

Navigating Complexities in Advanced Glaucoma Management: A Case Report Integrating Insights from the LiGHT Trial

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Abstract

Introduction: Glaucoma, a leading cause of irreversible blindness, presents significant management challenges, especially in patients intolerant to standard treatments. Recent findings from the Laser in Glaucoma and Ocular Hypertension (LiGHT) Trial offer new insights into alternative treatment strategies.

Case Presentation: This report discusses the case of a 79-year-old woman with a longstanding history of open-angle glaucoma (AOG), who was intolerant to conventional glaucoma medications. Her treatment included multiple surgeries: trabeculectomies in her left eye and various laser therapies in her right eye. The LiGHT Trial findings, demonstrating the efficacy of Selective Laser Trabeculoplasty (SLT) in providing long-term disease control with a favorable safety profile, offer relevant insights into similar cases.

Outcomes: As of the last examination, the patient's vision was 20/80 OD and 20/500 OS, with stable intraocular pressures and visual field loss. The case resonates with the LiGHT Trial's advocacy for SLT as a primary treatment option for managing glaucoma effectively.

Conclusion: This case underscores the complexities of managing advanced glaucoma in patients intolerant to traditional medications and highlights the importance of personalized, evolving treatment strategies. The insights from the LiGHT Trial reinforce the potential of SLT as a viable primary treatment, aligning with the need for innovative approaches in glaucoma management.

Key words: advanced open angle; glaucoma treatment

Introduction

This case report describes a 79-year-old woman presenting with advanced open-angle glaucoma OU and a strong family history for glaucoma. Despite multiple interventions, including trabeculectomies, laser trabeculoplasty, and use of various eye drops, the patient's vision continues to be compromised. The primary objective of all glaucoma procedures is to preserve the only treatable factor in glaucoma, which is the IOP. However, her pressures are stable with superior and inferior loss to fixation OD greater than OS. The term "superior and inferior loss to fixation" indicates a decrease in vision both above and below the point where the person is focusing. The phrase "greater than OS" suggests that the extent of vision loss in the right eye (OD) is more significant than that in the left eye (OS).

The case highlights the challenges of managing advanced glaucoma, especially in patients who cannot tolerate traditional medical therapies. The report emphasizes the importance of tailored treatment plans, ongoing monitoring, and patient education to achieve the best outcomes possible for

patients with advanced glaucoma. This report could potentially improve patient care through emphasis on personalized and multi-disciplinary management of advanced glaucoma.

Glaucoma is a leading cause of blindness, affecting approximately three million patients in the United States [1]. The pathogenesis of glaucoma involves the production of aqueous humor, which is not properly drained through the drainage angle. This leads to the buildup of aqueous humor, causing an increase in IOP [1]. The increased pressure inside the eye damages the optic nerve, leading to the development of blind spots in a patient's vision [1]. With further nerve death, complete blindness can occur [2].

There are two main mechanisms that likely cause glaucoma. The most common form of glaucoma is open-angle glaucoma, which affects 95% of individuals with glaucoma. Open-angle glaucoma occurs when fluid is not drained properly. Patients with more sensitive optic nerves are more

susceptible to developing open-angle glaucoma when IOP increases. The second mechanism is acute closed-angle glaucoma, which occurs when the patient's iris is very close to the drainage angle, leading to an increase in eye pressure and ultimately, a blockage of fluid outflow [3]. If left untreated, the patient is susceptible to blindness [3].

This case study addresses the knowledge gap regarding the options available for managing advanced glaucoma in patients who cannot tolerate conventional medical therapies. It may provide insights into the challenges faced by clinicians in such cases and the need for personalized and multi-disciplinary approaches to optimize patient care. By presenting a real-life scenario and discussing the patient's history, interventions, and outcomes, this case study may contribute to the existing literature by shedding light on the complexities of managing advanced glaucoma and potentially offering alternative strategies or considerations for similar patients in the future.

Patient Information

The patient is a 79-year-old woman diagnosed with advanced open-angle glaucoma (AOG) in both eyes (OU) for several decades. She exhibits a strong family history of the disease, which acts as a significant risk factor.

Primary Concerns and Symptoms- A key concern with this patient was her intolerance to glaucoma eyedrops, both those that increase outflow (ie. Latanoprost) and aqueous suppressants for reduced inflow. These are typically used to manage IOP but were not suitable for her. She has been experiencing impaired vision due to the advancement of the disease.

Medical, Family, and Psychosocial History

The patient has a strong family history of glaucoma, indicating genetic susceptibility to the disease. Besides this, other medical, family, or psychosocial history is not mentioned.

Relevant Past Interventions and Outcomes- To manage the disease, the patient underwent several surgical interventions. Her treatment involved two trabeculectomies in the left eye (OS) in 1995 and 2006, along with adjunctive 5-fluorouracil and mitomycin. These were used to inhibit fibroblast proliferation and increase the surgery's success rate. Postoperative argon laser suture lysis was employed after both trabeculectomies to prevent hypotony.

Clinical Findings

The patient's vision at her last physical examination on April 5, 2023, was found to be 20/80 in the right eye and 20/500 in the left eye, indicating impaired vision. This is especially concerning considering the patient's age and history of glaucoma. Intraocular pressures were relatively stable at 12 in the right eye and 10 in the left eye, despite her advanced disease.

Visual field tests showed stable superior and inferior loss, which was greater in the right eye than the left. This suggests a continued progression of the glaucoma despite numerous surgical interventions. Importantly, these interventions and the careful monitoring of her condition have helped manage her intraocular pressures and prevent any further deterioration of her vision.

The findings emphasize the challenge in managing patients with advanced glaucoma who cannot tolerate standard medical therapies. In these complex cases, careful, individualized, and multi-disciplinary management approaches are crucial. The patient's case emphasizes the importance of personalizing treatment plans for advanced cases of glaucoma, providing regular monitoring, and educating patients to achieve the best possible outcomes and preserve their visual function as much as possible.

Timeline of the Patient's Episode of Care:

Year	Episode of Care
Pre-1995	Patient diagnosed with advanced open angle glaucoma (AOG), exact date not specified.
1995	First trabeculectomy performed on left eye (OS). Adjunctive 5-fluorouracil and mitomycin used to inhibit fibroblast proliferation and increase success rate. Postoperative argon laser suture lysis performed to prevent hypotony.
2004	Argon laser trabeculoplasty performed on right eye (OD).
2006	Second trabeculectomy performed on left eye (OS) due to continuing disease. Again, adjunctive 5-fluorouracil and mitomycin used and argon laser suture lysis employed postoperatively.
2007	Right eye (OD) undergoes selective laser trabeculoplasty, repeat of the procedure performed in 2004.
2009	First micropulse laser trabeculoplasty performed on right eye (OD).
2018	Second micropulse laser trabeculoplasty performed on right eye (OD). Additionally, a trabeculectomy was performed on right eye (OD).
April 5, 2023	Last examination shows her vision to be 20/80 OD and 20/500 OS. Intraocular pressures of 12 OD and 10 OS. Her visual fields showed stable superior and inferior loss, greater in OD than OS.

It should be noted that the patient exhibited intolerance to standard glaucoma eyedrops throughout her treatment history. Despite these challenges, her disease has remained stable with the help of surgical interventions.

While the patient's vision remained impaired, her intraocular pressures were stable (12 OD and 10 OS) at her last examination in 2023, and her visual fields showed stable superior and inferior loss, greater in OD than OS. These suggest that although the disease couldn't be entirely reversed, the interventions helped manage the condition and prevent further deterioration.

Diagnostic Assessment

Diagnostic methods:

Diagnosis of advanced open angle glaucoma in this case was made through a combination of methods. Comprehensive eye exams including measuring intraocular pressure (IOP), visual field testing to check for areas of vision loss, examination of the optic nerve through dilated pupils, and assessing the angle in the eye where the iris meets the cornea (gonioscopy) are all used in diagnosis of glaucoma [12]. The patient's continued evaluation likely included regular IOP measurements, visual field tests, and optic nerve assessments.

Diagnostic challenges:

The patient was intolerant to traditional glaucoma treatments, including eye drops that increase outflow and aqueous suppressants. This intolerance made

management of her IOP levels more difficult and required surgical interventions to control the disease.

Diagnosis:

The patient was diagnosed with advanced open angle glaucoma (AOG) in both eyes (OU).

Prognostic characteristics:

While glaucoma is a chronic condition with no cure, management strategies can slow its progression and minimize vision loss [1]. In this patient's case, the regular surgical interventions and close monitoring of her condition have managed to stabilize her IOP and prevent any drastic further loss in her vision.

Therapeutic Intervention:

Types of therapeutic intervention:

The patient underwent various surgical procedures including two trabeculectomies in the left eye, and argon laser trabeculoplasty, selective laser trabeculoplasty, and micropulse laser trabeculoplasty in the right eye. These procedures performed to improve aqueous outflow through the trabecular meshwork and reduce the intraocular pressure.

Administration of therapeutic intervention:

Each surgical intervention was performed at different times from 1995 through 2018. Additionally, adjunctive 5-fluorouracil and mitomycin were used in the trabeculectomies to inhibit fibroblast proliferation and increase the success rate of the surgery. Postoperative argon laser suture lysis was employed after both trabeculectomies to increase outflow to maintain and allow target pressure and to prevent hypotony.

Follow-up and Outcomes:

Clinician- and patient-assessed outcomes if available:

The clinician-assessed outcomes showed that her intraocular pressures were relatively stable, and her visual fields showed stable superior and inferior loss, greater in the right eye than the left. Patient-assessed outcomes are not directly reported, but her continued engagement with treatments and follow-ups indicate her commitment to managing her disease.

Important follow-up diagnostic and other test results:

As of her last examination on April 5, 2023, her vision was 20/80 OD and 20/500 OS, with intraocular pressures of 12 OD and 10 OS. Her visual fields showed stable superior and inferior loss, greater in OD than OS.

Intervention adherence and tolerability:

Given the patient's intolerance to standard glaucoma medications, adherence to pharmacological intervention was not possible. However, she underwent several surgical interventions over the years, indicating her adherence to these treatment modalities.

Adverse and unanticipated events:

Adverse effects arise from glaucoma eyedrop medications. No other specific adverse or unanticipated events are mentioned in the provided information.

Discussion

Strengths and limitations of the case:

This case study represents the value in initiating long-term follow-up and varying treatment modalities in patients with glaucoma. The patient underwent varying treatment interventions, including usage of eye drops which were not tolerable and multiple surgeries to improve outflow and lower IOP. There is great importance in long-term management of glaucoma and personalization of treatment plans as patients respond differently to

interventions. Further, surgical interventions such as trabeculectomies may depend on patients cardiac and pulmonary status.

Limitations of this case – While this case study presents valuable insight within the field of ophthalmology, limitations still need to be acknowledged. Limitations for this case study include incomplete medical history records and variability in disease progression. The case study covers a single individual's long-term battle with a debilitating disease, which may not be generalizable to the larger population. Therefore, an incomplete medical history of records and selection bias limit the case study's ability to make a strong conclusion and its adaptation to the larger population.

Discussion of relevant medical literature – Megevand and Bron highlight the term “precision medicine” and the importance of personalized surgical treatments for glaucoma patients, which consider timing, individual risk factors, target the anatomical and functional outflow pathways and prevent scarring.¹³ Kim and Colleagues discuss the importance of long-term follow-up care in AOG patients. The study followed 127 AOG patients receiving topical medication treatment for AOG and detailed the course of progression in 56.7% of the patients. This study supports conclusions regarding the importance of long-term management and efforts to reduce IOP in glaucoma patients, even at the preperimetric stage [14]. This data combined with this case study signifies the importance of a personalized medical plan for patients with AOG.

Rationale of conclusions – Given the relevant medical literature, limitations of the case, and importance of results to the field of ophthalmology, it is essential to recognize glaucoma as a chronic condition that often necessitates long-term and personalized treatments. Early detection plays a crucial role in the preservation of optic nerve function. The key takeaway from these findings is the importance of recognizing that glaucoma requires ongoing intervention throughout the patient's lifetime to optimize visual outcomes. By prioritizing proactive management, ophthalmologists can strive to maintain the best possible vision for individuals affected by this condition.

The recent findings from the Laser in Glaucoma and Ocular Hypertension (LiGHT) Trial, as reported in the American Academy of Ophthalmology (AAO) Journal, offer compelling insights that could inform future treatment strategies for open-angle glaucoma (OAG) and ocular hypertension (OHT). The trial's 6-year follow-up data reveals that Selective Laser Trabeculoplasty (SLT), as a primary treatment, provides superior long-term disease control compared to initial drop therapy, notably reducing the need for incisional glaucoma and cataract surgeries over this period [15].

Significantly, the safety profile of SLT demonstrated in the trial indicates no serious laser-related adverse events, highlighting its viability as a safe treatment alternative.¹⁵ This aspect is particularly relevant to our case, considering our patient's intolerance to conventional treatment modalities.

Moreover, the trial underscores the efficacy of SLT in reducing disease progression. Fewer eyes treated initially with SLT showed progression from OHT to OAG or deterioration of existing OAG, compared to those treated with eye drops.¹⁵ This finding aligns with our treatment approach in the present case, where we prioritized long-term disease control and minimization of progression.

Additionally, the trial's focus on health-related quality of life (HRQoL) resonates with our patient-centric approach. The LiGHT Trial data suggests that patients treated with SLT experience a comparable quality of life to those on conventional drop therapy, further supporting the use of SLT as a patient-friendly treatment option [15].

Considering these findings, the LiGHT Trial's results could be a cornerstone in reshaping the management strategy for patients with glaucoma, especially those who are intolerant or non-responsive to traditional therapies. It emphasizes the need for personalized treatment approaches, considering individual patient profiles and long-term outcomes.

Primary lesson from case report - This case illustrates the importance of management, treatment, and long-term follow up in patients with the disease, given the complexity and severity exhibited by patients with glaucoma. In conclusion, it is important to build supportive and ongoing relationships with the patient and to utilize personalized treatment strategies for each eye to monitor disease progress and optimize visual function. The patient's management and treatment presented reveals the importance of prioritizing proactive management to improve patient quality of life within the field of ophthalmology.

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