



Pseudomonas stutzeri endogenous endophthalmitis and sequential giant retinal tear management

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Introduction

Endogenous endophthalmitis represents 2-8% of all endophthalmitis cases and is typically associated with poor visual outcomes.¹ Gram-negative organisms are implicated in 22 - 77% of culture-positive endogenous bacterial endophthalmitis cases, with *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* being the most common pathogens.² The underlying risk factors such as immunocompromised state, malignancy, debilitating chronic conditions, liver pathology, renal failure, poorly controlled diabetes mellitus, concurrent foci of infection, intravenous drug use, and hospital stays with intravenous lines or indwelling catheters are identified in up to 90% of cases.¹

Pseudomonas stutzeri (*P. stutzeri*), is an aerobic, non-fermenting, gram-negative bacillus found in soil and water.³ While known to cause exogenous endophthalmitis such as post-cataract endophthalmitis,⁴⁻⁸ reports of endogenous endophthalmitis are rare. This case presents the first known report of endogenous endophthalmitis caused by *P. stutzeri* in an immunocompetent individual, complicated by a giant retinal tear-associated retinal detachment.

Case Report

A 30-year-old healthy male presented with sudden onset of painful vision loss, redness, and tearing in his right eye over 2 days. There were no signs of sepsis at presentation. Review of systems was negative for fever, chronic cough, loss of appetite, weight loss, recent hospitalization, catheterization, intravenous drug use,

abdominal pain, burning micturition, gastrointestinal disturbance, joint pain, or oral/genital ulcers. There was no history of prior ocular surgery or trauma.

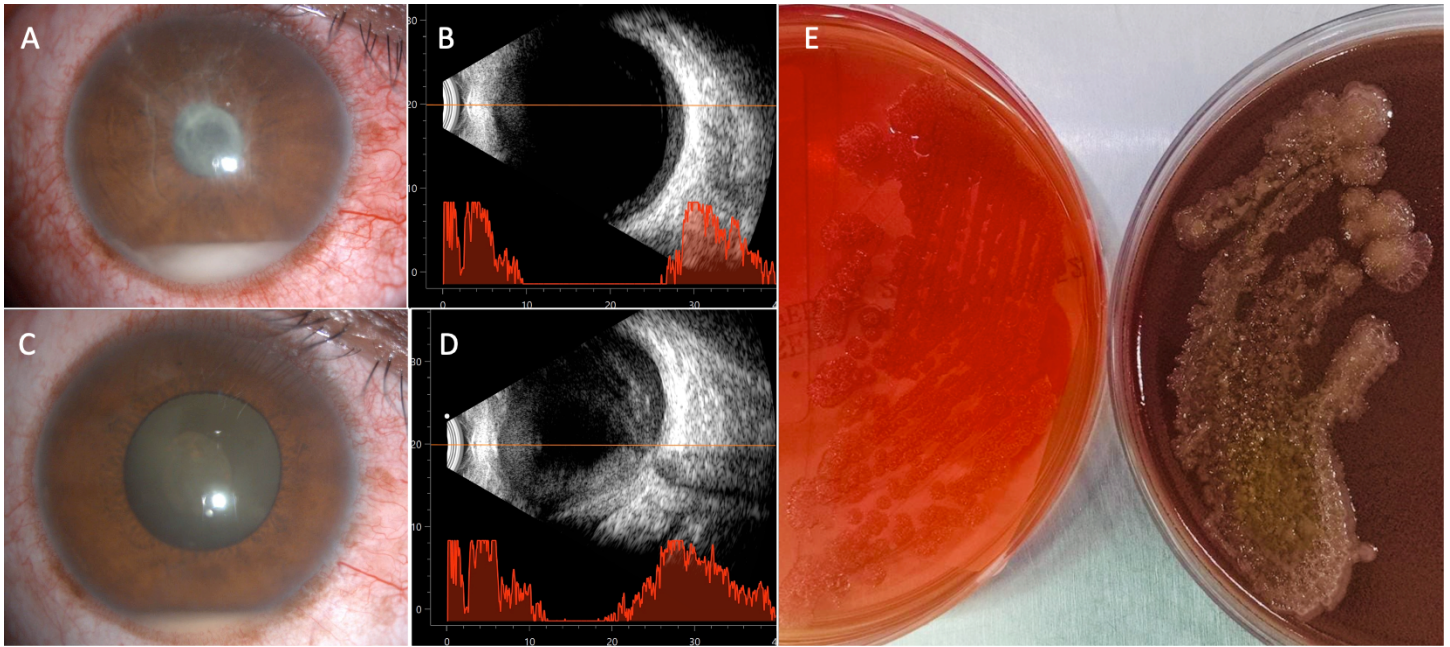


Figure 1. A. Slit-lamp photograph of the right eye showing hypopyon with dense fibrin in the pupillary space. B. B scan demonstrating hyperechoic accumulation of subhyaloid material. C. Partial resolution of inflammation with fibrin retraction. D. B scan on day 2, showing increased vitreous inflammation. E. Culture plates with growth of *Pseudomonas stutzeri* on blood and chocolate agar plates.

On examination, best-corrected visual acuity (BCVA) was hand motion in the right eye and 20/20 in the left eye. Intraocular pressure (IOP) was 17 mmHg bilaterally. Slit-lamp examination of the right eye revealed circumciliary congestion, a 1.5 mm hypopyon, and prominent fibrin. There was no view to the fundus, but B-scan showed moderate vitreous opacities, subhyaloid inflammatory material, and an attached retina. (Fig 1B). The left eye findings were unremarkable. In the right eye, topical 1% prednisolone acetate 6 times per day and 0.5% homatropine 3 times per day were started. Laboratory workup showed mildly elevated absolute neutrophil count. Serology for infective etiology including complete blood hemogram, tuberculin skin test, VDRL, HIV, hepatitis B surface antigen was negative and bilateral lung fields showed no obvious abnormality on high resolution computerized tomography. Urine analysis revealed scanty pus cells and gram-positive cocci. Blood cultures were obtained and pending. Based on the urine culture report, oral ciprofloxacin 500 mg twice daily was initiated. Within 24 hours, partial clearing of anterior segment inflammation (Fig 1C) was observed, but ultrasonography showed worsening of vitreous inflammation (Fig 1D). Endogenous endophthalmitis was

suspected, and a core pars plana vitrectomy (PPV) was performed. The time from initial presentation to vitrectomy was 48 hours.

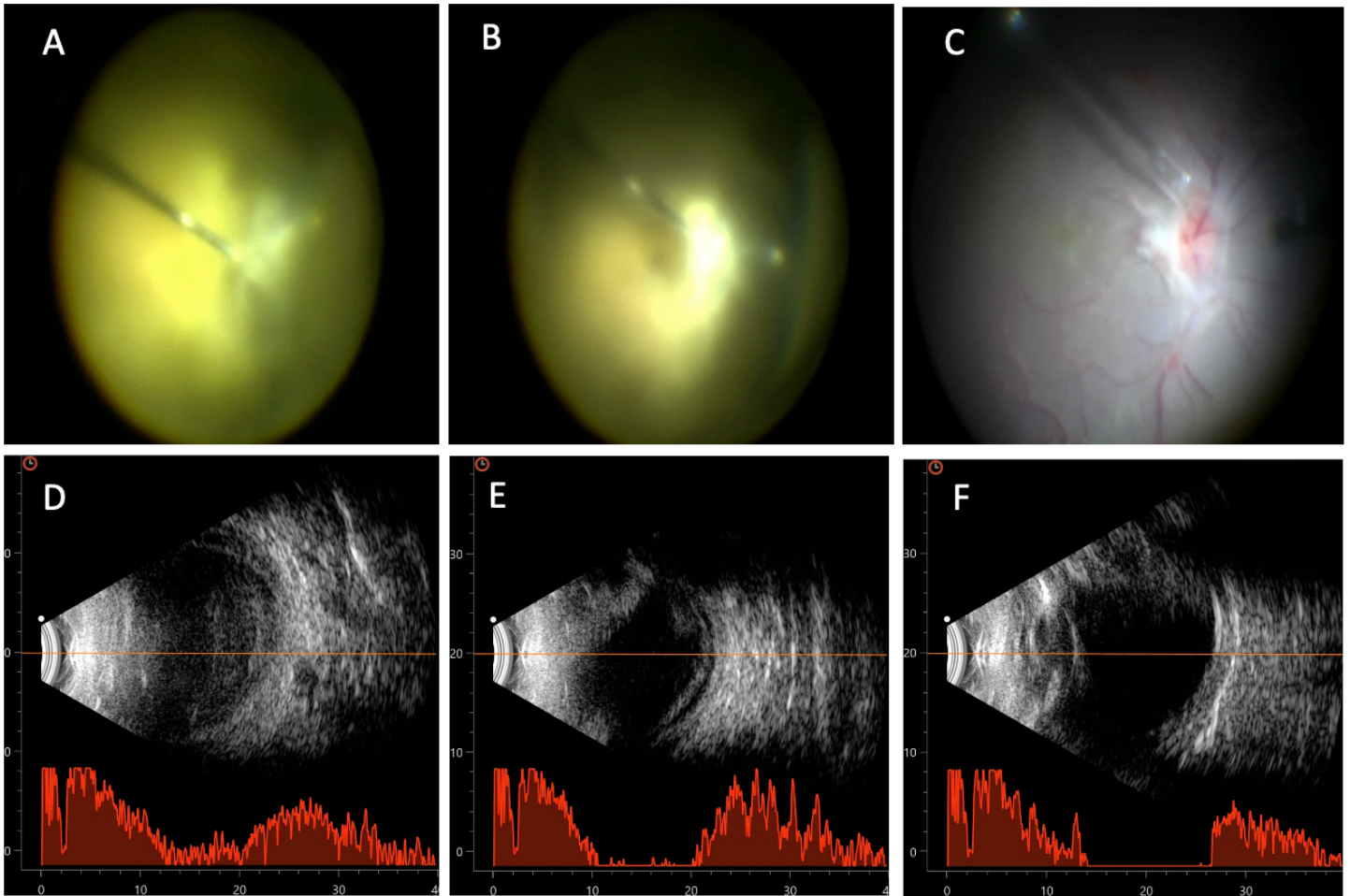


Figure 2. A-C. Intraoperative images demonstrated vitreous exudates, induction of posterior vitreous detachment and peeling of exudative membranes using internal limiting membrane forceps. D-F. Serial B scans on postoperative days 2, 4, and 7 showed progressive resolution of exudates.

Initially, undiluted vitreous and aqueous samples were obtained, dense vitreous exudates were removed, and a posterior vitreous detachment was induced (Figs 2A and B). Inflammatory membranes were carefully peeled (Fig 2C). No retinal breaks were seen. Fluid air exchange was performed, and intravitreal vancomycin 1mg/0.1 ml, ceftazidime 2.25 mg/0.1 ml and dexamethasone 0.4mg/0.1ml were injected.

Blood cultures yielded *Elizabethkingia meningoseptica* (*E. meningoseptica*) and vitreous cultures grew *P. stutzeri* (Fig 1E). Urine cultures showed scanty growth of urethral flora. Both organisms from blood and vitreous samples were sensitive to ceftazidime (Table 1). Fungal cultures were negative. The patient received additional intravitreal injections of ceftazidime and dexamethasone on postoperative days 2 and 4.

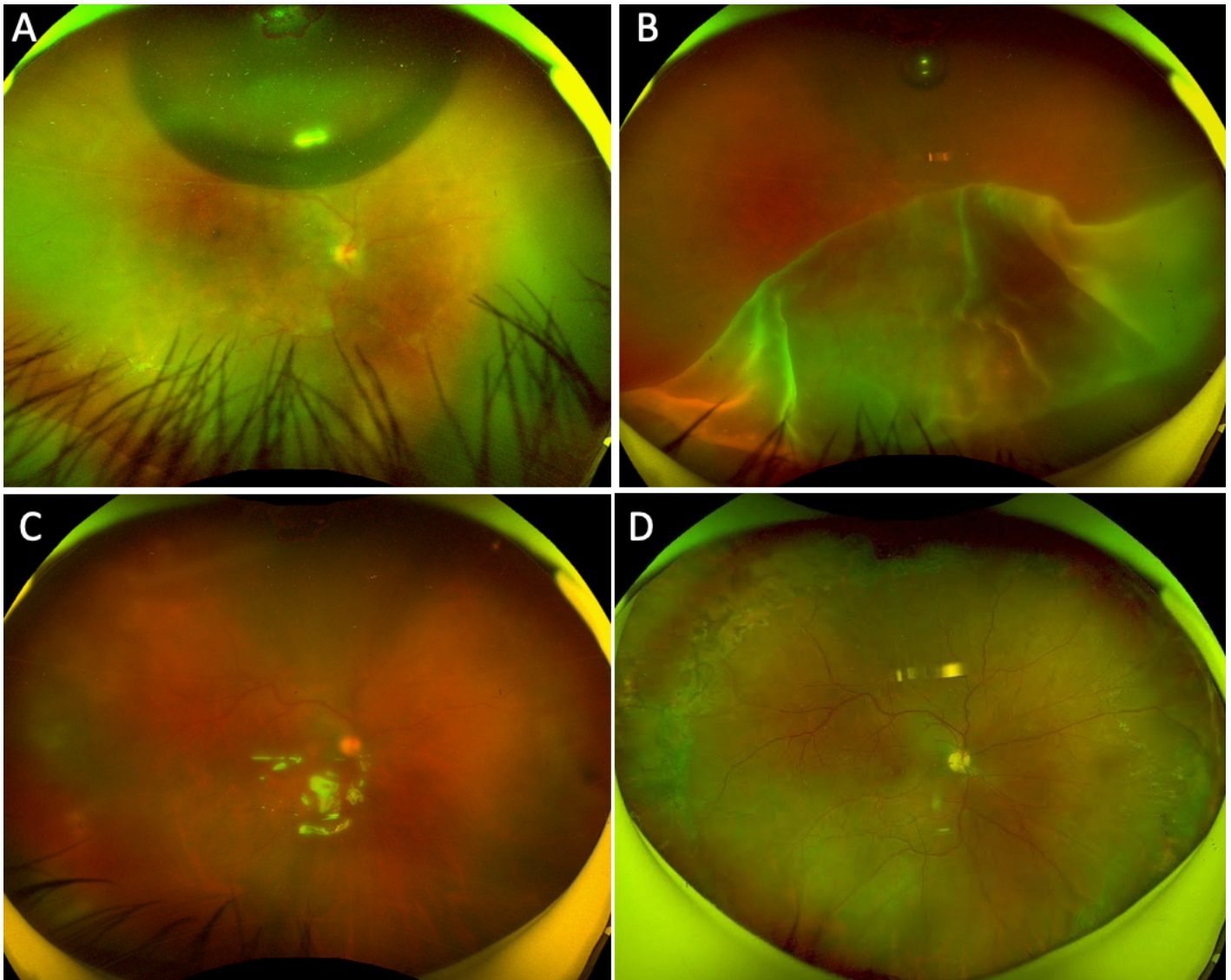


Figure 3. A. Ultra-widefield fundus photograph shows attached retina 1 week postoperatively. B. Giant retinal tear was observed with rolled-over superior flap. C. Silicone oil tamponade following perfluorocarbon liquid with subsequent silicone exchange. D. Attached retina at 8 months postoperatively.

The inflammation resolved, and BCVA improved to 20/200 on postoperative day 7 (Fig 3A). However, 4 days later, visual acuity suddenly decreased, and examination demonstrated a giant retinal tear-associated retinal detachment. The giant retinal tear involved more than 210 degrees, extending from 8 to almost 3 o'clock, with the posterior retinal flap flipped over onto the inferior retina (Fig 3B).

A second PPV was performed. Perfluoro-n-octane liquid was injected to stabilize the retina and unfold the flap. Residual peripheral vitreous was trimmed, and 3 rows of endolaser photocoagulation were applied along the edge of the giant retinal tear. Perfluorocarbon tamponade was used to minimize the risk of retinal slippage. Two weeks later, a second vitrectomy surgery was performed with air-fluid exchange and silicone oil tamponade (Fig

3C). Silicone oil was removed 6 weeks later. Fifteen months postoperatively (Fig 3D), the retina remained attached, and BCVA improved to 20/40.

Discussion

This case highlights a rare occurrence of endogenous endophthalmitis caused by *P. stutzeri* in a healthy adult with no systemic comorbidities. The simultaneous detection of *P. stutzeri* from the vitreous and *E. meningoseptica* from the bloodstream suggests 2 independent infectious foci rather than hematogenous spread of a single pathogen. While *P. stutzeri* is a rare but documented cause of ocular infection, including post-cataract endophthalmitis⁴⁻⁸ in healthy individuals, *E. meningoseptica* is increasingly recognized as a nosocomial bloodstream and central nervous system pathogen with a predilection for patients with indwelling devices or other vulnerabilities.⁹

To our knowledge, co-isolation of these 2 organisms in an immunocompetent host has not been previously reported. This underscores the importance of considering dual-pathogen infections even in immunocompetent individuals and tailoring management accordingly.¹⁰ Both isolates were sensitive to ceftazidime, facilitating effective targeted treatment. Identification was performed using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry, with automated susceptibility testing (Vitek 2).

Gram-negative bacilli are known to cause rapid and destructive endophthalmitis. Early vitrectomy has been suggested to improve outcomes by debulking infectious load and enhancing intraocular antibiotic penetration and distribution. Negretti and colleagues reported that delaying vitrectomy beyond 7 days in such cases may result in worse anatomical and functional outcomes.¹¹

Despite aggressive management of endogenous endophthalmitis, this eye developed a giant retinal tear-associated retinal detachment. A retinal detachment may develop in an eye with endophthalmitis, with a reported incidence ranging from 2% to 37% and may be due to necrosis, retinal thinning, or vitreoretinal traction.¹² The giant retinal tear in this case extended beyond 210 degrees and was associated with a highly mobile posterior flap. Perfluorocarbon was used intraoperatively and as a short-term postoperative tamponade because its high specific gravity and surface tension provide excellent retinal stabilization, prevent retinal slippage, and facilitate effective retinopexy. A staged approach with short-term perfluorocarbon tamponade followed by silicone oil exchange was preferred over intraoperative perfluorocarbon-silicone oil exchange due to the presence of an extensive giant retinal tear and marked retinal mobility, supporting early retinal flattening and firm chorioretinal adhesion. Previous studies have demonstrated favorable outcomes with this approach in large and complex giant retinal tears.¹³⁻¹⁵ Although this staged approach requires a second procedure and carries potential perfluorocarbon-related risks, these risks were minimized by limiting the postoperative

perfluorocarbon tamponade to 2 weeks. This strategy resulted in a successful anatomical and functional outcome in this case.

Conclusion

Endogenous endophthalmitis, although uncommon, should be considered in healthy individuals presenting with acute panuveitis. Although suggestive of endogenous endophthalmitis, the absence of a systemic focus and discordant cultures could possibly indicate transient bacteremia or unrelated infection. Polymicrobial involvement with different organisms from ocular and systemic samples highlights the importance of a comprehensive microbiological workup.

The development of a giant retinal tear despite resolution of the endophthalmitis underscores the need for close followup in these eyes. A giant retinal tear is rare but serious complication that requires prompt surgical intervention. Perfluorocarbon may serve as an effective short-term tamponade, promoting retinal stabilization and enhancing surgical outcome. A staged surgical approach using perfluorocarbon tamponade followed by subsequent silicone oil may offer promising results in such complex retinal detachments.

With timely diagnosis, organism-specific therapy, and appropriate surgical management, even aggressive endogenous endophthalmitis with visually threatening sequelae can result in favorable anatomical and visual outcomes.

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Statement of Ethics

The patient gave written consent to publish the data. The report does not include personal information that could identify the patient directly or indirectly. All medical interventions have been carried out according to the latest protocols of therapy. Reporting and writing are all in compliance with the Declaration of Helsinki.

Conflict of Interest Statement

The authors declare no conflicts of interest related to this topic.

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Table 1. Microbiological characteristics of isolates from ocular and non-ocular fluids

	Isolate 1	Isolate 2	Isolate 3	Isolate 4
	Blood	Vitreous	Aqueous	Urine
Day	Day 1	Day 2	Day 2	Day 1
Gram stain	Gram-negative bacilli	Gram-negative bacilli	Gram-negative bacilli	Gram-positive cocci
Organism	<i>Elizabethkingia meningoseptica</i>	<i>Pseudomonas stutzeri</i>	No growth	No growth
Antibiotic susceptibility test (AST)				
Amikacin	R	S		
Gentamicin	R	S		
Tobramycin	N/A	S		
Ciprofloxacin	S	S		
Levofloxacin	S	S		
Imipenem	S	S		
Meropenem	S	S		
Cefepime	S	S		
Ceftazidime	S	S		
Chloramphenicol	N/A	R		
Piperacillin/ tazobactam	S	S		

*S - Sensitive, R - Resistant, N/A - not applicable