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*Case report*
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# Post-traumatic hypertensive filtering bleb: a rare presentation

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## Abstract

*Introduction:* We present a rare case of hypertensive traumatic filtering bleb post trauma which deviates from the norm of hypotonic bleb reported in similar cases.
*Case report:* A 35-year-old male presented with a slowly progressive left eye swelling for a period of 1 year. He had undergone open globe injury repair 12 years ago and developed a traumatic filtering bleb with corneal decompensation associated with a raised intraocular pressure deviating from the norm of hypotony in similarly reported cases. The intraocular pressure required optimization with antiglaucoma treatment. There was significant mechanical lagophthalmos induced by the sub-conjunctival cyst. Anterior segment imaging confirmed the presence of a fistula.
*Conclusion:* The atypical nature of this case shows that the mechanisms of trauma and complications that follow can vary. This unpredictable natural history of ocular trauma will in turn pose various challenges to management requiring early detection and tailored treatment to pre-empt possible complications.
*Keywords:* corneal decompensation, hypertensive filtering bleb, iris cyst, ocular trauma

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# Blebs penapisan hipertensif pasca trauma: persembahan klinikal yang jarang ditemui


## Abstrak

*Pengenalan:* Laporan ini membentangkan satu kes jarang berlaku iaitu bleb penapisan traumatic hipertensif selepas trauma yang berbeza daripada kebiasaan bleb hipotonik yang dilaporkan dalam kes serupa.
*Laporan kes:* Seorang lelaki berumur 35 tahun hadir dengan bengkak mata kiri yang meningkat secara beransur-ansur selama setahun. Pesakit mempunyai Sejarah pembedahan pembaikan kecederaan bola mata terbuka 12 tahun lalu dan kemudiannya mengalami bleb penapisan traumatik dengan dekompensasi kornea serta tekanan intraocular yang tinggi, berbeza daripada keadaan hipotoni yang biasa dilaporkan. Tekanan intraokular dikawal dengan rawatan antiglaukoma. Terdapat *lagofthalmos* mekanikal yang ketara akibat sista subkonjunktiva. Pengimejan segmen anterior mengesahkan kehadiran fistula.
*Kesimpulan:* Kes yang tidak tipikal ini menunjukkan bahawa mekanisme trauma dan komplikasi yang berlaku adalah berbeza-beza. Perjalanan semula jadi trauma okular yang sukar dijangka ini menimbulkan cabaran dalam pengurusan, memerlukan pengesanan awal dan rawatan yang disesuaikan bagi mencegah komplikasi mungkin berlaku.


*Kara kunci:* bleb penapisan hipertensif, dekompensasi kornea, sista iris, trauma okular

## Introduction

Blunt injury to the eye can frequently lead to various ocular manifestations including damage to the cornea, iris, lens, and retina. Given that the eyeball behaves like an incompressible sphere because of its liquid contents, a blunt injury of sufficient magnitude may rupture the eyeball at the site of minimal resistance. Post-traumatic filtering blebs are usually hypotonus, not hypertensive. Therefore, we wish to highlight the atypical case of a young man who developed a hypertensive traumatic filtering bleb and an iris cyst after a corneo-limbal laceration wound from a penetrating injury. Over a 12-year follow-up, his case deviated from the typical presentation seen in other reported cases.

## Case report

A 35-year-old man presented with a traumatic corneo-limbal laceration and traumatic cataract in his left eye. The patient had experienced accidental self-injury due to his spectacles 12 years ago and had undergone corneal toilet, suturing, lens aspiration, and intraocular lens implantation. The patient's vision stabilized at 6/24 pinhole 6/18 and initially recovered well, but subsequently developed a corneal scar and a traumatic iris cyst associated with peripheral anterior synechiae at the affected site of the laceration. Eight years after the initial trauma, the patient experienced progressive corneal decompensation and secondary glaucoma due to an enlarging iris cyst encroaching onto the corneal endothelium. A therapeutic iris cyst puncture was performed via limbal paracentesis, which successfully collapsed the cyst. However, despite intraocular pressure (IOP) optimization, the cornea continued to deteriorate, resulting in a hand movement vision within 2 years.

On examination, the cornea was opaque at the site of previous trauma, with an adjacent scleral cyst measuring 6 mm x 4 mm that appeared to be in communication with the anterior chamber. Seidel test was negative. The previously drained iris cyst had reformed, resulting in endothelial touch. The IOP was controlled at 22 mmHg. A diagnosis of left eye corneal decompensation associated with a traumatic iris cyst and traumatic filtering bleb with secondary raised IOP was made. His fellow eye was normal and showed evidence of predisposition to the formation of a spontaneous filtering bleb. Due to the guarded prognosis of the eye, conservative management was recommended, and the patient was monitored for 2 years.

The patient presented with persistent eye pain in the previously affected eye accompanied by vague perception of light and a positive afferent pupillary defect. Upon examination, a significant mechanical lagophthalmos was noted due to an enlarging subconjunctival cyst extending from 1 o'clock to 7 o'clock, which had almost doubled in size since the last visit with no leakage (Fig. 1). Corneal stromal

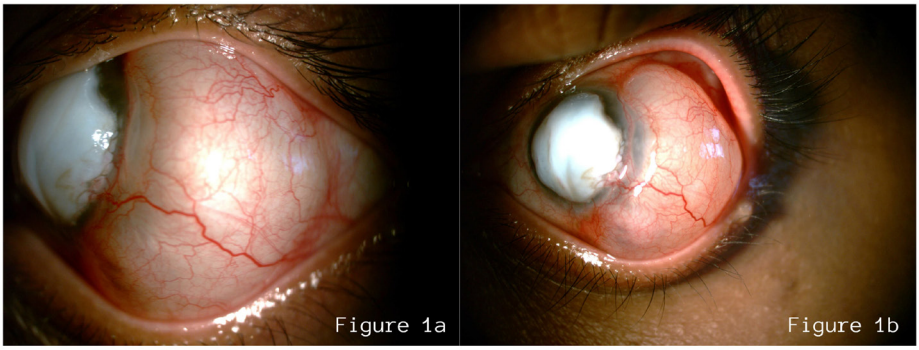


*Fig. 1. (a, b)* Left eye showing presence of huge subconjunctival cyst located temporally with opaque corneal ectasia.

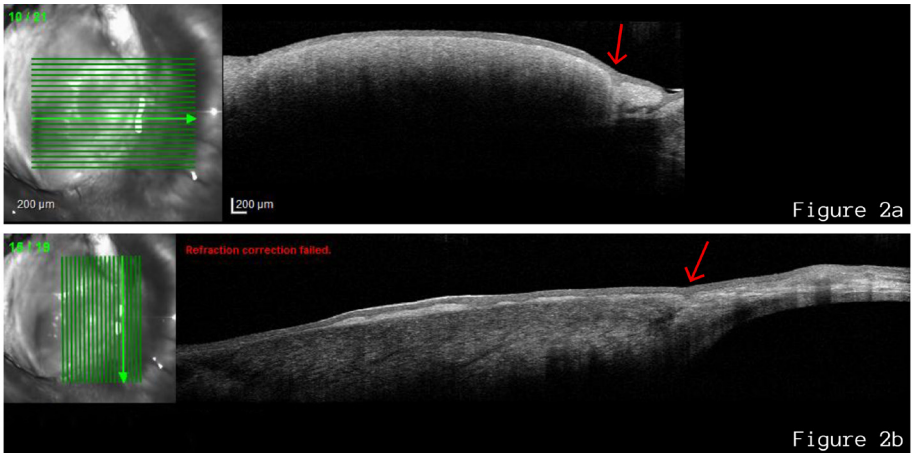


*Fig. 2.* Anterior segment optical coherence tomography showing a communicating fistula between the anterior chamber and bleb as seen in the *(a)* horizontal cut and *(b)* vertical cut.

ectasia with descemetocele was observed over the opaque cornea, limiting the view of the anterior chamber. There was also widespread superficial and deep corneal vascularization. Anterior segment optical coherence tomography imaging confirmed a fistula between the anterior chamber and the filtering bleb (Fig. 2).

Due to the poor visual prognosis and high risk of failure associated with additional treatment for the affected eye, conservative management was advised, and the patient was counselled accordingly. Evisceration with an orbital implant and ocular prosthesis may be considered in the future if the patient's condition deteriorates or if he opts for cosmetic surgery.

## Discussion

A well-functioning filtering conjunctival bleb is inevitably the desired goal in glaucoma surgeries such as trabeculectomy. However, inadvertent filtering blebs can also occur spontaneously or secondary to scleral dehiscence from underlying ocular and systemic conditions.[1] Post-traumatic filtering blebs have been reported following blunt or penetrating trauma to the eye as seen in our case. It was assumed to be a secondary impact from traumatic wound dehiscence, which is rare and unexpected even with tight apposition during primary repair. Our patient developed a high-pressure filtering bleb and secondary glaucoma with corneal decompensation 12 years after surgical treatment of a penetrating corneo-limbal injury. The dehiscence in the previous traumatic wound may have acted as the site of least resistance for the bleb's formation.[1] To our knowledge, only 1 case of a traumatic filtering bleb resulting in raised IOP has been reported by Selvan *et*

*al.* postulating that weakness in scar tissue following trauma may render the site vulnerable to future injury, as seen in our case.[2] The development of secondary iris cysts is linked to the inward growth and accumulation of surface epithelial cells from the conjunctiva or cornea following penetrating or surgical trauma. These cysts, once formed, can exert mechanical forces, potentially blocking drainage pathways, which in turn can result in elevated IOP. Moreover, they may come into direct contact with the endothelium, leading to corneal decompensation. It is worth noting that the growth of these epithelial cysts can also play a role in obstructing the trabecular meshwork.[3] The subsequent formation of the filtering bleb is best elucidated by a dehiscence in the previous traumatic wound, which acted as the site of least resistance. The lagophthalmos is owed to the large subconjunctival bleb that mechanically obstructs the lid from closing.

Traumatic filtering blebs can cause complications such as hypotonic disc swelling, maculopathy, bleb leakage, blebitis, and bleb-associated endophthalmitis. These complications can threaten vision, particularly when risk factors are present, such as ocular infections like conjunctivitis or blepharitis, ocular surface disease, thin, inferior or nasally placed blebs, cystic blebs, younger age, male gender, underlying diabetes, malnutrition, and poor immune system.[2]

Zhang *et al.* evaluated glaucoma filtering blebs based on slit-lamp-adapted optical coherence tomography and ultrasound biomicroscopy, proposing 4 main bleb postoperative morphologies: diffuse, cystic, encapsulated, and flat.[4] The former 2 are considered functional blebs, while the latter 2 are mainly attributed to the development of scar tissue, which impairs its function. This pattern was corroborated in another study by Anh *et al.*[5] The study suggests that fibrosis rate increases over time after surgery, but traumatic blebs may not follow this pattern due to the absence of a surgical wound overlying the bleb. Non-functional blebs are more common in those aged less than 55 years than the elderly, who have a reduced degree of fibrosis. With reference to inadvertent blebs, Francis *et al.* compared leaking trabeculectomy blebs, non-leaking trabeculectomy blebs, and inadvertent blebs following cataract surgery with a superior scleral tunnel incision.[6] They found that inadvertent blebs had thicker epithelial thickness and a greater number of goblet cell density versus those from trabeculectomy, irrespective of antifibrotic use. This difference could be attributed to the surgical procedure as well as pre- and postoperative topical medications. Further studies are needed to fully understand the natural history of blebs caused by trauma, but it is possible that the incidence of bleb leaks in inadvertent blebs is lower than in glaucoma filtering surgeries.

Managing traumatic filtering blebs can be challenging and should be customised based on clinical presentation. A conservative approach is appropriate if there is no aqueous leak, hypotony, progressive vision loss, or infection.[4] Surgical intervention is warranted when there is significant risk of endophthalmitis, persistent symptomatic hypotonic maculopathy or when IOP is below 4–5 mmHg,[7-9] which

may include direct repair via scleral suturing, amniotic membrane grafting, conjunctival rotation flap, and scleral flaps.[1,10] In our case, due to the degree of corneal decompensation, compromised optic nerve function, and medically optimised secondary glaucoma in an acceptable range, a conservative approach was chosen. Lifelong follow-up is necessary to detect and prevent bleb-associated infections and endophthalmitis.

## Conclusion

This case stands out for its unusual presentation, featuring a hypertensive traumatic filtering bleb and iris cyst years after a penetrating eye injury. The atypical nature of this case can be attributed to factors such as the initial trauma, subsequent iris cyst development, and corneal decompensation. Managing such a complex scenario required a highly individualised approach. Conservative management was chosen due to the compromised visual prognosis and medically optimiaed secondary glaucoma. This case highlights the importance of tailored management strategies in cases of post-traumatic filtering blebs, emphasizing the need for lifelong monitoring to prevent potential complications and optimize the patient's quality of life.

## Declarations

**Informed consent for publication**
The patient provided written informed consent for the publication of the clinical data and images provided in this article.

**Competing interests**
None to declare.

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