts, even without following phacoemulsification. Although hypotony and choroid detachment, associated with the use of suppressants of aqueous humour, are rarely observed, it should be considered in patients with hypotony with unclear etiology after glaucoma filtering surgery.¹⁰ Maj Vela MA et al.¹¹ describe precisely the mechanism hypotony develops as a result of repression of the aqueous humour production: at first ciliary body is injured, mostly because of increased sensitivity to the long-lasting suppression of aqueous humour or because of the performed filtering surgery. After repeated treatment with drugs, the sensible ciliary body reacts with very strong reduction of aqueous humour production that leads to hypotony. Not only local (timolol and dorzolamide) drops can lead to choroidal effusion, but oral drugs decreasing the production of intraocular fluid (acetazolamide)¹² and prostaglandin analogues and prostamide (latanoprost, bimatoprost, travoprost) as well. The mechanism of choroidal detachment by increased uveo-scleral outflow is attributed to lowering of the level of collagen type I, III, and IV in the ciliary smooth muscle fibers and the adjacent sclera.¹³ Martinez-Bello et al.¹⁴ showed that 28 eyes after trabeculectomy 4 to 6 months after the surgery had persistent choroidal effusion established with ultrasound biomicroscopy. They suggested that the observed effusion of the choroidea is provoked by increased uveo-scleral outflow, as a result of cyclodialysis, caused by trabeculectomy performed with excision of the scleral spur and removal of the barrier between anterior chamber and suprachoroidal space.¹⁴ Usage of mitomycin-C in trabeculectomy has direct toxic effect on the ciliary epithelium and that leads to hyposecretion of aqueous humour.¹⁵ When aggressive hypotensive anti-glaucomatous therapy is applied, choroidal detachment may be observed in cases with preceding glaucomatous or cataract surgery, as well as in cases without surgical intervention.¹⁶⁻²³ Most cases of postoperative choroidal detachment resolve spontaneously. Choroidal effusion in our patients was resolved with discontinuation of anti-glaucomatous therapy and inclusion of corticosteroid drops and cyclopet. Some authors use the same therapy.^{7,8} Other authors report a surgical drainage of suprachoroidal fluid with very fast effect²⁴ or performing pars plana vitrectomy²⁵.

CONCLUSION

Late choroidal effusion in eyes with previous trabeculectomy after phacoemulsification is attributed to unjustifiable

use of strong hypotensive drugs after cataract surgery and additional lowering of the intraocular pressure in the operated eyes.

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Поздняя хориоидальная эффузия после факоэмульсификации глаз с предшествующей трабекулэктомией

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Дата получения: 22 июня 2019 ♦ **Дата приемки:** 01 августа 2019 ♦ **Дата публикации:** 31 декабря 2019

Образец цитирования: Konareva-Kostianeva M, Kostianeva-Zhelinska S, Stoyanova N. Late choroidal effusion after phacoemulsification in eyes with previous trabeculectomy. Folia Med (Plovdiv) 2019;61(4):506-11. doi: 10.3897/folmed.61.e48259.

Абстракт

Цель: Представить 5 случаев поздней отслойки хориоидеи, возникающей спонтанно в псевдофакических глаукоматозных глазах, которые перенесли трабекулэктомию перед операцией по удалению катаракты. Обсуждаются причины, факторы риска, частота, методы диагностики, дифференциальная диагностика и лечение этого заболевания.

Материалы и методы: В представленных 5 случаях хориоидальная эффузия была подтверждена офтальмоскопией и ультразвуком. Поздний пилинг сосудистой оболочки происходит в первые 6 месяцев и в последние 9 лет (в среднем 2.5 года) после факоэмульсификации в глаукоматозных глазах с предшествующей трабекулэктомией. Чтобы продемонстрировать отслойку хориоидеи, мы выполнили плановое офтальмологическое обследование, включая историю болезни, остроту зрения, тонометрию, исследование переднего сегмента (ПС) и дна. Мы выполнили сонографию В-сканирования, используя ультразвуковое исследование глаза A / B Aviso Quantel Medical

Результаты: У одного пациента была обнаружена геморрагическая отслойка, подтвержденная ультразвуком В-сканирования, а у остальных четырех пациентов была тяжелая отслойка. У обследованных пациентов была глаукомная болезнь в течение 10.4 ± 6.11 года (среднее значение \pm СО). Средний возраст при постановке диагноза хориоидальной эффузии составил 76.8 ± 7.6 года (68–87 лет). Период между трабекулэктомией и последующей факоэмульсификацией составил 6 ± 3.08 года (от 1 до 9 лет). Все пациенты проходили местную терапию против глаукомы, включая ингибиторы карбоангидразы, до возникновения эффузии. Во всех случаях консервативная терапия кортикостероидами и циклоплегией была достаточной для преодоления адгезии и восстановления остроты зрения.

Выводы: Поздняя хориоидальная эффузия сосудистой оболочки глаза после факоэмульсификации глаз с предшествующей трабекулэктомией связана с введением неоправданно сильных гипотензивных препаратов для местного применения после операции по удалению катаракты, в большинстве случаев связанных с дополнительным снижением внутриглазного давления.

Ключевые слова

хориоидальная эффузия, трабекулэктомия, факоэмульсификация, глаукома
