

# Case study of a sudden loss of vision in a diabetic patient: an unusual cause. Endogenous *Klebsiella pneumoniae* panophthalmitis and cerebellar abscess associated with pyogenic liver abscess

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## Abstract

Background: Community-acquired pyogenic liver abscesses due to *Klebsiella pneumoniae* is increasingly recognized across the world with more incidence in East Asian countries. Cases of endogenous endophthalmitis secondary to pyogenic liver abscesses with K1 serotype *K. pneumoniae* have been reported in the literature. We report a case of endogenous panophthalmitis along with cerebellar abscess occurring in a newly diagnosed diabetic patient secondary to pyogenic liver abscess. Case presentation: A middle-aged male of east Asian descent presented with sudden onset right eye vision loss associated with fever. Workup revealed newly diagnosed diabetes mellitus, panophthalmitis, cerebellar abscess, and pyogenic liver abscess due to *K. pneumoniae*. The patient, unfortunately, underwent right eye evisceration. Conclusion: Endogenous panophthalmitis due to *K. pneumoniae* is a fatal complication and can result in blindness. Multiple foci of infection can be present in such cases. Thorough workup, prompt antibiotics as well as surgical treatment may improve prognosis.

## Introduction

*K. Pneumoniae* is an organism known to cause community-acquired Liver abscess syndromes. Such cases have been increasingly identified in the past decades particularly in patients with diabetes mellitus. Metastatic infectious complications due to this organism can occur. Endogenous endophthalmitis is a rare complication with panophthalmitis being more infrequent. It is very rare to encounter more than one infectious foci in such cases. We present a case of Pyogenic liver abscess with 2 metastatic foci; leading to panophthalmitis and cerebellar abscess.

This exemplifies the pertinence of thorough workup for infectious complications along with prompt medical as well as surgical treatment to prevent complications & mortality. Despite treatment with parenteral and intravitreal antibiotics, visual outcomes are generally poor, savable vision is limited to eyes that receive early treatment.

## Case Presentation

We present the case of a 56-year-old Indonesian man who presented to emergency department with four-day history of fever and two-day history of sudden-onset right-sided eye pain, redness, and loss of vision. The patient was in his usual state of health prior to the current presentation. Fever was associated with chills and headache, relieved with paracetamol. He experienced right eye redness, yellowish ocular discharge, painful right eye movement along with sudden onset loss of vision. He denied any history of trauma, ophthalmic conditions or surgeries, abdominal pain, nausea, vomiting, dysuria, cough, shortness of breath,

or neck pain. Upon examination, he was found to be febrile (38.1 C), blood pressure 139/92 mmHg, heart rate of 116 beats per minute, respiratory rate of 22 breaths per min, and oxygen saturation of 99% on room air. Ophthalmological examination revealed right eyelid and periorbital swelling, impaired right visual acuity with increased intraocular pressure (Table 1). The rest of the physical examination was unremarkable. Right eye endophthalmitis was suspected and urgent computed tomography (CT) of both the orbits did not reveal any obvious radiodense foreign body in both orbital cavities.

Table 1 : Ophthalmological examination of both eyes

Examination	Right eye	Left eye
Visual acuity	Hand movement	6/6 unaided
Intraocular pressure	29 mmHg	14 mmHg
Eyelids	Eyelid and periorbital swelling, minimal erythema	Normal
Lacrimal duct	Patent	Patent
Conjunctiva, sclera	Diffuse injection, chemosis and pus discharge	Clear
Cornea	Corneal edema, no epithelial defects	Clear
Anterior Chamber	4 mm hypopyon	Quiet, deep
Iris	Hazy view to the upper part of iris	Normal
Pupil	Hazy view, irregular sluggish synechia	Pharmacologically dilated
Lense	Hazy view of the lens	Clear
Ocular Motility	Full, painless	Full, painless
Fundus	No view	Normal optic disc and macula, flat retina

Initial laboratory investigations revealed neutrophilic leukocytosis, hyponatremia and hyperkalemia (Table 2). Investigations were appreciative of an infectious process along with newly-diagnosed Type 2 diabetes mellitus and diabetic ketoacidosis (DKA). The patient was commenced on DKA protocol and empirically started on ceftriaxone plus vancomycin, which was later escalated to meropenem. He underwent right anterior chamber tap, vitreous tap and intracameral and intravitreal injection with vancomycin, ceftazidime, and voriconazole.

Table 2. Initial laboratory investigations

Investigation	Value	Reference range (male)
WBC	20.7 x10 <sup>3</sup> /μL	4- 10 x 10 <sup>3</sup> /μL
Absolute Neutrophil Count	17 x10 <sup>3</sup> /μL	2.0-7.0 x10 <sup>3</sup> /μL
RBC	5.2 x10 <sup>6</sup> /μL	4.5-5.5 x10 <sup>6</sup> /μL
Hemoglobin	15.6 g/dL	13- 17 g/dL
Platelets	296 x10 <sup>3</sup> /μL	150-400 x10 <sup>3</sup> /μL
Sodium	130 mmol/L	136- 145 mmol/L
Potassium	5.6 mmol/L	3.5- 5.1 mmol/L
Chloride	93 mmol/L	98- 107 mmol/L
Bicarbonate	20 mmol/L	22- 29 mmol/L
Glucose	19.6 mmol/L	3.3- 5.5 mmol/L
Albumin ( blood)	27 g/L	35- 52 g/L
Beta Hydroxy Butyrate	2.69 mmol/L	0.03- 0.30 mmol/l
Venous pH	7.28	7.31- 7.41
Albumin corrected Anion gap (AG)	20.3 mmol/L	3 -11 mmol/L
Albumin corrected Delta gap	8.3 mmol/L	0 mmol/L
Albumin corrected Delta Ratio	2.1	A ratio >2 reflects high anion-gap acidosis and a concurrent metabo
Total bilirubin	8 μmol/L-	0- 21 μmol/L
Alkaline phosphatase	237 U/L	40- 129 U/L

Investigation	Value	Reference range (male)
ALT	79 U/L	0- 41 U/L
AST	35 U/L	0- 40 U/L
C reactive Protein	187.2 mg/L	0- 5 mg/L
Procalcitonin	29.10 ng/mL	> 2.0 ng/mL represents a high risk of sever sepsis and/or septic sho
Lactic acid	2.2 mmol/L	0.5 -2.2 mmol/L
HbA1C	13.2%	< 6%

A contrast-enhanced CT abdomen revealed a large lobulated and multiloculated intrahepatic lesion with fluid density content, occupying the right lobe involving segment VI and VII, measuring 8.1 x 6.7 x 7.4 cm (in anteroposterior, transverse, and coronal dimensions), with irregular and thick peripheral as well as septal enhancement, surrounded by tissue edema and minimal free fluid and fat stranding in the subhepatic region. The finding was suggestive of hepatic abscess (*Figure 1*). He underwent ultrasound-guided drainage of the right liver lobe abscess and yellowish pus was aspirated. Cultures from the aqueous and vitreous fluid revealed *Klebsiella pneumoniae*. Pus culture from the liver abscess grew the *Klebsiella pneumoniae* with similar sensitivity. Two sets of blood cultures along with fungal cultures were negative.

Magnetic resonance imaging (MRI) head and orbit was done which showed extensive inflammatory changes involving the right orbit, preseptal, postseptal regions and vitreous chamber with diffusion restriction suggestive of right eye panophthalmitis (as the inflammatory changes extend beyond the scleral lining by definition). The right lens was subluxed laterally and the medial aspect of the uvea and sclera was thickened, irregular and detached laterally as along with the presence of a hemorrhagic component in the medial aspect of the right lobe (*Figure2 and 3*). These findings may be attributed to extensive inflammatory changes or could be related to the recent surgical intervention. A ring-enhancing lesion with central diffusion restriction was noted in the inferior aspect of the left middle cerebellar peduncle measuring 11 x 7 mm, representing abscess along with moderate perilesional vasogenic edema (*Figure 4*).

Based on the culture and sensitivity of the organism, antibiotics were shifted to ceftriaxone for better CNS penetration. The patient, unfortunately, had to undergo right eye evisceration for source control. He was discharged on oral trimethoprim-sulfamethoxazole with a follow-up MRI head to document the clearance of infection.



Figure 1: CT scan of the abdomen showing hepatic abscess (Red arrow)



Figure 2: T1 weighted transverse post-contrast MRI orbit showing right pan-orbital enhancement.( marked by red arrow)

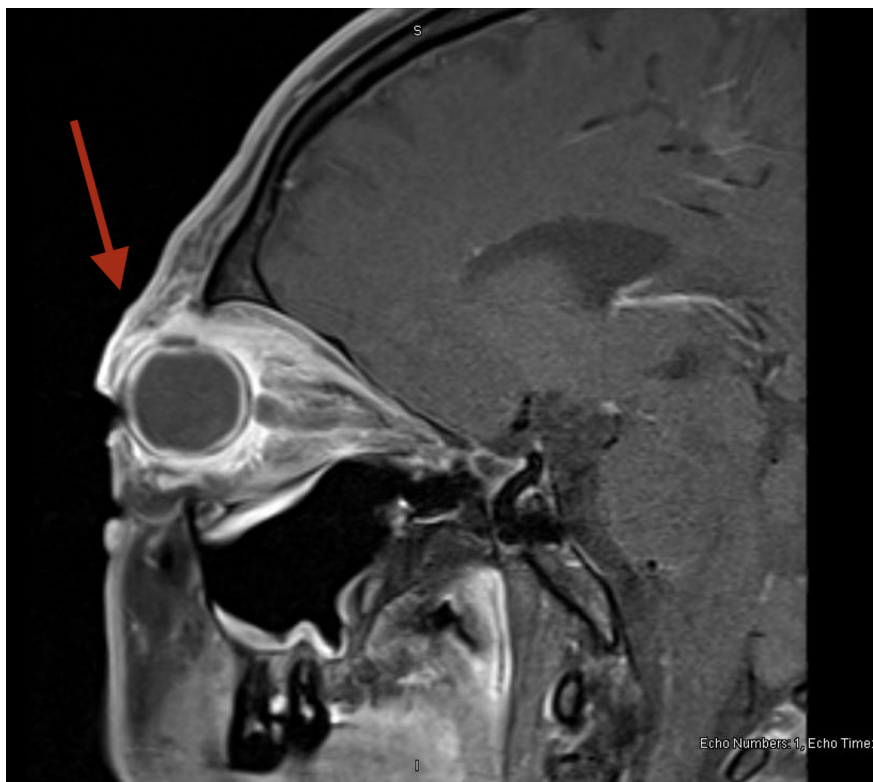


Figure 3: T1 weighted sagittal post-contrast MRI orbit showing right pan-orbital enhancement (marked by red arrow).



Figure 4: T1 weighted transverse MRI head showing cerebellar abscess (red cross).

## Discussion

As we know from the basics of microbiology, *Klebsiella pneumoniae* is a gram-negative, facultative anaerobic, rod-shaped bacterium belonging to the Enterobacteriaceae genus. *K. pneumoniae* infections are usually hospital-acquired and occur in patients with impaired immunity. A unique exception to this is syndromes involving community-acquired primary liver abscesses which have been typically described in East Asian countries.<sup>1</sup> We present a case of panophthalmitis and cerebellar abscess in association with a pyogenic liver abscess caused due to *K. pneumoniae*. Panophthalmitis differs from endophthalmitis due to inflammation extending to periocular tissue thereby involving all structures of the eyeball. A study on endogenous panophthalmitis described that 12 out of 18 patients with panophthalmitis had an infection caused by *K. Pneumoniae*, which was most commonly associated with liver abscesses.<sup>2</sup> Our case adds to the list with an addition that the central nervous system (CNS) complications can occur concurrently along with panophthalmitis.

A Taiwanese retrospective cohort study of 177 cases of *K. pneumoniae* pyogenic liver abscess identified genotype K1 as a possible significant risk factor for causing ocular and CNS complications.<sup>1</sup> Although the K1 serotype may be an important risk factor, the K2 serotype might also carry the potential of invasive disease.<sup>3</sup> Cases of K2 serotype causing invasive liver abscess have been reported and it is certainly possible to develop metastatic infections in such instances.<sup>4,5</sup> Diabetes is a notable risk factor for metastatic infectious disease as evident in our case.<sup>6,7</sup> Genotype identification of *Klebsiella* was not done in this particular case, which is one of the limitations in this report. A 20-year retrospective study regarding *K. pneumoniae* endophthalmitis in association with pyogenic liver abscess concluded that only 5 patients out of 144 had more than one

infectious focus; making it extremely rare.<sup>8</sup> The same study also concluded that pyogenic liver abscess-related endophthalmitis due to *K. pneumoniae* leads to poor visual outcomes.<sup>8</sup> The right lobe of the liver is the most common site of abscess formation possibly due to typical unequal portal venous distribution from superior and inferior mesenteric vein.<sup>9</sup>

Management involves early initiation of intravenous antibiotics along with surgical or percutaneous drainage of the liver abscess to reduce morbidity and mortality. Prognosis in terms of visual outcome of *K. Pneumoniae* endophthalmitis is generally poor; prompt treatment is necessary. The patient may require evisceration or enucleation, but early vitrectomy may be useful in a select group of patients who do not respond to intravitreal antibiotics.<sup>7</sup>

## Conclusion

Endogenous panophthalmitis due to *K. Pneumoniae* is potentially fatal and monocular or binocular blinding complication of Pyogenic liver abscess. Diabetes and East Asian descent maybe a risk factor. Rarely multiple infection foci may be present as evident in our case with the presence of cerebellar abscess. Visual prognosis is generally guarded but a subset of patients with endophthalmitis may have preserved vision provided early medical and surgical intervention is done.

## Declarations :

### Ethics approval and consent to participate

Medical research committee at Hamad Medical Corporation approved the case study for publication. (MRC-04-20-582)

### Consent for publication

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

### Availability of data and materials

Data and materials regarding the case report are available to the Editor-in-Chief and can be requested from the corresponding author.

### Competing interests

The authors have no conflict of interest relevant to this case.

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### Author contributions

The first authors (RS and SS) contributed equally to the writing and preparation of this article. RS and SS have written the initial draft of the manuscript and performed the literature review. The draft was revised and updated by RS and SS with supervision from WHI. RS, WR, ISK, IMA and WHI were part of the medical treating team. All the authors critically reviewed the initial and the final draft of the manuscript and approved it for submission.

## Appendix 1

Name	Location	Contribution
Rohit Sharma	Hamad Medical Corporation, Doha, Qatar	Writing the initial draft of the manuscript, Me
Sundus Sardar	Hamad Medical Corporation, Doha, Qatar	Writing the initial draft of the manuscript, Re
Waa'il Rozi	Hamad Medical Corporation, Doha, Qatar	Medical management of the case, Revising the
Ibrahim Sa'id Khamees	Hamad Medical Corporation, Doha, Qatar	Medical management of the case, Revising the

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Ibrahim Mohammad Obeidat	Hamad Medical Corporation, Doha, Qatar	Medical management of the case, Revising the
Wanis Hamad Ibrahim	Hamad Medical Corporation, Doha, Qatar	Conceptualization and supervision, Medical m

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