

Indolent Postoperative Endophthalmitis With Vitreous Metagenomic Detection of *Enterobacter hormaechei* in an Eye With Central Retinal Vein Occlusion: A Case Report

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Case Report

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Abstract

Background

Enterobacter hormaechei is a member of the *Enterobacter cloacae* complex and an emerging multidrug-resistant opportunistic pathogen. *Enterobacter* endophthalmitis is uncommon and usually aggressive; an indolent postoperative presentation associated with species-level detection of *E. hormaechei* has not been well characterized.

Case presentation:

A 68-year-old woman with previous central retinal vein occlusion and retinal laser photocoagulation underwent left cataract surgery. Approximately 1 month later, after postoperative drops had been stopped, she developed ocular symptoms diagnosed as conjunctivitis. Follow-up was irregular, and she re-presented approximately 4 months later with persistent visual loss. At admission, left visual acuity was 0.08 (decimal), intraocular pressure was 13 mmHg, the conjunctiva and anterior chamber were quiet, the intraocular lens was centered, and vitreous opacity was most marked anteriorly. Vitreous DNA metagenomic next-generation sequencing (mNGS) detected *E. hormaechei* (656 reads; relative abundance, 2.80%); the laboratory categorized the signal as a low-attention finding. Intravitreal ceftazidime (1.0 mg/0.1 mL) and norvancomycin hydrochloride (1.0 mg/0.1 mL) produced no clear improvement after 1 week. Pars plana vitrectomy with silicone-oil tamponade was then performed. At 2 months, the retina was attached, intraocular inflammation was controlled, and best-corrected visual acuity was 0.12 (decimal); residual visual limitation was confounded by ischemic retinal disease.

Conclusion

Delayed postoperative endophthalmitis may present with little anterior-segment inflammation. Vitreous mNGS can identify unexpected organisms, but a low-abundance result without orthogonal confirmation should be interpreted as supportive rather than definitive evidence of causation. Persistent vitreous opacity despite intravitreal antibiotics may justify vitrectomy for source control, diagnostic sampling, and media clearance.

INTRODUCTION

Enterobacter hormaechei belongs to the taxonomically complex *Enterobacter cloacae* complex (ECC). Originally described in 1989, it is now recognized as an increasingly important opportunistic and health care-associated pathogen with considerable genomic diversity and an expanding antimicrobial-resistance repertoire [2–5]. Species-level identification within ECC remains difficult, and conventional biochemical or mass-spectrometric methods may not reliably distinguish closely related taxa [3].

Enterobacter endophthalmitis is rare. Culture-proven series have generally described acute, destructive disease, frequent antimicrobial resistance, and unfavorable visual outcomes despite intravitreal therapy and vitrectomy [6, 7]. Reports specifically assigning ocular infection to *E. hormaechei* are exceptionally scarce. Meanwhile, mNGS has increased the yield of pathogen detection from small-volume intraocular samples, including culture-negative and atypical infections [11–14]. Its high analytical sensitivity also creates interpretive challenges: microbial DNA may reflect a true pathogen, a nonviable organism, or background contamination, particularly when read counts are low and orthogonal confirmation is absent.

We report an indolent postoperative vitreous inflammatory syndrome in which *E. hormaechei* was detected by vitreous mNGS. The case is clinically instructive because the eye remained externally quiet, the anterior chamber showed no obvious inflammatory reaction, and coexisting retinal vein occlusion complicated attribution of the visual deficit. The report follows the CARE framework [1].

CASE PRESENTATION (Table 1)

Patient Information and Clinical Findings

A 68-year-old woman was admitted for investigation and treatment of persistent visual loss and vitreous opacity in the left eye. She had undergone cataract surgery in that eye approximately 6 months earlier. The surgery went smoothly; the posterior capsule of the natural lens remained intact, and the intraocular lens was implanted into the capsular bag. Ocular symptoms began about 1 month postoperatively after topical medications had been stopped. The episode was initially diagnosed as conjunctivitis and treated with topical antibiotics. She did not attend regular review and returned approximately 4 months later, when left endophthalmitis was suspected.

The ocular history also included left central retinal vein occlusion (CRVO) treated with two sessions of retinal laser photocoagulation (Fig. 1). Her systemic history included stable hyperthyroidism; no other systemic disease was recorded. Her medical record stated that routine blood indices, immune-related testing, and systemic imaging did not reveal evidence of a systemic infectious focus.

At admission, uncorrected or presenting visual acuity in the left eye was 0.08 (decimal notation), and intraocular pressure was 13 mmHg. The conjunctiva was not injected and the cornea was clear. The anterior chamber was of normal central depth, with a peripheral depth estimated at one-half corneal thickness; flare, keratic precipitates, and visible cells were absent. The pupil was round, 3 mm in diameter, and reactive to light. The posterior chamber intraocular lens was centered. After dilation, marked vitreous opacity was seen, predominantly in the anterior vitreous, whereas the posterior vitreous remained comparatively clear. The posterior pole was only partly visible; vascular occlusive changes and previous laser scars were noted (Fig. 1). No pain, hypopyon, wound abnormality, capsular plaque, or intraocular-lens instability was documented.

Diagnostic Assessment

The working differential diagnosis included delayed postoperative infectious endophthalmitis, noninfectious intermediate or posterior uveitis, sterile vitreous inflammation, vitreoretinal lymphoma, and vitreous changes related to retinal vascular disease. The delayed onset after cataract surgery favored a chronic postoperative process; however, the quiet anterior chamber and absence of a documented capsular plaque were atypical for classic *Cutibacterium acnes* endophthalmitis [9, 10].

Before injecting antibiotics into the vitreous, we got the vitreous sample which was submitted for DNA pathogen mNGS. The report identified *E. hormaechei* with 656 sequence reads and 2.80% relative abundance and classified the result as a low-attention indicator (Fig. 2). Bacteria, viruses, fungi, parasites, and selected special pathogens were otherwise reported as negative. Our record did not state the specimen volume, sequencing platform, database, genome coverage, reads-per-million value, negative-control ratio, reporting threshold. Conventional Gram stain, bacterial/fungal culture, antimicrobial susceptibility testing, species-specific PCR, and intraoperative repeat sampling were not reported. Accordingly, the organism was treated as a plausible etiologic finding rather than microbiologically proven causation.

Therapeutic Intervention

Therapeutic Intervention

Once intraocular infection was suspected, topical gatifloxacin and tobramycin were each administered six times daily, and compound tropicamide was used for pupillary mobilization. After the mNGS result, the patient received intravitreal ceftazidime 1.0 mg/0.1 mL plus norvancomycin hydrochloride 1.0 mg/0.1 mL.

At approximately 1 week, neither symptoms nor the degree of vitreous opacity had materially improved, and the anterior chamber remained quiet. Pars plana vitrectomy was therefore performed. During vitrectomy, the mid-peripheral and basal portions of the vitreous were removed and replaced with silicone oil; the lens capsule and intraocular lens were preserved, and no further intraocular anti-inflammatory injections were administered. Two further sessions of retinal laser photocoagulation were performed postoperatively for persistent areas of nonperfusion.

Follow-up and Outcomes

At 1 week, 1 month, and 2 months after vitrectomy, slit-lamp examination and multimodal imaging showed silicone-oil fill, an attached retina, and no recurrent clinically apparent inflammation. Ultrawide-field imaging and fluorescein angiography continued to show retinal nonperfusion related to the previous CRVO, and additional laser treatment was anticipated. At 2 months, best-corrected visual acuity was 0.12 (decimal) with a refraction of + 6.00 DS/+2.00 DC x 10 degrees (Fig. 3). This modest visual improvement could not be attributed solely to infection control because pre-existing ischemic retinal

damage, silicone-oil optics, and incomplete information about macular status were important confounders.

Table 1
Clinical Timeline

Approximate time	Clinical event	Finding / management
Before cataract surgery	Left central retinal vein occlusion	Two sessions of retinal laser photocoagulation were documented.
Month 0	Left cataract surgery	Operative details were not available in the supplied record.
Approximately month 1	Ocular symptoms after postoperative drops were stopped	Diagnosed elsewhere as conjunctivitis and treated with topical antibiotics; regular follow-up did not occur.
Approximately months 5–6	Re-presentation and admission	Left visual acuity 0.08, intraocular pressure 13 mmHg, quiet anterior chamber, centered intraocular lens, and predominantly anterior vitreous opacity.
During admission	Diagnostic vitreous sampling	<i>DNA-based mNGS detected E. hormaechei: 656 reads, 2.80% relative abundance, laboratory category 'low-attention indicator.'</i>
After mNGS result	Intravitreal antimicrobial treatment	Ceftazidime 1.0 mg/0.1 mL plus norvancomycin hydrochloride 1.0 mg/0.1 mL; topical gatifloxacin and tobramycin were continued.
Approximately 1 week later	Persistent vitreous opacity	No material improvement was recorded; pars plana vitrectomy with silicone-oil tamponade was performed.
Postoperative weeks 1 to month 2	Follow-up and retinal treatment	Retina remained attached and inflammation was controlled; two additional laser sessions were performed for nonperfusion.
Postoperative month 2	Latest documented visit	Best-corrected visual acuity was 0.12 decimal with + 6.00 DS/+2.00 DC x 10 degrees; further laser treatment was anticipated.

DISCUSSION

An Unusually Indolent Postoperative Phenotype

Chronic postoperative endophthalmitis is generally defined as infectious intraocular inflammation presenting more than 6 weeks after ocular surgery and may masquerade as noninfectious uveitis [9]. The present case fits the delayed time course but differs from many classic cases because there was no pain, conjunctival injection, hypopyon, keratic precipitate, or clinically visible anterior-chamber reaction. The predominant abnormality was anterior vitreous opacity. A quiet anterior segment therefore did not

exclude a low-grade posterior-segment infection, but it also reduced the specificity of the clinical phenotype.

The prior CRVO complicated interpretation. Ischemic retinal disease can independently reduce vision, produce vascular leakage and nonperfusion, and coexist with vitreous inflammatory findings. Intermediate uveitis and vitreoretinal lymphoma also enter the differential diagnosis of painless chronic vitritis [17–19]. In this case, the temporal relationship to surgery, mNGS finding, limited response to intravitreal therapy, and improvement in media/inflammatory status after vitrectomy favored an infectious process, but none of these observations alone establishes organism-specific causation.

Clinical Meaning of the *Enterobacter hormaechei* Signal

Published *Enterobacter* endophthalmitis series have reported severe disease and poor functional outcomes, although most isolates were identified only to the genus level or as *E. cloacae* [6–8]. In those series, ciprofloxacin, amikacin, and ceftazidime commonly retained in-vitro activity, but susceptibility was incomplete and outcomes remained guarded [6, 7]. The present presentation was far more indolent than the rapidly progressive phenotype often associated with Gram-negative postoperative endophthalmitis.

E. hormaechei has become clinically important because of its diverse resistance mechanisms, including inducible or derepressed AmpC beta-lactamase, acquired extended-spectrum beta-lactamases or carbapenemases, and porin alterations that can reduce beta-lactam entry [3–5]. Therefore, species identification without phenotypic susceptibility testing cannot justify a definitive targeted regimen. Ceftazidime was a reasonable empirical Gram-negative intravitreal agent, but the absence of a culture isolate prevents assessment of whether the detected organism was susceptible.

Strengths and Limits of mNGS Evidence

Large intraocular-fluid studies have shown that mNGS can substantially increase pathogen detection compared with conventional testing, especially in culture-negative or atypical infections [11–14]. Nevertheless, intraocular fluid is a low-microbial-biomass specimen. Reliable interpretation depends on specimen handling, negative controls, background subtraction, genome coverage, predefined thresholds, and clinical concordance. Contemporary reports increasingly use metrics such as reads per million, ratios to negative controls, and orthogonal confirmation [13, 14].

In this patient, the laboratory itself categorized the *E. hormaechei* signal as low attention. The result comprised 656 reads at 2.80% relative abundance, but relative abundance alone is not a validated measure of causality. Without culture, susceptibility testing, species-specific PCR, repeat sampling, or control data, the most defensible wording is 'presumed chronic postoperative endophthalmitis with vitreous mNGS detection of *E. hormaechei*.' A targeted literature search through 14 August 2026 did not identify a prior PubMed-indexed human ophthalmic case explicitly assigned to this species.

Management Considerations

Empirical intravitreal coverage with a glycopeptide plus ceftazidime is widely used for suspected bacterial postoperative endophthalmitis. The Endophthalmitis Vitrectomy Study established evidence for acute cases presenting within 6 weeks of surgery, but its results cannot be directly extrapolated to an indolent presentation several months after cataract surgery [15]. More recent observational work and meta-analysis continue to support individualized decisions between tap-and-inject and early vitrectomy according to vision, clinical severity, timing, media opacity, and response to initial treatment [16].

In the present case, proceeding to vitrectomy after 1 week without clear improvement was clinically coherent because it reduced vitreous inflammatory or microbial load, improved visualization, and offered an opportunity for repeat diagnostic sampling. However, the vitrectomy preserved the lens capsule and the intraocular lens. This matters in chronic postoperative infection because organisms may be sequestered on the capsule or implant, increasing recurrence risk [9, 10]. The absence of relapse during 2 months of follow-up is reassuring but too brief to establish eradication.

Strengths and Limitations

The strengths of this report are the longitudinal multimodal imaging, transparent reporting of the exact mNGS read count and relative abundance, and documentation of the response to escalation from intravitreal antibiotics to vitrectomy. Important limitations are the retrospective reconstruction of an imprecise chronology; absent culture, smear, susceptibility, PCR, and mNGS-control data; incomplete systemic-infection workup; no documented intraoperative repeat sampling; short follow-up; and major visual confounding from CRVO and silicone oil. These limitations preclude a definitive assertion that viable *E. hormaechei* caused the endophthalmitis or that the intervention alone produced the visual outcome.

CONCLUSIONS

Delayed postoperative endophthalmitis can be clinically quiet and may present chiefly as persistent vitreous opacity. mNGS can reveal unexpected organisms such as *E. hormaechei*, but low-abundance detection without orthogonal confirmation should be presented as supportive evidence, not microbiologic proof. When intravitreal antibiotics do not produce a clear response, vitrectomy may provide source control, diagnostic material, and optical rehabilitation. Rigorous reporting of assay controls, conventional microbiology, drug susceptibility, and longer follow-up is essential before this rare association can be interpreted confidently.

Abbreviations

E. hormaechei—*Enterobacter hormaechei* □mNGS—metagenomic next-generation sequencing □CRVO—central retinal vein occlusion □

Declarations

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Author contributions

S. Z.: Investigation. Data curation; Writing– original draft; H.M.: Conceptualization, Resources, Supervision. All authors read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Ethics approval and consent to participate

Ethics approval was not required for this individual case report.

Consent for publication

Written informed consent was obtained from the patient for permission for publication of her personal and clinical details along with non-identifying images to be published in this study.

Competing interests

The authors declare no competing interests.

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Figures

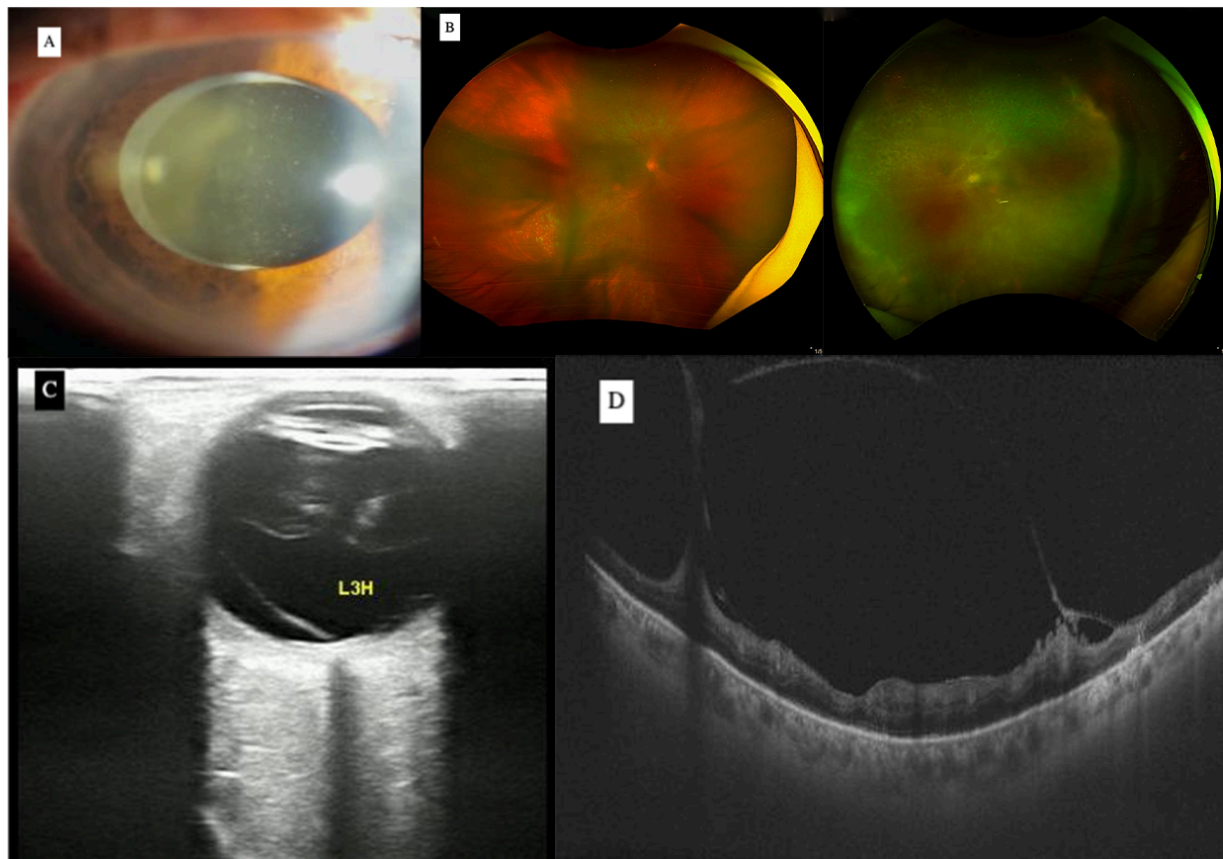


Figure 1

Baseline multimodal imaging of the left eye. (A) Slit-lamp photograph showing a quiet anterior segment and vitreous opacity behind a centered intraocular lens. (B) Ultrawide-field fundus image with reduced media clarity and pre-existing laser scars. (C) B-scan ultrasonography showing vitreous opacities and membranous echoes. (D) Optical coherence tomography showing a preretinal membrane/tractional interface. Patient aliases and acquisition dates were removed from the source image.

03 结果列表

细 菌						
属				种		
类型	名称	序列数	相对丰度 (%)	名称	序列数	关注度
G-	肠杆菌属 <i>Enterobacter</i>	656	2.80	霍氏肠杆菌 <i>Enterobacter hormaechei</i>	656	低
病 毒						
类型	名称	序列数	相对丰度 (%)	名称	序列数	关注度
-	-	-	-	-	-	-
真 菌						
名称		序列数	相对丰度 (%)	名称	序列数	关注度
-		-	-	-	-	-
寄 生 虫						
名称		序列数	相对丰度 (%)	名称	序列数	关注度
-		-	-	-	-	-
特殊病原体 (包括分枝杆菌、支原体/衣原体等)						
类型	名称	序列数	相对丰度 (%)	名称	序列数	关注度
-	-	-	-	-	-	-

Figure 2

Vitreous DNA metagenomic next-generation sequencing result list. *Enterobacter hormaechei* was reported with 656 organism-specific reads, 2.80% relative abundance, and a low-attention classification.

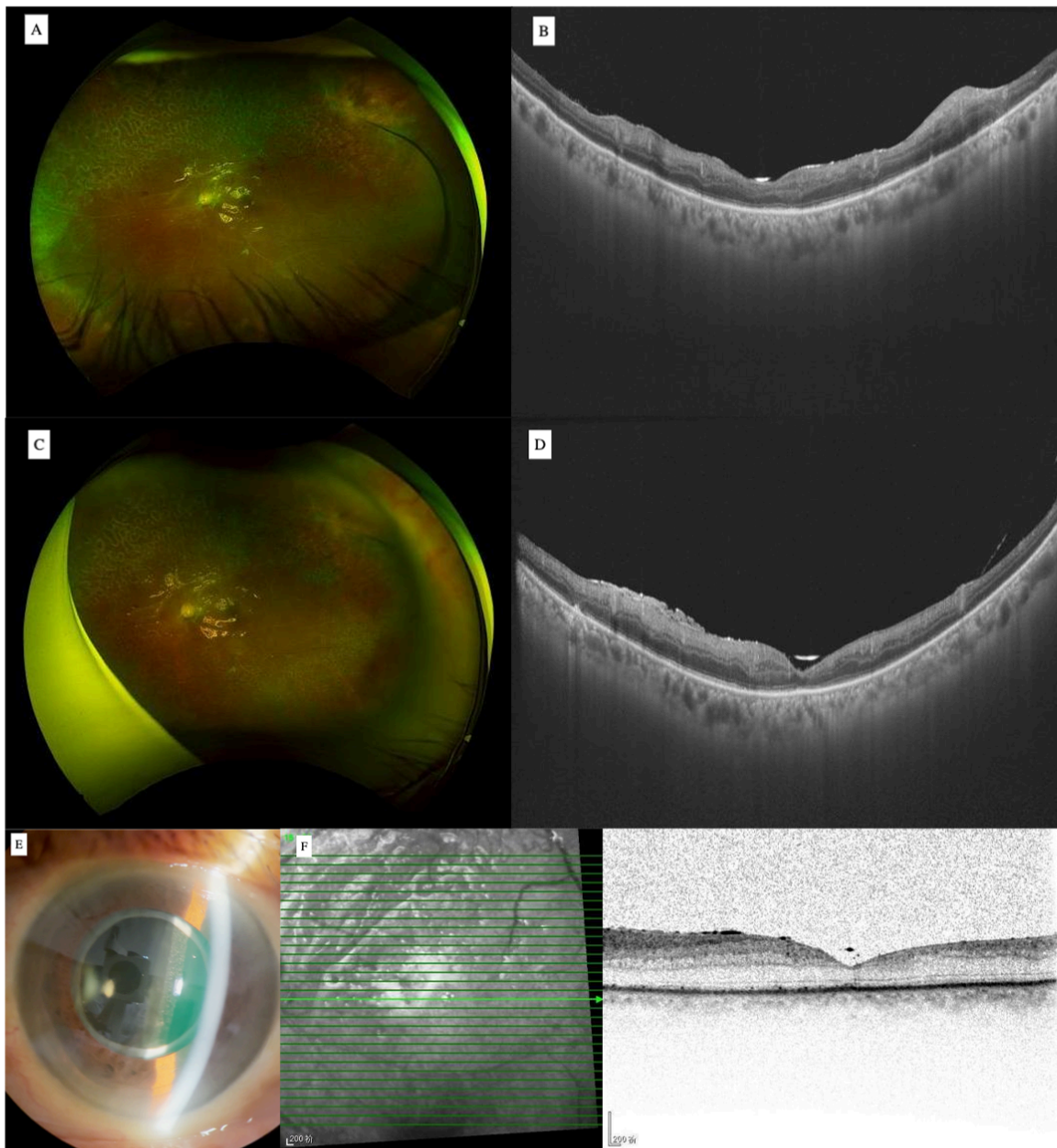


Figure 3

Post-vitrectomy follow-up of the left eye. (A, B) Ultrawide-field fundus image and optical coherence tomography at approximately 1 week. (C, D) Corresponding imaging at approximately 1 month. (E, F) Slit-lamp photograph and optical coherence tomography at approximately 2 months. The retina remained attached under silicone oil and no recurrent anterior-segment inflammation was documented. Exact acquisition dates and panel chronology require confirmation from the imaging archive; patient aliases and dates were removed from the displayed fundus images.