

Case Report

The rise of multi-drug resistant *Klebsiella pneumoniae* in endogenous panophthalmitis: a rare case report

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ABSTRACT

Endogenous panophthalmitis is a devastating intraocular infection resulting from hematogenous spread of pathogens, often associated with significant morbidity and mortality. We report a case of fulminant panophthalmitis with orbital cellulitis secondary to carbapenem-resistant *Klebsiella pneumoniae* (CRKP) bacteraemia in a 71-year-old female with uncontrolled diabetes, chronic kidney disease on haemodialysis, and a recent catheter-related bloodstream infection (CRBSI). The patient presented with severe ocular pain, proptosis, corneal melt, and systemic instability. Imaging revealed vitreous exudates, retinal detachment, and orbital involvement. Blood cultures confirmed CRKP, sensitive only to polymyxin and tigecycline. Aggressive systemic antibiotics and supportive care was initiated, but surgical intervention was deferred due to hemodynamic instability. The patient succumbed shortly due to multiorgan failure. This case underscores the rapid progression of endogenous panophthalmitis in immunocompromised hosts, particularly with multidrug-resistant organisms. Our case highlights the critical need for multidisciplinary management, and prompt source control in catheter-dependent patients. The fatal outcome emphasizes the poor prognosis associated with resistant pathogens, reinforcing the importance of preventive strategies in high-risk populations.

Keywords: Panophthalmitis, Sepsis, Catheter related infections, *Klebsiella pneumoniae*

INTRODUCTION

Panophthalmitis is an ocular and medical emergency characterised by severe purulent inflammation of eyeball, including all coats of eyeball as well as the intraocular contents. It may be endogenous or exogenous depending on the origin of infection. Endogenous panophthalmitis is rare, with associated orbital cellulitis being more infrequent. *Klebsiella pneumoniae* is emerging as a common causative agent in endogenous panophthalmitis with immunocompromised state of the patient being a significant risk factor.¹

Despite treatment, the outcome of panophthalmitis is very poor. Here we report a case of rare occurrence of panophthalmitis with orbital cellulitis secondary to carbapenem-resistant *Klebsiella pneumoniae* bacteraemia in a catheter-dependent haemodialysis patient.

CASE REPORT

A 71-year-old female patient, with uncontrolled diabetes mellitus on insulin, systemic hypertension, coronary artery disease, chronic kidney disease on haemodialysis presented with complaints of redness and pain in left eye (LE) of 5 days. She had defective vision in LE since few years and could not appreciate any drop in vision. She visited a local hospital for the same and was diagnosed as lens induced glaucoma and was prescribed topical steroids and antiglaucoma medications.

Symptoms worsened and she developed protrusion of LE and hence was referred to our centre. Patient had a history of catheter related bloodstream infection (CRBSI) 2 months back. Her right IJV (internal jugular vein) cannula was insitu for the past 2 months. On examination, the patient was drowsy, febrile with unstable vitals, bilateral

basal crepitations and low oxygen saturation with right IJV catheter in situ. Ocular examination of LE-Vision could not be assessed, EOM (extraocular movements)-absent, diffuse periorbital oedema with tenderness, axial proptosis of 23 mm with resistance to retropulsion, mucopurulent discharge, circumcorneal congestion, 360-degree chemosis, subconjunctival pus in perilimbal area, diffuse corneal oedema with dense corneal infiltrate and corneal melt of near total cornea.

Anterior chamber was filled with exudates, the rest of details including fundus could not be appreciated (Figure 1). IOP (intraocular pressure) was high on digital palpation. Right eye -absent consensual light reflex, rest unremarkable.



Figure 1: LE-External photo-360-degree chemosis, dense corneal infiltrate with diffuse corneal melt.

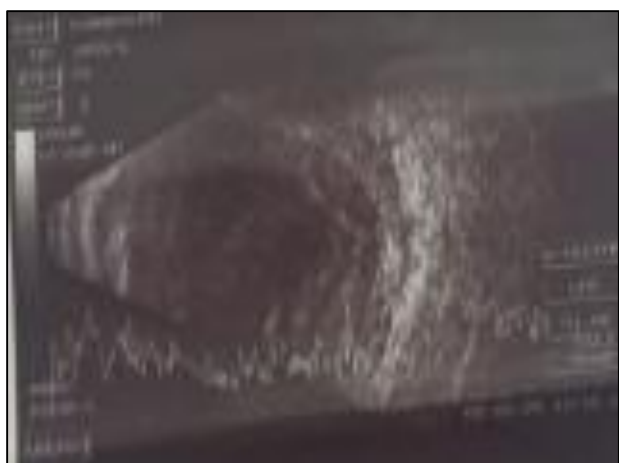


Figure 2: B-Scan-LE-coarse vitreous echoes with exudative Retinal detachment, T-sign and scleral thickening.

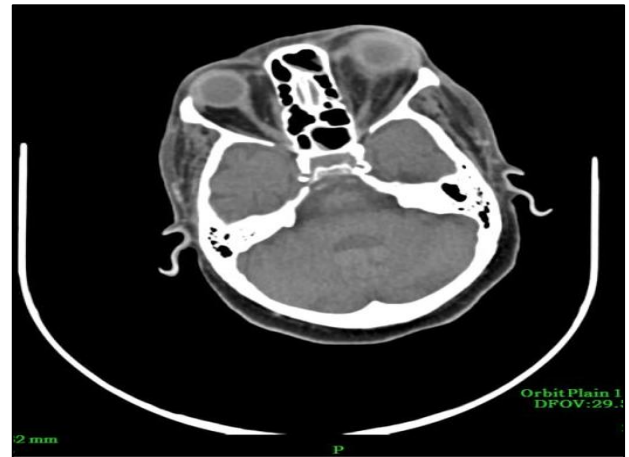


Figure 3: CT-ORBIT with PNS-Proptosis of left eye with subcutaneous oedema, fat stranding, bulky extra ocular muscles s/o left eye orbital cellulitis with panophthalmitis.



Figure 4: Blood agar culture plate showing growth of *Klebsiella pneumoniae*.



Figure 5: Antibiotic sensitivity test showing multidrug resistance of above growth.

General examination

Dental caries present. Ear and nose examinations were unremarkable. B scan ultrasonography of LE showed coarse vitreous echoes with exudative retinal detachment, T-sign with scleral thickening (Figure 2), while CT orbit with Paranasal sinuses showed proptosis of left eye with subcutaneous oedema, fat stranding, bulky extra ocular muscles (Figure 3).

Lab investigations

Leucocytosis with predominant neutrophilia (Total Count-33600, Neutrophils-79.3%) with elevated acute inflammatory markers and deranged RFT. ECHO and USG abdomen revealed no foci of infections. The clinical impression was LE- septicemia-CRBSI with Panophthalmitis and orbital cellulitis.

Patient was admitted in multi-disciplinary ICU and was put on non-invasive ventilation and hemodynamic support. She was empirically started on intravenous piperacillin-tazobactam 2.25 g IV TID, inj. metronidazole 500 mg IV TID, Fortified Ceftazidime (50 mg/ml) eye drops 1 drop hourly (LE). Right IJV catheter was removed, femoral artery catheter inserted and haemodialysis continued.

Blood culture and sensitivity, conjunctival swab and right IJV catheter tip culture revealed carbapenem resistant *Klebsiella pneumoniae* sensitive only to polymyxin, tigecycline and colistin (Figure 4 and 5), following which systemic antibiotics were escalated. Vitreous tap, intravitreal antibiotics and evisceration was deferred due to hemodynamic instability. Due to financial constraints, the patient's relatives refused further treatment from our centre and was discharged against medical advice to another centre. On telephonic follow up, the patient had succumbed after 2 days.

DISCUSSION

Panophthalmitis is the most severe form of endophthalmitis, leading to poor visual outcomes. It can be classified as exogenous, occurring due to direct pathogen inoculation from trauma, ocular infections like infective keratitis or postoperative complications. Endogenous panophthalmitis occurs when microorganisms metastasize hematogenously to the eye from distant infectious sites such as urinary tract infections, bacteraemia, pneumonia, or soft tissue injuries.

The causative organisms of endogenous endophthalmitis exhibit regional variations, gram-positive bacteria predominate in Western countries, whereas gram-negative organisms are common in East Asia. In a case series of 34 eyes of 27 patients with endogenous endophthalmitis by Binder et al, there was equal incidence of bacterial and fungal etiologies.² *Klebsiella pneumoniae*-a Gram-negative bacillus causing hepatobiliary, urinary tract, and nosocomial infections-is the leading pathogen in

endogenous endophthalmitis, particularly in Southeast Asia.¹ Patients with underlying disorders such as diabetes mellitus, chronic alcoholism, immunocompromised states, liver disease or recent antibiotic use are more susceptible to *Klebsiella pneumoniae* infections.¹ Clinically, this organism induces aggressive intraocular inflammation with rapid progression and extensive posterior segment involvement. Chen et al. identified multiple risk factors predictive of poor visual outcomes in endogenous *Klebsiella pneumoniae* endophthalmitis, including unilateral disease, initial visual acuity worse than counting fingers, presence of ocular pain, hypopyon, elevated intraocular pressure, culture-positive intraocular fluids, subretinal abscess formation, delayed ophthalmic intervention, initial manifestation of ocular symptoms prior to systemic signs, and corneal oedema at presentation.³

In this case of fulminant endogenous panophthalmitis, a longstanding right internal jugular vein (IJV) catheter was identified as the focus of infection. Our patient developed panophthalmitis secondary to catheter-related bloodstream infection (CRBSI), reinforcing the considerable risks caused by indwelling catheters in haemodialysis patients, consistent with the findings of Batista et al.⁴ However, while their reported case involved MRSA bacteraemia, our patient presented with Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) infection—a finding that aligns with the increasing incidence of Gram-negative endogenous endophthalmitis in Asian populations, as noted by Eqbal et al.⁵

Timely diagnosis and aggressive systemic and ocular therapy are mandatory to reduce the increased morbidity and mortality associated with this condition. Suwan et al, reported a 58-year-old diabetic male who developed bilateral endogenous panophthalmitis due to *Klebsiella pneumoniae* septicemia, wherein despite prompt vitrectomy and intravitreal antibiotics, the final visual outcome was poor.⁶ Nayak et al and Natarajan et al reported cases of endogenous panophthalmitis in immunocompromised patients resulting in evisceration.^{7,8} These cases highlight the need for early diagnosis and intervention, especially in high-risk immunocompromised patients, however the visual outcome is still poor. Also, meticulous evaluation of potential sources of infection is essential, with multimodal imaging (USG and CT scans) playing a crucial role in management. Undetected primary infections frequently lead to therapeutic delays, highlighting the need for a multidisciplinary approach to optimize patient outcomes. In spite of this integrated treatment approach, our patient unfortunately had succumbed to death, reflecting the condition's frequently devastating course.

The rapid progression to orbital cellulitis observed in our case reflects the aggressive disease course described by Kulkarni et al, where delayed intervention led to evisceration.⁹ This further emphasizes the critical importance of early suspicion for metastatic ocular

infections in immunocompromised septic patients. Similar to the case reported by Hassanin et al, our patient presented with concurrent endogenous panophthalmitis and orbital cellulitis, however unlike in our case. Their case involved *E. coli* infection with no identifiable source, while our case was linked to CRKP bacteraemia of catheter origin-a distinction that exemplifies the growing threat of multidrug-resistant Gram-negative pathogens in healthcare-associated infections.¹⁰

The main stay of treatment for endogenous panophthalmitis involves prompt initiation of systemic antibiotics combined with intravitreal antibiotic therapy. This dual approach is essential due to the limited penetration of systemically administered drugs across the blood-retinal barrier. While intravitreal injections serve as a critical adjunct to intravenous therapy, cases with uncontrolled infection or refractory to medical management often require evisceration or enucleation. In our case, all surgical interventions were relatively contraindicated due to the unstable systemic condition.

CONCLUSION

This case report highlights a rare, severe and fulminant presentation of endogenous panophthalmitis complicated by orbital cellulitis secondary to carbapenem-resistant *Klebsiella pneumoniae* bacteraemia in a catheter-dependent haemodialysis patient with multiple comorbidities. It highlights the aggressive clinical course and diagnostic challenges associated with endogenous sources of infection in immunocompromised patients. Timely identification of the infectious focus, early initiation of appropriate systemic and local antibiotic therapy, and a multidisciplinary management approach are crucial to improve outcomes. Unfortunately, despite comprehensive medical interventions, the prognosis remains grave due to delayed presentation, rapid disease progression, extensive ocular damage, and underlying systemic complications.

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