International Journal of Pharmaceutical Science Invention
ISSN (Online): 2319-6718, ISSN (Print): 2319- 670X
www.ijpsi.org Volume 11 Issue 4 || Jul. –Aug. 2022 || PP. 01-04

Choroidal Detachment after Uncomplicated Cataract Surgery

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Abstract
Serous choroidal detachments are rare conditions that occur when fluid accumulates in the suprachoroidal layer, located between the choroid and sclera. The most common cause of choroidal detachment is secondary due to trabeculectomy or other causes such as trauma, inflammation, infection, or growth of neoplasms. There are only few case reports in the literature of such a complication after modern cataract surgery and mainly they are linked with the presence of some risk factors such as prolonged intraoperative time, hypotony, combined cataract and filtrating surgery, or drug-related complications. However, the underlying mechanism of such a complication after phacoemulsification and the risk factors for its development are still poorly understood and further investigations are necessary. We are presenting a case report of a serous choroidal detachment after a standard cataract surgery along with a scientific review on this topic.
Keywords:*choroidal detachment, cataract surgery, shallow anterior chamber*

Date of Submission: 01-07-2022 Date of acceptance: 10-07-2022

I. INTRODUCTION

Serous choroidal detachments are rare conditions with abnormal accumulation of fluid in the suprachoroidal layer between the choroid and the sclera. It could be caused by inflammation, infections, neoplasm growth, trauma, or different surgical procedures. The main pathophysiological mechanism underlying the serous choroidal detachment is the transudation of the serum from the choroidal vessels to the suprachoroidal space. This could be caused due to an increased vascular permeability such is seen in cases with an inflammatory response or due to decreased intraocular pressure that could be caused by different factors such as trauma, surgical interventions, or drug-related reactions. The most common cause of serous choroidal detachment after surgical interventions, reported in the literature, is low IOP after trabeculectomy surgery. There are few reports only of such a complication following cataract surgery. (1-6) Modern cataract surgery uses small incisions and usually does not cause a significant intraoperative and postoperative hypotony, so this complication is rarely seen. In the past, there were many more reported cases of choroidal detachment after extracapsular extraction which could be linked with the different surgical technic - bigger incisions, corneal sutures, possible wound leakage, and postoperative hypotony. (1), (37) Eventhough these risk factors in modern cataract surgery are reduced, we could still observe those complications rarely, as in our case, and further investigation for other possible pathophysiological mechanisms and risk factors must be considered.

AIM

We aim to present a rare complication of serous choroidal detachment that occurred after uncomplicated cataract surgery and to discuss the possible causes and risk factors for its development

II. METHODS

We are presenting a case report of serous choroidal detachment that occurred after uncomplicated cataract surgery along with a clinical review of the scientific literature.

III. CASE REPORT

An 82-year-old woman underwent uneventful cataract surgery on her left eye. Her best visual acuity before the surgery was VOD= 0,3 with -3.0 dsph in the right eye and VOS=0,05 in the left, the IOP in both eyes

was normal. From the ophthalmological status - we observed an arcus senilis, a deep anterior chamber, and a hyper-mature intumescent cataract in the left eye. Due to the dense cataract, investigation of the retina was impossible, so a B-scan echography on the left eye was performed – the retina was intact and no other pathologies were found. The axial length of the left eye was 24.78 mm and 25.05 mm in the right eye.Standard phacoemulsification with implantation of a soft hydrophobic acrylateIOL in the left eye was performed, without intraoperative complications. The next day, the visual acuity in the left eye improved, the anterior chamber was deep and the IOP was normal. However, on the second day after the surgery, the patient complained of decreased vision.A shallow anterior chamber along with hypotony and a temporal ciliochoroidal detachment was detected (Figure 1). A Seidel test was performed and no wound leakage was observed. A surgical revision with a viscoelastic reformation of the anterior chamber was conducted and combined intravenous and local steroid therapy along with cycloplegia was initiated. The day after the surgical revision a well-formed deep anterior chamber, a normal IOP and a decreased area of the detachment were found. A week after the visual acuity of the left eye improved to 0.7 and no signs of choroidal detachment were observed.

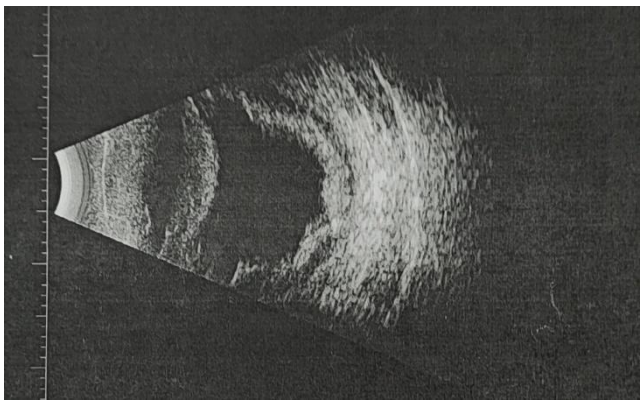

Figure 1: A B-scan showing a serous cilioretinal detachment 2 days after uneventful cataract surgery

IV. DISCUSSION

To our knowledge, there are only few case reports of serous choroidal detachment after modern cataract surgery. Most of them are linked with drug-induced reactions such as increased vascular permeability/angioedema due to previous therapy with Acetazolamide (2), (3), (4), ACE-inhibitors (5), or ATB-blockers (6). In their article, Chikako Suto et al. report a case of choroidal detachment after uneventful cataract surgery and suggest the usage of angiotensin II receptor blockers (ARB) as a possible cause of this complication. (6) Another studyreports the same complication in patients on ACE-inhibitor medication therapy. (5) In all of these studies, the authors suggest a drug-induced increased vascular permeability and angioedema adverse reaction mechanism. A choroidal detachment as a complication after cataract surgery was reported as well due to Acetazolamide intake after the intervention. (2), (3), (4). However,in our case, the patient was not taking any of those medications,before or after the surgical intervention. The only medication she was taking is Nicergoline due to mild senile dementia and atherosclerotic cerebrovascular disease. Nicergoline is an ergot alkaloid derivative that acts as an α1-adrenoceptor antagonist and induces vasodilation and increases arterial blood flow.(38) The induced vasodilatation and the increased blood flow in the choroidalvessels due to the therapy with Nicergoline could be a possible mechanism for developing a choroidal detachment in our case. However, there areno clinical reports for such an adverse effect of Nicergoline, so further investigations in the field are necessary, as wellas other possible mechanisms or risk factors must be considered.

A clinical review of the literature shows several different factors that could increase the risk of developing a serous choroidal detachment. Two are the main pathophysiological mechanisms for this – first, low intraocular pressure that causes transudation of the serum from the choroidal vessels to the intravascular space, and second - increased vascular permeability, due to inflammation. (7), (8)

The first known pathophysiological mechanism for choroidal detachment – **the hypotony**, frequently occurs during and after filtration surgery operations. Incidence rates of hypotony have been reported to be up to 19 percent following trabeculectomy, and up to 33 percent following aqueous shunt surgery. (9), (10). In the past, the incidence of hypotony and choroidal effusion following cataract extraction surgery was pretty high. (11) However, the incidence rate of hypotony and choroidal detachment after modern cataract surgery remains unclear. In any case, our team suggests a possible intraocular hypotony or a sudden drop of the intraocular pressure during the cataract surgery or in the early post-op period as a possible mechanism for choroidal detachment following modern cataract surgery, especially in the cases of dense,intumescent cataracts – as seen in our case.The clinical data shows that such a sudden drop in the IOP or prolonged hypotony during glaucoma surgery could increase significantly the risk for serous choroidal detachment. (12) The same result occurs when

intensive treatment is given for an acute angle-closure attack, where the sudden drop in intraocular pressure causes a greater incidence of choroidal detachment than in patients treated for chronic angle-closure glaucoma. (13)

Another possible risk factor is the use of local **anti-hypertensive medications** such as timolol, dorzolamide, bimatoprost, travoprost, and latanoprost that have been reported to increase the risk of developing a choroidal detachment secondary due to hypotony following filtration surgery or cataract extraction. (14) The current literature on eye drop-induced choroidal detachments following surgery is based on case reports alone, with participant numbers ranging from one to four, and thus the relative risk of developing a detachment while using topical anti-glaucoma medication is still unclear. Excessive intraocular pressure lowering by topical anti-hypertensive medications alone increases the risk of choroidal detachments, irrespective of surgery. However, in our case, the patient was having normal tension before the surgery so none of those medications was used. There have also been case reports of choroidal detachments occurring after the use of**certain other medications**. Such medications reported include Acetazolamide (3), (16), (17), (18),Topiramate (19), Venlafaxine (20), Losartan (21), Methazolamide (22), Tamsulosin (23), (24), Indapamide (25).In our case none of those medications were used so another mechanism for the complication must be considered.

The second known pathophysiological mechanism for choroidal detachment is **increased vascular permeability** of the choroidal vessels due to **local inflammation**. Cataract surgery is considered an inflammatory insult to the eye, and postoperative inflammation has been proposed as the underlying pathogenic mechanism of PME through a breakdown of the blood-retinal and blood-aqueous barriers, or the release of prostaglandins and vascular endothelial growth factor (VEGF). (26), (27), (28). Recently, an acute expression of pro-inflammatory genes and proteins has been found in the neurosensory retina as well as in the choroid of mice undergoing lens extraction. (29) This last study suggests that the choroid may also be involved in the inflammatory response after cataract surgery and our team suggests that such an inflammatory response could be linked with a possible mechanism for serous choroidal detachment after uneventful cataract surgery. Several studies show that there is an increased inflammatory response after phacoemulsification in human eyes. This response could lead to inflammation in the anterior chamber (30) or to increased choroidal macular thickness. (31), (32), (33), (34). The autors suggest exactly this inflammatory response as a possible cause of the increased choroidal thickness. We suggest such a possible mechanism for choroidal detachment due to increased inflammatory response in our case report as well. However, since there are not enough data, further investigations are necessary. A good method to acquire the necessary data for the changes in the choroidal thickness could be performing an SD-OCT, SS-OCT, orEDI-OCTbefore and after cataract surgeries. (34), (35)

Other reported possible risk factors for developing choroidal detachment following cataract surgery are **nanophthalmos and high hypermetropia**. (36) Recent developments in cataract surgery procedures with phacoemulsification have reduced the rate of complications. However, Steijns et al. reported that 9.3 percent of those patients develop choroidal detachments following lens extraction. (37) In our case the patient was having an axial length of 24.78 mmin the left eye and 25.05 mm in the right eye, so we excluded hypermetropia as a possible risk factor.

The last possible reported mechanism is an increased risk forchoroidal detachment due to the increased fragility of the choroidal vasculature, people with increased age, arterial hypertension, tachycardia, atherosclerosis, and diabetes. (38) In our case all ofthese risk factors, except the presence of diabetes, could be considered as possible for the occurrence of the complication since our patient was 82 years old,have had a complaint of intermittent tachycardia and was taking Nicergolineas a therapy due to mild dementia and cerebrovascular atherosclerosis.

V. CONCLUSION

The serous choroidal detachment is a rarely seen complication after modern cataract surgery. If this complication occurs, a combination of different risk factors for its development should be considered.A sudden drop in the IOP during the cataract surgery or in the early post-op period could be considered as a possible mechanism for developing choroidal detachment, especially in the cases of dense, intumescent cataracts, as seen in our case. Other risk factors are the use of certain medicines that could increase vascular outflow,decrease significantly the IOP or cause angioedema as an adverse effect.Another possible mechanismthat must be considered is the recently found induced inflammatory gene expression and inflammatory response in the choroidea following standard cataract extraction. However, the clinical and scientific data in the field are not enough and further investigations must be conducted.

ACKNOWLEDGMENTS

No financial interest to declare.

REFERENCES

[1]. Swyers, E. M. (1972). Choroidal Detachment Immediately Following Cataract Extraction. Archives of Ophthalmology, 88(6), 632–634. doi:10.1001/archopht.1972.01000030634012

[2]. Parthasarathi S, Myint K, Singh G, Mon S, Sadasivam P, Dhillon B. Bilateral acetazolamide-induced choroidal effusion following cataract surgery. Eye (Lond). 2007 Jun;21(6):870-2. doi: 10.1038/sj.eye.6702741. Epub 2007 Feb 9. PMID: 17293785.

[3]. Malagola R, Arrico L, Giannotti R, Pattavina L. Acetazolamide-induced cilio-choroidal effusion after cataract surgery: unusual posterior involvement. Drug Des DevelTher. 2013;7:33-6. doi: 10.2147/DDDT.S38324. Epub 2013 Jan 23. PMID: 23378740; PMCID: PMC3556858.

[4]. Mancino R, Varesi C, Cerulli A, Aiello F, Nucci C. Acute bilateral angle-closure glaucoma and choroidal effusion associated with acetazolamide administration after cataract surgery. J Cataract Refract Surg. 2011 Feb;37(2):415-7. doi: 10.1016/j.jcrs.2010.12.032. PMID: 21241929.

[5]. Fromberg I, Krause M, Brückner K, Lang M, Seitz B. AderhauteffusionnachunkomplizierterKataraktoperation [Choroidal effusion after uncomplicated cataract surgery]. KlinMonblAugenheilkd. 2008 Jun;225(6):591-3. German. doi: 10.1055/s-2008-1027431. PMID: 18516782.

[6]. Suto C, Mita S, Hori S. Choroidal detachment after uncomplicated small incision cataract surgery. Case Rep Ophthalmol. 2012 May;3(2):175-9. doi: 10.1159/000339127. Epub 2012 May 30. PMID: 22740826; PMCID: PMC3383237.

[7]. Diep MQ, Madigan MC. Choroidal detachments: what do optometrists need to know? Clin Exp Optom. 2019 Mar;102(2):116-125. doi: 10.1111/cxo.12807. Epub 2018 Jul 4. PMID: 29971817.

[8]. Shah P, Yohendran J, Hunyor A et al. Uveal effusion: Clinical features, management and visual outcomes in a retrospective case series. J Glaucoma 2016; 25: e329–e35.

[9]. Schrieber C, Liu Y. Choroidal effusions after glaucoma surgery. CurrOpinOphthalmol 2015; 26: 134–142.

[10]. Nguyen Q. Avoiding and managing complications of glaucoma drainage implants. CurrOpinOphthalmol 2004; 15: 147–150.

[11]. Swyers EM. Choroidal detachment immediately following cataract extraction. Arch Ophthalmol. 1972 Dec;88(6):632-4. doi: 10.1001/archopht.1972.01000030634012. PMID: 5085207.

[12]. Healey P, Herndon L, Smiddy W. Management of suprachoroidal hemorrhage. J Glaucoma 2007; 16: 577–579

[13]. You Y, Zhu L, Wen J et al. Ultrasound biomicroscopic evaluation of uveal effusion in acute primary angle closure. J Glaucoma 2015; 24: 656–661.

[14]. Nakakura S, Noguchi A, Tabuchi H et al. Bimatoprost-induced late-onset choroidal detachment after trabeculectomy. Medicine 2017; 96: 1–4.

[15]. Llovet-Rausell A, Ruiz Tolosa F, Kudsieh B. Severe ocular side effects with acetazolamide: a case report. Arch Soc EspOftalmol 2016; 91: 543–546.

[16]. de Rojas V, Gonzalez-Lopez F, Baviera J. Acetazolamide-induced bilateral choroidal effusion following insertion of a phakic implantable collamer lens. J Refract Surg 2013; 29: 570–572.

[17]. Malagola R, Giannotti R, Pattavin L et al. Acute ciliochoroidal effusion due to acetazolamide: unusual posterior involvement. Drug Des DevelTher 2013; 7: 33–36.

[18]. Mancino R, Varesi C, Cerulli A et al. Acute bilateral angle-closure glaucoma and choroidal effusion associated with acetazolamide administration after cataract surgery. J Cataract Refract Surg 2011; 37

[19]. Dehghani A, Abtahi M, Abtahi S et al. Massive bilateral choroidal detachment induced by administration of topiramate. Case Rep Ophthalmol 2011; 2: 251–255.

[20]. de Guzman M, Thiagalingam S, Ong P et al. Bilateral acute angle closure caused by supraciliary effusions associated with venlafaxine intake. Med J Aus 2005; 182: 121–123.

[21]. Lipa R, Sanchez M, Ordovas C et al. Circumscribed cilichoroidal effusion presenting as acute angle closure attack. J Ophthalmic Vis Res 2017; 12: 117–119

[22]. Kwon S, Park D, Shin J. Bilateral transient myopia, angle-closure glaucoma, and choroidal detachment induced by methazolamide. Jpn J Ophthalmol 2012; 56: 515–517.

[23]. Lubbers S, Japing W. Unilateral choroidal detachment following the use of tamsulosin. Can J Ophthalmol 2017; 52: e75–e7.

[24]. Kerimoglu H, Zengin N, Ozturk B et al. Unilateral chemosis, acute onset myopia and choroidal detachment following the use of tamsulosin. Acta Ophthalmol 2010; 88: e20–e1.

[25]. Vegh M, Hari-Kovacs A, Rez K et al. Indapamideinduced transient myopia with supraciliary effusion: case report. BMC Ophthalmol 2013; 13: 58.

[26]. Liu J, Jones RE, Zhao J, Zhang J, Zhang F, Hartnett ME. Influence of uncomplicated phacoemulsification on central macular thickness in diabetic patients: a meta-analysis. PloS One. 2015; 10(5): e0126343. doi: 10.1371/journal. pone.0126343.

[27]. Romero-Aroca P. Targeting the pathophysiology of diabetic macular edema. Diabetes Care. 2010; 33: 2484–2485. doi: 10.2337/dc10-1580.

[28]. Chae JB, Joe SG, Yang SJ, et al. Effect of combined cataract surgery and ranibizumab injection in postoperative macular edema in nonproliferative diabetic retinopathy. Retina. 2014; 34: 149–156. doi: 10.1097/IAE.0b013e3182979b9e

[29]. Xu H, Chen M, Forrester JV, Lois N. Cataract surgery induces retinal pro-inflammatory gene expression and protein secretion. Invest Ophthalmol Vis Sci. 2011; 52: 249–255. doi: 10.1167/iovs.10-6001.

[30]. Predictive factors for the development of post-operative fibrinous exudationY.Zdravkov, E. Yankova, G. Tsvetkova, E. Marinova, A. Oscar, I. Tanev,doi: http://dx.doi.org/10.14748/bro.v0i1.4790

[31]. Gudauskiene G, Matuleviciute I, Mockute R, Maciulaityte E, Zaliuniene D. Changes in subfoveal choroidal thickness after uncomplicated cataract surgery. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2019 Jun;163(2):179-183. doi: 10.5507/bp.2018.076. Epub 2018 Dec 18. PMID: 30565567.

[32]. Abdellatif MK, Ebeid WM. Variations in Choroidal and Macular Thickness Maps after Uneventful Phacoemulsification. Semin Ophthalmol. 2018;33(5):719-725. doi: 10.1080/08820538.2017.1417453. Epub 2017 Dec 18. PMID: 29252070.

[33]. Zeng S, Liang C, He Y, Chen Y, Zhao Q, Dai S, Cheng F, Zhang J, Jiang X. Changes of Subfoveal Choroidal Thickness after Cataract Surgery: A Meta-Analysis. J Ophthalmol. 2018 Nov 12;2018:2501325. doi: 10.1155/2018/2501325. PMID: 30607294; PMCID: PMC6260537.

[34]. Application of OCT for choroid thickness examination, Y. Zdravkov, I. Tanev, Bulgarian Review of Ophthalmology, vol.60, No2/2016(40-45); doi: 10.14748/bro.v0i2.4541

[35]. Yalvac I, Satana B, Ozkan G et al. Management of glaucoma in patients with nanophthalmos. Eye 2008; 22: 838–843.

[36]. Steijns D, Bijlsma W, Van der Lelij A. Cataract surgery in patients with nanophthalmos. Ophthalmology 2013; 120: 266–270.

[37]. Saxena R, Kumar D. Choroidal detachment (a clinicoaetiopathological study). Indian J Ophthalmol 1983; 31: 238–241.

[38]. Winblad B, Fioravanti M, Dolezal T, Logina I, Milanov IG, Popescu DC, Solomon A. Therapeutic use of nicergoline. Clin Drug Investig. 2008;28(9):533-52. doi: 10.2165/00044011-200828090-00001. PMID: 18666801.