

Case Report

Capsular Block Syndrome after an Intravitreal Injection of Ranibizumab: A Case Report

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Keywords

Capsular block syndrome · Intravitreal injection · Ranibizumab

Abstract

Introduction: We present a case of capsular block syndrome that occurred after intravitreal injection of ranibizumab in a patient with age-related macular degeneration, which has not been reported in the literature. **Case Presentation:** A 78-year-old male presented with decreased visual acuity in the right eye. Slit-lamp examination findings were unremarkable; however, AMD was diagnosed based on fundus examination, fluorescein angiography, and optical coherence tomography (OCT). Subsequently, the patient was administered an intravitreal injection of ranibizumab. A slit-lamp examination revealed residual cortical material, numerous inflammatory cells, and posterior capsular distension 1 week after the injection. OCT showed an adhesion of the intraocular lens to the continuous curvilinear capsulorhexis site. The patient's vision improved following Nd:YAG laser posterior capsulotomy. **Conclusion:** Meticulous cortical removal is crucial during phacoemulsification to prevent capsular block syndrome. In patients with a history of cataract surgery, verifying the absence of residual cortical material before administering an intravitreal injection of ranibizumab is important.

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Introduction

Ranibizumab, a humanized monoclonal anti-vascular endothelial growth factor (anti-VEGF) that was approved by the Food and Drug Administration (FDA) in 2006, has been used to treat choroidal neovascularization in age-related macular

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degeneration (AMD). Intravitreal injections of anti-VEGF agents such as bevacizumab and ranibizumab are generally safe but may rarely cause ocular or systemic adverse effects.

Capsular block syndrome is a rare postoperative complication of cataract surgery performed with phacoemulsification. It is caused by a 360-degree adhesion between the optic part of the intraocular lens (IOL) and the capsulorhexis margin following continuous curvilinear capsulorhexis and intracapsular insertion of a posterior chamber IOL [1]. Typically, it arises when the viscoelastic material is trapped in the closed space between the IOL and the capsule, where the entrapped viscoelastic material attracts water due to osmotic pressure and causes the capsule to swell. The IOL acts as a valve, allowing the entry of aqueous humor behind it while preventing the exit of viscoelastic material [2]. Consequently, the capsule becomes distended, pushing the IOL forward, leading to a shallower anterior chamber, and inducing a myopic shift [3]. Capsular block syndrome usually occurs one to 2 weeks postoperatively.

Herein, we report a case of capsular block syndrome that occurred after an intravitreal injection of ranibizumab in a patient with AMD. The CARE checklist has been completed by the author for this case report, attached as online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000537755>).

Case Report

A 78-year-old male presented with decreased visual acuity in the right eye. The patient had undergone an uncomplicated right cataract surgery performed with phacoemulsification 5 years earlier at another hospital, as well as panretinal photocoagulation for diabetic retinopathy. The patient had no medical history other than diabetes mellitus. At the initial examination, his corrected vision was 0.15 in the right eye and 0.9 in the left eye, and his intraocular pressure measured using a noncontact tonometer was 7 mm Hg in the right eye and 5 mm Hg in the left eye. The refractive power was -1.50 Dcyl Axis 90 in the right eye. Slit-lamp examination revealed no anterior segment inflammation or neovascularization in the iris; other ocular findings were unremarkable. Fundus examination showed macular hemorrhage in the right eye, and fluorescein angiography (FAG) identified macular leakage in early and late phases (shown in Fig. 1). Optical coherence tomography (OCT) revealed a disruption in the arrangement of the photoreceptor layer (shown in Fig. 2). The patient was diagnosed with AMD and administered intravitreal injection of ranibizumab in the right eye. One day postoperatively, no abnormalities were observed in the anterior segment examination. However, 1 week later, his corrected vision decreased to 0.08 in the right eye and 0.8 in the left, and his intraocular pressure measured using a noncontact tonometer was 5 and 6 mm Hg in the right and left eyes, respectively. The refractive power was not measured in the right eye. A slit-lamp examination of the right eye revealed normal IOL positioning but showed residual cataract cortical fragments, numerous inflammatory cells, and liquid retention between the lens and the posterior capsule. Anterior OCT revealed an adhesion between the capsulorhexis margin and the anterior surface of the IOL, based on which the patient was diagnosed with capsular block syndrome (shown in Fig. 3). Nd:YAG laser capsulotomy was performed in the right eye. One week later, the patient's uncorrected vision improved to 0.15, and his intraocular pressure measured 10 mm Hg. Subsequent slit-lamp examination confirmed the loss of the previously observed cortical fragments and inflammatory cells within the lens capsule.

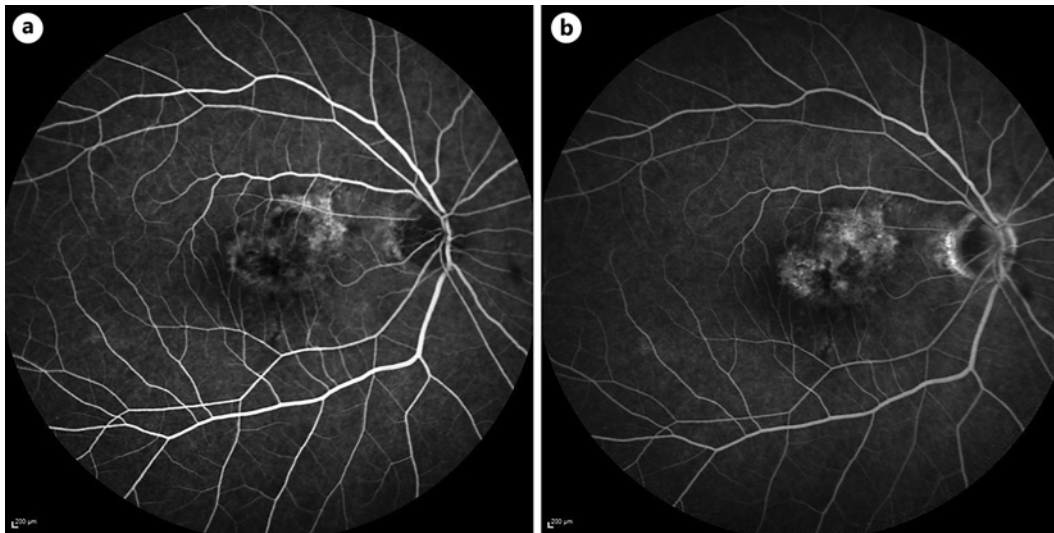


Fig. 1. Fluorescein angiography of the right eye. **a** Early stage of fluorescein angiography. **b** Late stage of fluorescein angiography. Early (**a**) and late (**b**) phases of fluorescein angiography (FAG) showing dye staining lesions.

Discussion

Ranibizumab, a humanized monoclonal anti-VEGF agent, has a higher affinity for VEGF and penetrates the retinal pigment epithelium more effectively than similar agents, resulting in a quicker onset of action. Thus, it has been the standard drug for treating choroidal neovascularization associated with AMD since receiving FDA approval in 2006.

Although systemic adverse reactions are rare, ranibizumab can increase the risk of extraocular bleeding and thrombus formation. The most common adverse ocular effect is intraocular inflammation, which has a 2-year incidence of 2–3%. Other adverse effects include increased intraocular pressure, retinal detachment or tears, intraocular hemorrhage, and ischemia.

Six cases of capsular block syndrome were first described by Davison in 1990, who referred to it as a rare early postoperative complication [3]. Eifrig reported an accumulation of milky fluid between the posterior IOL and posterior capsule, and Masket first used the term postoperative capsular block syndrome [4, 5]. Miyake et al. [6] categorized it into three types based on the timing of its occurrence (intraoperative, early postoperative, and late postoperative) and stated that early postoperative is the most common type.

The etiologies of capsular block syndrome are thought to include proliferation and fibrosis of residual lens epithelial cells in the capsule that lead to posterior capsule opacification and closure of the gap between the anterior capsule and the IOL. This results in the accumulation of collagen and extracellular matrix in the capsule, consequently drawing fluid into the capsule through osmosis. Early postoperative cases are reported as occurring due to postoperative residual viscoelastic material in the capsule [6, 7]. Reports have also shown that the risk for the condition increases with a larger contact area between the IOL and the anterior aspect of the eye, such as that created with certain types of IOLs like the 4-haptic Akreos® Adapt, as well as in eyes with a longer axial length (>25.0 mm) [8].

Treatment options for capsular block syndrome include anti-inflammatory eye drops, slit-lamp-guided needle decompression, surgical residual cortex and fluid aspiration, and Nd:

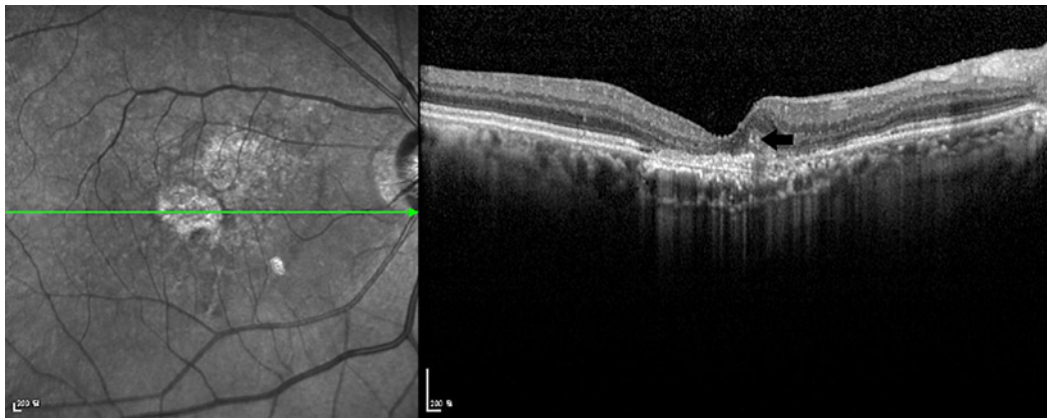


Fig. 2. Macular optical coherence tomography of the right eye. There is a loss of outer retinal layers, including the RPE. The Bruch's membrane and choroidal capillaries are visible due to the overlying outer retinal atrophy. Also, intraretinal hemorrhage was shown (black arrow).

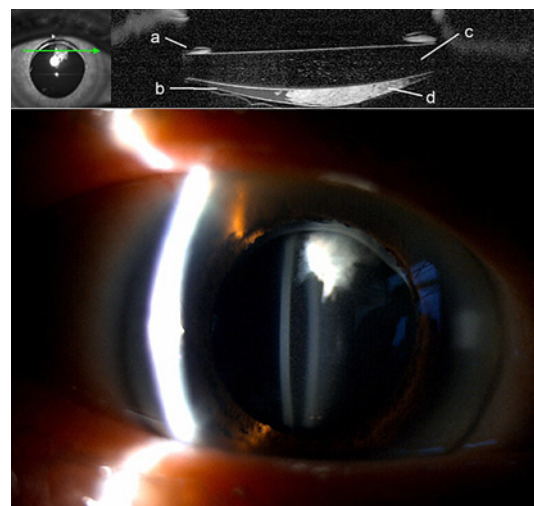


Fig. 3. Anterior segment optical coherence tomography and anterior segment photography of the right eye. An adhesion between the anterior capsule and intraocular lens was found. **a:** anterior capsule; **b:** posterior capsule; **c:** intraocular lens; **d:** remnant cortex.

YAG laser anterior and posterior capsulotomy [1, 6, 9–13]. Nd:YAG laser posterior capsulotomy may be challenging in cases of severe intracapsular opacification [1, 9].

Delayed capsular block syndrome cases have been reported since the timing-based classification by Miyake et al. [6]. Baikoff et al. [12] were the first to confirm capsular block syndrome through OCT [6]. However, we report the first case of delayed capsular block syndrome following an intravitreal injection of ranibizumab.

Saint-Geniez et al. [14] reported that VEGF is involved in the formation of ocular vessels and the differentiation of the lens in a mouse model. Although we cannot determine the exact causality regarding the effects of ranibizumab and residual lens epithelial cells in the capsule, we suspect that intraocular inflammation that occurred after the intravitreal injection of ranibizumab might have caused an adhesion between the capsulorhexis margin and the anterior surface of the IOL, leading to capsular block syndrome as the remaining cortical material in the capsule degenerates. It is also possible that the entry of ranibizumab into the anterior and lens capsules influenced the proliferation of residual epithelial cells. Further research is needed to understand the effects of ranibizumab on the lens capsule and the residual cortical material.

Therefore, it is important to meticulously remove cortical material during phacoemulsification and examine the presence of any residual cortex before administering an intravitreal injection of ranibizumab in patients with a history of cataract surgery. Additionally, OCT can help diagnose suspected cases of postoperative capsular block syndrome.

Statement of Ethics

Written informed consent was obtained from the patient to publish this case report and accompanying images. This retrospective review of patient data did not require ethical approval in accordance with local guidelines. All procedures were performed in accordance with ethical standards and the Declaration of Helsinki.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Substantial contributions to the conception or design of the work, acquisition of data for the work (treating the patient), and drafting the work: J.S.K.

Data Availability Statement

All data generated or analyzed during this study are included in this article and its online supplementary material, and further inquiries can be directed to the corresponding author.

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