CASE REPORT

Trauma-Related Filtering Bleb in Exfoliation Syndrome

Fikret Ucar[1], *Banu Bozkurt*[2]

ABSTRACT

This case involves a 76-year-old male, a retired veterinary academic, under regular follow-up in our clinic for exfoliation syndrome. Despite significant risk factors for glaucoma progression, including advanced age and dense exfoliation material (especially in the right eye), his intraocular pressure (IOP) has remained stable for decades without anti-glaucoma medications or surgical intervention. The patient underwent uncomplicated bilateral cataract surgery approximately two months ago. Preoperative IOP was 14 mmHg (right eye) and 17 mmHg (left eye), decreasing postoperatively to 11 mmHg and 14 mmHg, respectively. Best-corrected visual acuity was 20/20 in both eyes. Retinal nerve fiber layer (RNFL) thickness measured 81 µm in the right eye and 92 µm in the left eye. History revealed a penetrating ocular injury at age 16, when a shard of window glass entered the right eye. No surgical intervention was performed at that time; only patching was applied. On slit-lamp examination, a 3 × 2.5 mm cystic, elevated lesion was noted ~2 mm inferonasally from the limbus. Swept-source anterior segment optical coherence tomography (OCT) demonstrated a dome-shaped subconjunctival cavity with hyporeflective microcystic structures, resembling a filtration bleb typically seen after trabeculectomy. We hypothesize that this filtration route, possibly secondary to old scleral trauma with uveal prolapse, has served as an alternative aqueous outflow pathway, contributing to long-term IOP stability in this high-risk patient.

Keywords: glaucoma, exfoliation syndrome, spontaneous filtering bleb, trauma-related filtering bleb

INTRODUCTION

Exfoliation syndrome is a well-recognized risk factor for ocular hypertension and glaucoma, often necessitating lifelong medical or surgical intervention to prevent progressive optic nerve damage [1]. Moreover, exfoliative glaucoma represents the most prevalent form of secondary open-angle glaucoma globally. While exfoliation-associated glaucoma typically characterized by a more aggressive clinical course and reduced responsiveness to standard therapeutic interventions compared to primary open-angle glaucoma, rare cases exhibit unexpectedly stable intraocular pressure (IOP) without treatment [2]. The mechanisms underlying such stability remain incompletely understood, though alternative aqueous outflow pathways—whether iatrogenic or trauma-induced—may play a role [3].

We present the case of a 76-year-old man with long-standing exfoliation syndrome who maintained normal IOP without treatment for decades. Notably, the patient had a history of penetrating ocular trauma in adolescence, which appears to have created a traumatic, bleb-like subconjunctival filtration pathway. This serendipitous outflow route, resembling a functional trabeculectomy bleb, may explain his remarkable IOP stability despite high-risk features for glaucoma progression. To our knowledge, this is the first reported case of trauma-induced, self-limiting filtration mimicking surgical bleb morphology in a patient with exfoliation syndrome.

This letter highlights the importance of meticulous anterior segment examination in patients with unexplained IOP stability, particularly those with prior ocular trauma. Furthermore, it raises intriguing questions about the potential role

1 Konyagöz Hospital, Ophthalmology, Konya, Türkiye

2 Selçuk University Faculty of Medicine, Ophthalmology, Konya, Türkiye

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Corresponding author:
Fikret Ucar
Email: fikretucar@konyagoz.com

of unintentional filtration pathways in modulating aqueous dynamics, offering insights into alternative mechanisms of IOP regulation.

CASE PRESENTATION

This case involves a 76-year-old male, a retired veterinary academic, under regular follow-up in our clinic for exfoliation syndrome. Despite significant risk factors for glaucoma progression, including advanced age and dense exfoliation material (especially in the right eye), his IOP has remained stable for decades without anti-glaucoma medications or surgical intervention. The patient underwent uncomplicated bilateral cataract surgery approximately two months ago. Preoperative IOP was 14 mmHg (right eye) and 17 mmHg (left eye), decreasing postoperatively to 11 mmHg and 14 mmHg, respectively. Best-corrected visual acuity was 20/20 in both eyes. Retinal nerve fiber layer (RNFL) thickness measured 81 µm in the right eye and 92 µm in the left eye. Visual field testing revealed mild functional loss, with a mean deviation (MD) of –4.49 dB in the right eye and –2.83 dB in the left eye. Scheimpflug imaging showed open anterior chamber angles between 42° and 48° in both eyes.

History revealed a penetrating ocular injury at age 16, when a shard of window glass entered the right eye. No surgical intervention was performed at that time; only patching was applied. On slit-lamp examination, a 3 × 2.5 mm cystic, elevated lesion was noted ~2 mm inferonasally from the limbus (**Figure 1A**). Swept-source anterior segment optical coherence tomography (OCT) demonstrated a dome-shaped subconjunctival cavity with hyporeflective microcystic structures, resembling a filtration bleb typically seen after trabeculectomy (**Figure 1B**). As seen in this image, the absence of scleral thinning or conjunctival defects supported a trauma-induced mechanism. Additionally, no angle abnormalities, peripheral anterior synechiae, or angle recession were observed. We hypothesize that this filtration route, possibly secondary to old scleral trauma with uveal prolapse, has served as an alternative aqueous outflow pathway, contributing to long-term IOP stability in this high-risk patient.

DISCUSSION

The development of a filtering bleb typically results from the deliberate surgical formation of a fistula connecting the anterior or posterior chamber to the subconjunctival space, as performed in conventional glaucoma procedures such as trabeculectomy [4]. However, alternative etiologies—including posttraumatic defects or inadvertent surgical complications—may also facilitate fistula formation. This anomalous passage establishes a low-resistance outflow pathway, diverting aqueous humor into the subconjunctival space, where it is subsequently absorbed into the periocular venous circulation.

There are very few studies on spontaneous filtering bleb formation from the literature. It was first proposed that corneal disorders such as Terrien's marginal degeneration, known to cause Descemet's membrane rupture, facilitate the formation of filing blebs if the defect extends below the conjunctiva [5]. Other studies describe patients with concurrent ocular and systemic anomalies, including microspherophakia and craniofacial dysmorphism, and have

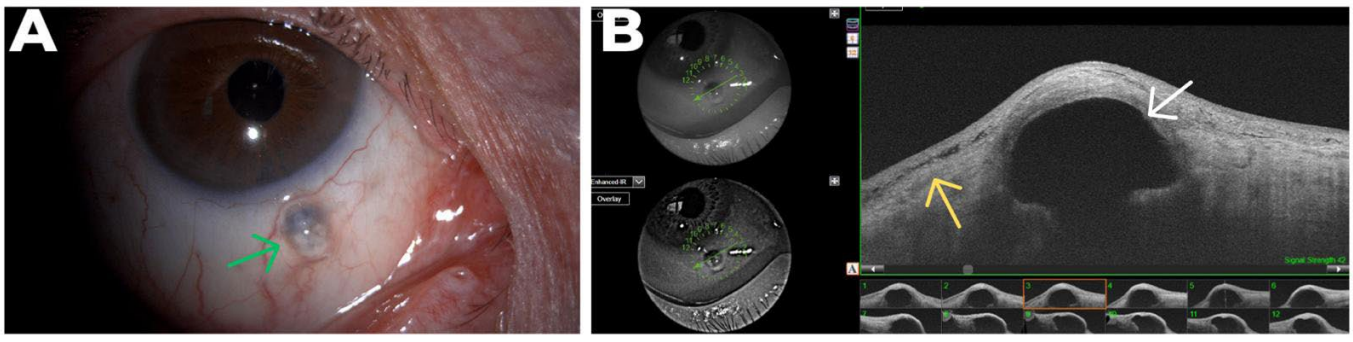

Figure 1. *(**A**) On slit-lamp examination, a 3 × 2.5 mm cystic, elevated lesion (green arrow) was noted ~2 mm inferonasally from the limbus. (**B**) Swept-source anterior segment optical coherence tomography (OCT) (B-scans oriented horizontally and vertically) demonstrated a dome-shaped subconjunctival cavity with hyporeflective microcystic structures (yellow arrow), resembling a filtration bleb (white arrow) typically seen after trabeculectomy.*

suggested abnormal connective tissue development and scleral thinning as a possible etiologic factor [6,7].

However, to our knowledge, this is the first reported case of trauma-induced, self-limiting filtration mimicking surgical bleb morphology in a patient with exfoliation syndrome. In the presented case, we think that this filtration pathway—likely secondary to remote scleral trauma with concomitant uveal prolapse—may function as an alternative aqueous outflow mechanism, thereby conferring long-term IOP stability in this high-risk patient with exfoliation syndrome. Additionally, this case underscores the critical role of comprehensive anterior segment evaluation in patients demonstrating unexplained IOP stability, especially in the context of previous ocular trauma.

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