Infection and Drug Resistance

Dovepress
Taylor & Francis Group

Open Access Full Text Article

CASE REPORT

Endogenous Fungal Endophthalmitis in a Patient After Fetal Reduction Surgery With a Literature Review: A Case Report

Xiaolu Cao[1], Peipei Jia[1], Lili Zhao[2], Xiulian Qiao[1], Yu Duan[1], Junxiao Jia[1], Jiangbo Xin[1]

[1]Hebei Ophthalmology Key Lab, Hebei Eye Hospital, Xingtai, Hebei, People's Republic of China; [2]Department of Pharmacy, First Hospital of Qinhuangda, Qinhuangdao, Hebei, People's Republic of China

Correspondence: Xiaolu Cao, Email 1299741546@qq.com

Infection and Drug Resistance downloaded from https://www.dovepress.com/
For personal use only.

Abstract: Endogenous fungal endophthalmitis (EFE) is a rare but severe ophthalmic emergency that often results in vision-threatening complications and, in extreme cases, can be life-threatening. This report presents a successfully treated case of fungal endophthalmitis, offering insights into clinical management. A 35-year-old female experienced decreased vision in her right eye following fetal reduction surgery. Her best-corrected visual acuity was limited to 10 cm finger counting in the affected eye. Following systemic antifungal therapy combined with vitrectomy, her vision recovered significantly. Through a detailed case analysis and literature review, this study aims to guide clinical practice. In patients with suspected EFE, obtaining early vitreous samples for pathogen identification and initiating timely treatment is critical. Furthermore, early vitrectomy during disease progression, along with an appropriate dosage and duration of antifungal therapy, is essential for restoring visual function and preventing vision loss.

Keywords: endogenous fungal endophthalmitis, fetal reduction surgery, vitrectomy

Introduction

Endogenous fungal endophthalmitis (EFE) is a rare intraocular infection resulting from hematogenous dissemination of fungal pathogens from distant foci. This condition is a severe ophthalmic emergency, often leading to vision-threatening complications and, in extreme cases, life-threatening outcomes.[1] This report presents a case of EFE caused by a rare etiology, demonstrating a favorable prognosis following systematic medical and surgical intervention. Through comprehensive analysis and a review of relevant literature, we aim to provide valuable insights for clinical management. The study was approved by the Ethical Committee of Hebei Eye Hospital (Approval No:2024LW28). The publication of anonymized case details was also approved by Hebei Eye Hospital. Written informed consent was obtained from the patient for the publication of any potentially identifiable images or data included in this article.

Case Presentation

A 35-year-old female patient presented with complaints of redness, pain, and blurred vision in her right eye, persisting for 15 days. She had undergone fetal reduction surgery one month prior and reported irregular vaginal bleeding following the procedure. Her best-corrected visual acuity was 10 cm finger counting in the right eye and 20/33 in the left eye. Intraocular pressure measured 8 mmHg in the right eye and 13 mmHg in the left eye. Examination of the right eye revealed conjunctival swelling with hemorrhage, numerous dust-like keratic precipitates on the corneal endothelium, and anterior chamber plankton (++). There was mild fibrinous exudation on the iris surface, with blurred iris texture and a round pupil measuring 4 mm in diameter. The anterior lens capsule exhibited minimal pigmentation, and the lens itself displayed no significant turbidity. The vitreous body contained numerous inflammatory cells and flocculent white, ball-like opacities (Figure 1A). The optic disc appeared light red with indistinct margins, and the retinal blood vessels were

Received: 17 October 2024
Accepted: 11 March 2025
Published: 15 March 2025

© 2025 Cao et al. This work is published and licensed by Dove Medical Press Limited. The full terms of this license are available at https://www.dovepress.com/terms.php and incorporate the Creative Commons Attribution – Non Commercial (unported, v3.0) License (http://creativecommons.org/licenses/by-nc/3.0/). By accessing the work you hereby accept the Terms. Non-commercial uses of the work are permitted without any further permission from Dove Medical Press Limited, provided the work is properly attributed. For permission for commercial use of this work, please see paragraphs 4.2 and 5 of our Terms (https://www.dovepress.com/terms.php).

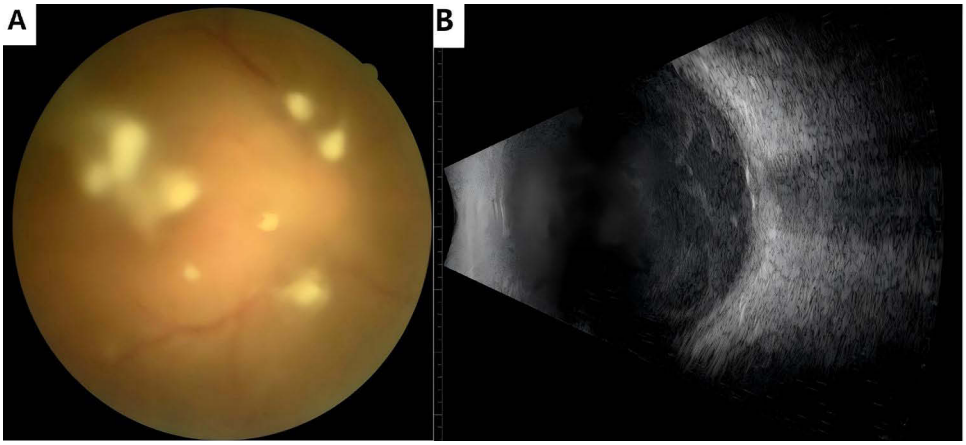

Figure 1 A large number of inflammatory cells and white ball-like flocculent turbidity in the vitreous body.(**A**) B-ultrasonography showed severe opacity in the vitreous body.(**B**).

engorged and tortuous. B-ultrasonography revealed severe vitreous opacity (Figure 1B), obscuring further visualization of posterior structures. No abnormalities were detected in the anterior or posterior segments of the left eye.

Upon admission, the patient's aqueous humor was analyzed for metagenomic and cytokine detection of pathogenic microorganisms. The results identified *Candida albicans* (+) with elevated cytokine levels: IL-6 at 11,530.6 pg/mL, VCAM at 21,394.8 pg/mL, and IL-8 at 354.7 pg/mL. Based on these findings, the initial diagnosis was fungal endophthalmitis of the right eye.

The patient received an intravitreal injection of voriconazole (500 mg/L, 0.1 mL). However, her condition did not significantly improve, and visual acuity further declined. Subsequently, the right eye underwent vitrectomy combined with an additional intravitreal injection of voriconazole (500 mg/L, 0.1 mL). During the procedure, the turbid vitreous body was completely removed, and a small yellow-white retinal lesion above the macula was observed. A sample of the vitreous body was collected for fungal culture, which confirmed *Candida albicans* (Figure 2). Postoperatively, the patient was treated with intravenous voriconazole (200 mg, q12h) in combination with voriconazole eye drops. Her condition

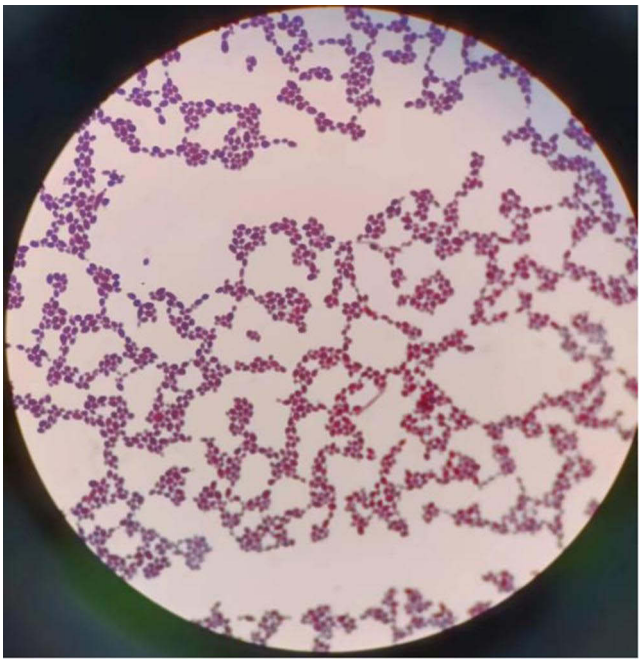

Figure 2 Candida albicans isolated by vitreous culture.

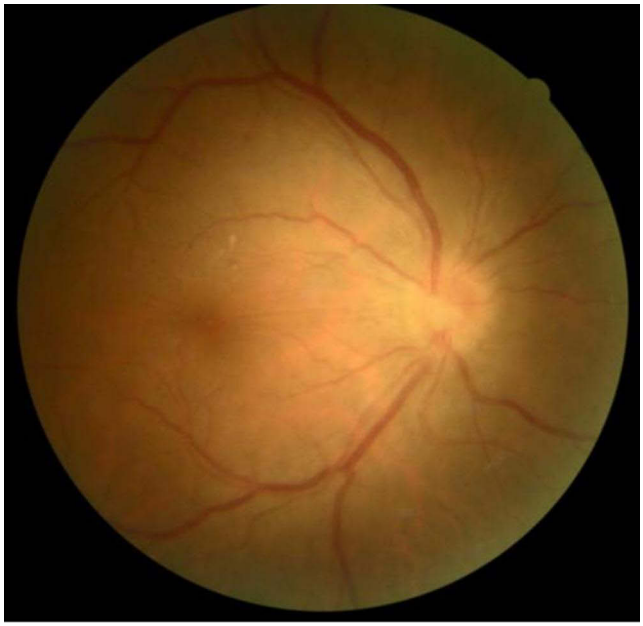

Figure 3 Fundus image 3 months after treatment.

improved significantly, allowing a transition to oral voriconazole (200 mg, q12h) as sequential therapy. The complete antifungal treatment regimen lasted three months. Following treatment, the patient's condition stabilized, and the visual acuity in the right eye improved to BCVA 20/25 (Figure 3).

Discussion

EFE is a rare but severe intraocular infection that can severely compromise vision and, in some cases, result in complete vision loss.[2] It is typically caused by fungal septicemia, with the pathogen initially spreading to the vascular-rich choroid. Early stages of the condition are often characterized by mild inflammation in the vitreous or aqueous humor; however, significant vitreous inflammation may develop as the infection progresses, potentially involving the aqueous humor.[3] The most common causative pathogen of EFE is *Candida albicans*,[4] while other fungi, such as *Aspergillus, Cryptococcus*, and *Coccidia*, are less frequently implicated.

The primary risk factors for EFE include retention of a central venous catheter, prolonged mycobacteremia, total parenteral nutrition, broad-spectrum antibiotic therapy, recent abdominal surgery, neutropenia, glucocorticoid use, and a history of intravenous drug use.[4–6] Pregnancy may also increase susceptibility to fungal infections. Hormonal changes during pregnancy double the vaginal culture rate of *Candida* species, predisposing women to fungal colonization.[7] With advancements in prenatal screening and diagnostic technologies, abnormalities in multiple pregnancies are increasingly identified early, enabling timely interventions. Consequently, fetal reduction surgery has become a common procedure, though infection is a major complication. In this case, transient Candida bloodstream invasion likely occurred during the induced abortion, leading to systemic symptoms such as high fever, Candida chorioretinal seeding, and subsequent vitreous involvement.

EFE is often insidious, leading to missed or delayed diagnoses due to atypical symptoms and delayed treatment. EFE typically exhibits the following clinical characteristics: (a) a long incubation period, with a mean latent period of about 30 days,[1] slowly progressing inflammation should raise suspicion of fungal endophthalmitis, as early symptoms often include decreased visual acuity, dark shadow floaters, and visual field occlusion. (b) The disease progresses in a "posterior-to-anterior" manner, initially affecting the choroid or retina. It is primarily characterized by white or pale-yellow villus-like patches with blurred boundaries, typically located in the posterior pole.[8] (c) As the infection advances, varying degrees of vitreous inflammation are observed, often presenting as fungal abscess balls or distinctive "beaded" clumps of turbidity.[4] (d) The presence of anterior segment inflammatory lesions is a hallmark of advanced disease progression.[9] (e) Additionally, bilateral eye involvement is more common in EFE compared to bacterial endophthalmitis, further complicating its presentation and management.[10]

Endogenous endophthalmitis generally responds better to intravenous antibiotics compared to exogenous endophthalmitis. Early diagnosis and the immediate initiation of appropriate anti-infective treatment are crucial; thus, accurate pathogen identification is essential. Microbiological detection methods include direct microscopy, pathogen culture, polymerase chain reaction (PCR), and metagenomic next-generation sequencing (mNGS). Pathogen culture is effective for certain microorganisms, such as bacteria and fungi; however, its positive detection rate is limited to 25.6%–44.1%. Furthermore, it is time-consuming, often requiring up to one week for a positive result, which restricts its clinical utility. Nonetheless, its primary advantage lies in the ability to perform drug susceptibility testing,[11] which provides valuable guidance for adjusting clinical treatment regimens. PCR, as the earliest molecular diagnostic technology, serves as the foundation for most DNA detection methods. It offers higher sensitivity, specificity, and positive and negative predictive values, with strong alignment to clinical diagnoses.[12] However, PCR is prone to interference from DNA amplification when pathogens with high copy numbers are present, which can hinder the detection of other pathogens.[13] mNGS, on the other hand, has significant advantages in detecting fungi, anaerobic bacteria, and atypical pathogens. It is also capable of identifying DNA viruses, RNA viruses, and parasites within specimens. This method allows for the rapid identification of infectious pathogens and provides a basis for timely clinical treatment decisions.[14] According to Dhanshree et al, mNGS achieves a sensitivity of 87.5% and a specificity of 100%.[15] Despite their speed and efficiency, molecular biology methods such as PCR and mNGS do not provide drug susceptibility information. As a result, the combination of traditional culture techniques with modern molecular diagnostic methods remains the optimal approach for pathogen identification and treatment planning.

Timely treatment of EFE is critical, as early diagnosis and appropriate interventions can effectively preserve vision.[15] The primary treatment options for EFE include systemic antifungal therapy, intravitreal antifungal injections, and vitrectomy. Systemic antifungal therapy alone is appropriate for patients with isolated chorioretinitis. For those with lesions threatening the macula or presenting with mild-to-moderate vitreous inflammation, intravitreal injection of antifungal agents combined with systemic therapy is recommended to rapidly achieve high drug concentrations in the posterior segment of the eye. Patients with moderate-to-severe vitreous inflammation typically require vitrectomy in combination with intravitreal antifungal injections and systemic antifungal therapy.[16]

Systemic antifungal therapy is essential for treating EFE, and the selected agents must effectively cross the blood-retinal barrier to achieve therapeutic concentrations in the eye. Common systemic antifungal drugs include amphotericin B, flucytosine, fluconazole, voriconazole, posaconazole, and echinocandins. Amphotericin B combined with flucytosine is one of the preferred regimens for *Candida* endophthalmitis.[16] However, amphotericin B achieves low vitreous concentrations and is associated with significant renal toxicity. Flucytosine can achieve effective ocular concentrations but may cause myelotoxicity in patients with renal insufficiency. Fluconazole is less toxic than amphotericin B and achieves vitreous concentrations equivalent to approximately 70% of plasma levels.[17] It is the preferred drug for *Candida* endophthalmitis but is ineffective against molds. Voriconazole is increasingly used for fungal endophthalmitis due to its broad antifungal spectrum. It is effective against multiple *Candida* strains, including *Candida glabrata* resistant to fluconazole and nearly all *Candida krusei* strains. Voriconazole also demonstrates potent activity against *Aspergillus* and *Fusarium*. Its vitreous concentration reaches approximately 40% of serum levels, and it can be administered intravenously or orally, with high oral bioavailability (96%). Sequential therapy, transitioning from intravenous to oral administration, is often employed after an initial response to intravenous treatment.[18] Posaconazole and echinocandins have limited vitreous penetration and are not recommended for treating fungal endophthalmitis.[19] The duration of treatment should be at least 4–6 weeks.[16]

Intravitreal injection of antifungal drugs is the most critical component of treatment for fungal endophthalmitis. Commonly used intravitreal antifungal agents include amphotericin B (5–10 μg) and voriconazole (100 μg). While both drugs are effective, voriconazole is preferred due to its broader antifungal spectrum and lower risk of retinal toxicity. However, when voriconazole is not an option, intravitreal amphotericin B remains a reasonable alternative, particularly for fungal endophthalmitis caused by yeast.[20]

Vitrectomy enables the direct removal of infected vitreous, microbial toxins, inflammatory cells, inflammatory mediators, and cloudy refractive media. Early vitrectomy is crucial in reducing the risk of advanced retinal detachment and is essential for achieving favorable clinical outcomes.[21] Intravitreal injections may be administered either as a standalone treatment or in combination with vitrectomy. When combined, the intravitreal injections should be performed after the vitrectomy procedure.

Conclusion

In patients with suspected EFE, obtaining early vitreous samples for pathogen identification and initiating prompt treatment is critical. Early vitrectomy during disease progression, combined with an adequate dosage and duration of antifungal therapy, is essential for restoring visual function and preserving vision. Furthermore, greater attention should be paid to infections associated with fetal reduction surgery to prevent complications and improve patient outcomes.

Abbreviations

EFE, endogenous fungal endophthalmitis; IOP: Intraocular pressure; KP, keratic precipitate; mNGS, metagenomics next-generation sequencing; BCVA: Best-corrected visual acuity.

Date Sharing Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Statement

This study was performed in accordance with the Declaration of Helsinki and approved by the Ethical Committee of Hebei Eye Hospital (Approval No:2024LW28). The publication of anonymized case details was also approved by Hebei Eye Hospital. Written informed consent was obtained from the patient for the publication of any potentially identifiable images or data included in this article.

Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval for the version to be published; and agreed to be accountable for all aspects of the work.

Funding

This work was supported by the Key research and development program of Xingtai City (2022ZC079 and 2022ZC234).

Disclosure

The authors have no competing interests to declare in this work.

References

1. Danielescu C, Stanca HT, Iorga RE, Darabus DM, Potop V. The diagnosis and treatment of fungal endophthalmitis: an update. *Diagnostics*. 2022;12(3):679. doi:10.3390/diagnostics12030679
2. Danielescu C, Anton N, Stanca HT, Munteanu M. Endogenous endophthalmitis: a review of case series published between 2011 and 2020. *J Ophthalmol*. 2020;2020:8869590. doi:10.1155/2020/8869590
3. Nam KY, Lee JE, Lee JE, et al. Clinical features of infectious endophthalmitis in South Korea: a five-year multicenter study. *BMC Infect Dis*. 2015;15:177. doi:10.1186/s12879-015-0900-5
4. Durand ML. Bacterial and fungal endophthalmitis. *Clin Microbiol Rev*. 2017;30(3):597–613. doi:10.1128/CMR.00113-16
5. Kim JH, Suh JW, Kim JY, et al. Prevalence and risk factors for endogenous fungal endophthalmitis in adult patients with candidemia at a tertiary care hospital in the Republic of Korea over 13 years. *J Mycol Med*. 2021;31(1):101102. doi:10.1016/j.mycmed.2020.101102
6. Seidelman J, Fleece M, Bloom A, et al. Endogenous candida endophthalmitis: who is really at risk? *J Infect*. 2021;82(2):276–281. doi:10.1016/j.jinf.2020.12.032
7. Potasman I, Leibovitz Z, Sharf M. Candida sepsis in pregnancy and the postpartum period. *Rev Infect Dis*. 1991;13:146–149. doi:10.1093/clinids/13.1.146
8. Das T, Agarwal M, Anand AR, et al. Fungal endophthalmitis: analysis of 730 consecutive eyes from 7 tertiary eye care centers in India. *Ophthalmol Retina*. 2022;6(3):243–251. doi:10.1016/j.oret.2021.09.006
9. Gajdzis M, Figuła K, Kamińska J, Kaczmarek R. Endogenous endophthalmitis-the clinical significance of the primary source of infection. *J Clin Med*. 2022;11(5):1183. doi:10.3390/jcm11051183
10. Wang H, Chang Y, Zhang Y, Yang R, Shi H, Zhang M. Bilateral endogenous fungal endophthalmitis: a case report. *Medicine*. 2023;102(16):e33585. doi:10.1097/MD.0000000000033585

11. Hao X, Jin W, Wang W, Qi Q, Yang A. Application of intraocular fluid detection in diagnosis and evaluation of ocular infectious diseases. *Rec Adv Ophthalmol*. 2022;42(07):573–576.
12. Sugita S, Ogawa M, Shimizu N, et al. Use of a comprehensive polymerase chain reaction system for diagnosis of ocular infectious diseases. *Ophthalmology*. 2013;120(9):1761–1768. doi:10.1016/j.ophtha.2013.02.020
13. Nakano S, Tomaru Y, Kubota T, et al. Evaluation of a multiplex strip PCR test for infectious uveitis: a prospective multicenter study. *Am J Ophthalmol*. 2020;213:252–259. doi:10.1016/j.ajo.2019.10.031
14. Das T, Joseph J, Jakati S, et al. Understanding the science of fungal endophthalmitis - AIOS 2021 sengamedu srinivas badrinath endowment lecture. *Ind j Ophthalmol*. 2022;70(3):768–777. doi:10.4103/ijo.IJO_2329_21
15. Zhu J, Xia H, Tang R, et al. Metagenomic next-generation sequencing detects pathogens in endophthalmitis patients. *Retina*. 2022;42:992–1000. doi:10.1097/IAE.0000000000003406
16. Pappas PG, Kauffman CA, Andes DR, et al. Clinical practice guideline for the management of candidiasis: 2016 update by the infectious diseases society of America. *Clin Infect Dis*. 2016;62(4):e1–50. doi:10.1093/cid/civ933
17. Tod M, Lortholary O, Padoin C, Chaine G. Intravenous penetration of fluconazole during endophthalmitis. *Clin Microbiol Infect*. 1997;3:143. doi:10.1111/j.1469-0691.1997.tb00269.x
18. Haseeb AA, Elhusseiny AM, Siddiqui MZ, Ahmad KT, Sallam AB. Fungal endophthalmitis: a comprehensive review. *J Fungi*. 2021;7(11):996. doi:10.3390/jof7110996
19. Riddell J 4th, Comer GM, Kauffman CA. Treatment of endogenous fungal endophthalmitis: focus on new antifungal agents. *Clin Infect Dis*. 2011;52:648. doi:10.1093/cid/ciq204
20. Chen KJ, Sun MH, Chen YP, et al. Endogenous fungal endophthalmitis: causative organisms, treatments, and visual outcomes. *J Fungi*. 2022;8(6):641. doi:10.3390/jof8060641
21. Chee YE, Eliott D. The role of vitrectomy in the management of fungal endophthalmitis. *Semin Ophthalmol*. 2017;32:29–35. doi:10.1080/08820538.2016.1228396

Infection and Drug Resistance

Dovepress
Taylor & Francis Group

Publish your work in this journal

Infection and Drug Resistance is an international, peer-reviewed open-access journal that focuses on the optimal treatment of infection (bacterial, fungal and viral) and the development and institution of preventive strategies to minimize the development and spread of resistance. The journal is specifically concerned with the epidemiology of antibiotic resistance and the mechanisms of resistance development and diffusion in both hospitals and the community. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit http://www.dovepress.com/testimonials.php to read real quotes from published authors.

Submit your manuscript here: https://www.dovepress.com/infection-and-drug-resistance-journal