



A rare case of concomitant *Klebsiella pneumonia* and panophthalmitis in a poorly controlled diabetic patient: the first case report from Syria

Mohamad F. Kashkash, MSc^{a,d}, Zain Douba, MD^{a,b,c,*}, Samer H. Kaddour, PhD^{a,e}, Abdulla Khouri, PhD^{a,d}

Introduction: Diabetes mellitus is the most common endocrine metabolic disease. Uncontrolled diabetes affects almost all components of immunity. Diabetes mellitus patients have an increased susceptibility to infections which aggravates in the cases of uncontrolled hyperglycemia.

Case presentation: The authors present the case of a 63-year-old female patient with a history of poorly controlled type 2 diabetes. She went to the ambulance complaining of fever, poor appetite, dyspnea, cough, fatigue, and asthenia. The chest computed tomography showed the presence of bilateral ovoid infiltration densities, mostly on the upper-right side. The initial diagnosis was community-acquired pneumonia in an immunocompromised host due to poorly controlled diabetes. A swelling was observed in the right cheek and around the right eye, along with ptosis of the right eyelid. The ophthalmologist indicated the presence of panophthalmitis of the entire right eye with optic neuritis and right orbital cellulitis. The bacterial culture of bronchoalveolar lavage showed Gram-negative bacteria known as *Klebsiella*. After 17 days of hospitalization, the patient was discharged from the hospital on treatment with oral fluconazole, oral ciprofloxacin, and intramuscular gentamicin.

Conclusion: In conclusion, the case highlights the importance of early detection of systematic infection manifestations in diabetic patients, regarding their age, history, and other comorbidities. Ocular symptoms are highly recommended to be evaluated in this context of *Klebsiella* infection.

Keywords: diabetes mellitus, endogenous, *Klebsiella*, panophthalmitis, pneumonia

Introduction

Diabetes mellitus (DM) is the most common endocrine metabolic disease, and its prevalence has been increasing steadily all over the world with recently diagnosed cases; it is estimated that there will be 592 million people (10.1%) with DM in 2035^[1].

Uncontrolled diabetes affects almost all components of immunity^[2]. The relationship between diabetes and infection has been known for a long time and has been traditionally considered bidirectional; DM patients have an increased susceptibility to

HIGHLIGHTS

- Diabetes mellitus prevalence has been increasing steadily all over the world.
- Diabetes mellitus patients have an increased susceptibility to infections which aggravates in the cases of uncontrolled hyperglycemia.
- The present case sought to reveal the polymicrobial etiology of infection in a poorly controlled diabetes patient.
- Clinical examination indicated the presence of panophthalmitis of the entire right eye with optic neuritis and right orbital cellulitis.
- The patient clinically improved but unfortunately, she lost vision in her right eye.
- Early detection of systematic infection manifestations in diabetic patients regarding their age, past history, and other comorbidities.
- Ocular symptoms are highly recommended to be evaluated in this context of *Klebsiella* infection.

^aFaculty of Medicine, ^bCME Office, Faculty of Medicine, University of Aleppo,

^cDepartment of Hematology, Zahi Azrak Hospital, Ministry of Health Syria, Departments of ^dPulmonology and ^eLaboratory Medicine, Aleppo University Hospital, Aleppo, Syria

M.F.K. and Z.D.: first author.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

*Corresponding author. Address: Aleppo, 15310, Syria. Tel: +963958627005. E-mail address: dr.zain.a.douba@gmail.com (Z. Douba).

Copyright © 2023 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Annals of Medicine & Surgery (2023) 85:913–917

Received 6 August 2022; Accepted 12 November 2022

Published online 27 April 2023

<http://dx.doi.org/10.1097/MS9.000000000000011>

infections, which aggravates in the case of uncontrolled hyperglycemia.

Diabetic infections may be polymicrobial, and that has been well documented in diabetes wounds^[3] and feet^[4].

The present case sought to reveal the polymicrobial etiology of infection in a poorly controlled diabetes patient who suffered from an infection that started as a respiratory infection and worsened to spread to the sinuses, then the orbit and the right eye,

and was then exposed to necrotizing pneumonia. The microscopic study showed the presence of multiple infections. Where the *Candida* fungi were isolated from sinus swabs, *Klebsiella* bacteria were isolated from the bronchoscopy (bronchoalveolar lavage), and they were treated according to culture and sensitivity, but unfortunately, she lost vision in the right eye.

In this case, we have discussed a case of a diabetic female with multiple presentations, including panophthalmitis and *Klebsiella pneumoniae*.

This case highlights the importance of early detection of systematic infection manifestations in diabetic patients, regarding their age, history, and other comorbidities. Ocular symptoms are highly recommended to be evaluated in this context

Case presentation

We present the case of a 63-year-old female patient with a history of type 2 diabetes. Unfortunately, it was poorly controlled. She went to the ambulance complaining of fever, poor appetite, dyspnea, cough, fatigue, and asthenia.

The physical examination was characteristic of a dyspneic patient with a fever of 39°C. Also, it revealed an increased respiratory rate of 22 per minute, a pulse 109 per minute, blood pressure of 105/75 mm Hg, and chest auscultation characterized by soft, bilateral crackles, more severe in the right lung.

The laboratory study showed an elevation of leukocytes (20,100/mm³) with a clear elevation of neutrophils (89%), glucose 305 mg/dL, C-reactive protein 175 mg/dL, and coronavirus disease-2019 screening using PCR was negative.

The chest computed tomography (CT) showed the presence of bilateral ovoid infiltrative densities, which were mainly on the upper-right side (Fig. 1).

The initial diagnosis was community-acquired pneumonia in an immunocompromised host due to poorly controlled diabetes. A treatment plan was started, including the broad-spectrum antibiotics combination of Ceftriaxone and Azithromycin. In addition to rehydration and good glucose control, a slight improvement in the general condition was noted at the beginning



Figure 2. Right eye belpharoptosis.

with also slight improvement laboratory testimonials.

A swelling was observed in the right cheek and around the right eye with ptosis of the right eyelid (Fig. 2).

Thus, a sinus CT study was obtained, and showed the presence of a density filling both maxillary sinuses with edema of the subcutaneous tissue on the right side of the face (Fig. 3A).

The ophthalmologist indicated the presence of panophthalmitis of the entire right eye with optic neuritis and right orbital cellulitis.

A sinusoscopy was performed by an otolaryngologist, who took swabs to check for the fungus. Mucormycosis was negative, but the smear showed the presence of *Candida albicans*.

The presence of venous sinus thrombosis was ruled out by MRI, which showing the venous sinuses (Fig. 3B).

The antifungal coverage included Amphotericin, and Fluconazole was added to the treatment regime. The clinical response was not adequate. There was a recurrence of fever with an increase in crackles on chest auscultation. A decision was made to repeat the CT of the chest.

A CT of the chest showed necrosis of the previous densities (Fig. 4), so the decision was made to perform bronchoscopy with samples taken for investigations. The endoscopic view of the bronchial tree was within normal limits, and bronchoalveolar lavage and brush samples were taken.

The investigation of tumor cells was negative; the detection of *Mycobacterium tuberculosis* was negative; the bacterial culture

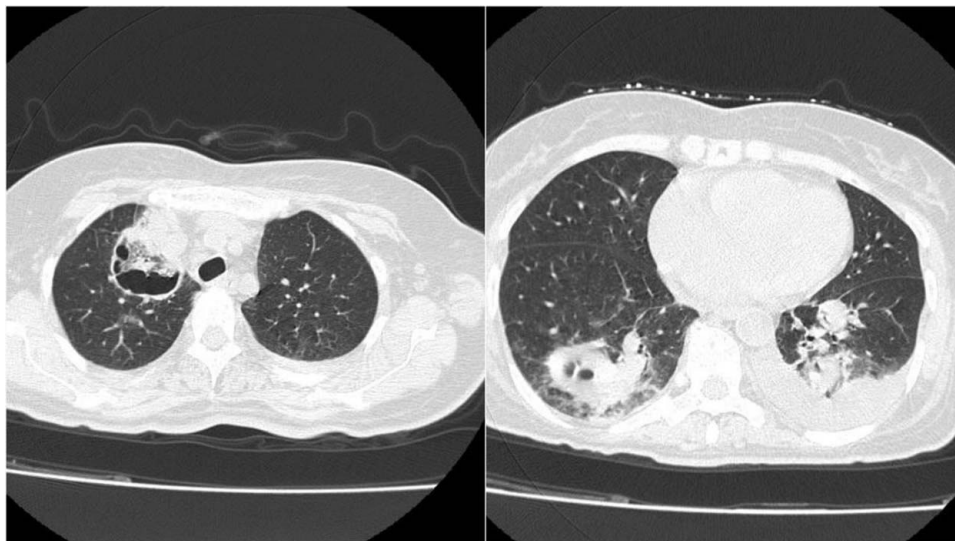


Figure 1. Oval-shaped infiltrative densities, bilateral, predominantly basal.

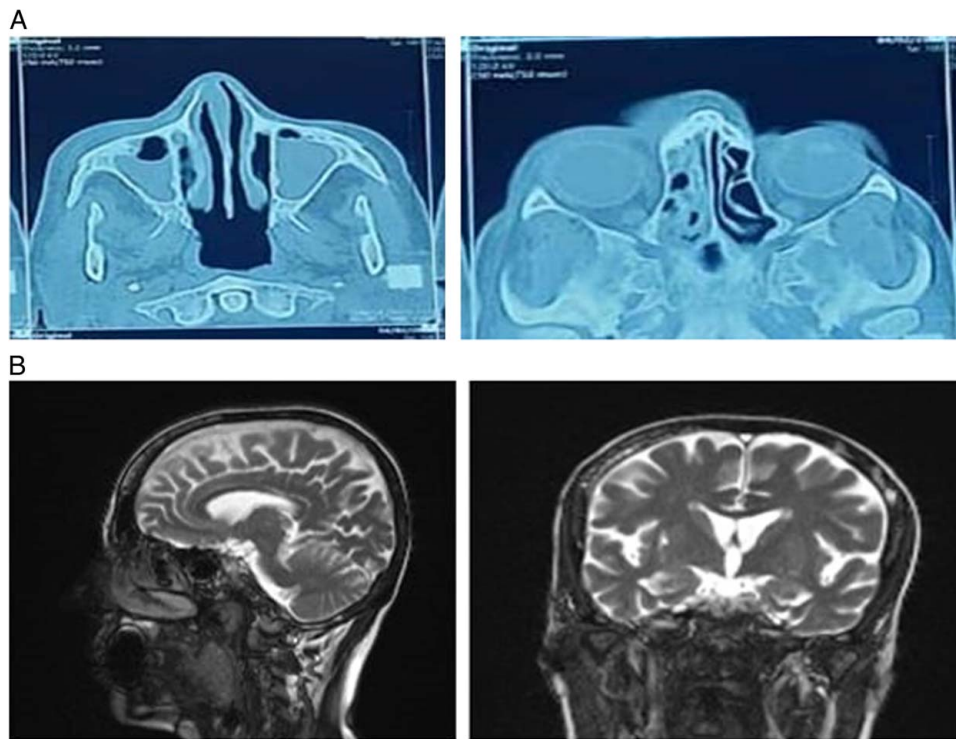


Figure 3. (a) MRI venous sinuses shows absence of thrombosis in the venous sinuses. (b) Computed tomography sinuses showing mucosal thickening filling the maxillary sinuses with edema in the subcutaneous tissue on the right side of the face.

showed Gram-negative bacteria known as *Klebsiella*; and the sensitivity test showed its response to Ciprofloxacin, Gentamicin, and Doripenem.

The combination of Ciprofloxacin with Gentamycin was chosen and added to Amphotericin and Fluconazole. The clinical and laboratory responses were good, with a clear improvement through follow-up for 7 days. After 17 days of hospitalization, the patient was discharged from the hospital on treatment with oral fluconazole, oral ciprofloxacin, and intramuscular gentamicin.

The patient was reviewed weekly with a clear clinical improvement in the condition, with the fever completely gone and the laboratory condition improving, but unfortunately, the patient lost vision in her right eye after about 3 months of the case onset.

Discussion

Diabetes is a systematic disease that can affect many organs, causing increasing damage to the cell structure. Diabetic patients suffer from recurrent injuries and prolonged wound healing, which is responsible for increasing the chance of wound infection and finally polyinfection sites in the body. Exaggerated inflammation and the delayed response of dermal cells altogether are related to high blood glucose and poor control^[3].

Klebsiella spp. are gram-negative, encapsulated, anaerobic bacteria^[5]. They are commonly known to cause endogenous endophthalmitis and panophthalmitis in Asia (3–37%), especially when concomitant with DM^[5,6].

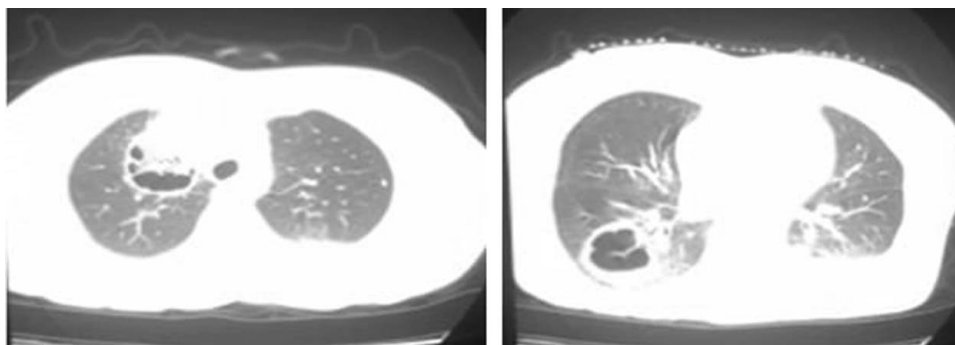


Figure 4. Computed tomography of the chest showed necrosis of the previous densities.

Diabetes is the most detected risk factor for developing an ocular infection as endophthalmitis and panophthalmitis from *Klebsiella* infection and is also a poor visual prognostic factor^[6].

'*K. pneumonia* invasive syndrome is a systemic presentation caused by hypervirulent *K. pneumonia* resulting in serious life-threatening community-acquired infections such as liver abscess, pneumonia, meningitis, and endophthalmitis^[7-9].'

Other reported risk factors are hypertension, renal disease, stroke, dementia, hyperlipidaemia, chronic obstructive pulmonary disease/bronchiectasis, advanced cancer, ischemic heart disease, hepatic disease, and HIV/AIDS. The blood-ocular barrier permits *Klebsiella* to enter the eye and then cause endophthalmitis. The prognosis of a patient's vision who has been diagnosed with endophthalmitis caused by *Klebsiella* is generally poor. As well, the late commencement of systemic antibiotic management may be responsible for severe sepsis^[10].

Despite the reported association between endogenous *Klebsiella* and endophthalmitis in many cases, Sng and colleagues study analysis had not shown any statistical significance. However, they attributed these results to the small sample size of their study^[10].

Our patient presented with gradually developing symptoms of panophthalmitis and orbital cellulitis, as well as respiratory and sinusitis symptoms.

The case was managed with some broad-spectrum antibiotics, such as Doripenem (an IV antibiotic of the penem class), which is indicated as a single agent for the treatment of complicated *K. pneumonia*.

Carbapenems are widely used to treat serious bacterial infections since they have broad-spectrum and potent antibacterial activity. A significant visual improvement has been recorded after the treatment with carbapenem (IV), as a treatment for endophthalmitis caused by *K. pneumonia*^[11-13].

Conclusion

K. pneumonia invasive syndrome is generally seen in Asia as the most common risk factor for DM.

In this case, we have discussed a case of a diabetic female with multiple presentations, including panophthalmitis and *K. pneumonia*.

The case diagnosis and management were challenging because of the patient's poorly controlled history of diabetes.

In conclusion, the case highlights the importance of early detection of systematic infection manifestations in diabetic patients, regarding their age, past history, and other comorbidities. Ocular symptoms are highly recommended to be evaluated in this context of *Klebsiella* infection. Regular check-ups of the septic status in diabetic patients are of high priority to treat it appropriately and rapidly. To the best of our knowledge, this is the first reported case of endogenous *Klebsiella* panophthalmitis with orbital involvement in a diabetic patient in Syria.

Ethical approval

Not mandatory for this type of papers 'Case report'.

Consent

Written consent for publication was obtained from the patient. A copy of the consent form is available for review by the Editor of this journal.

Sources of funding

None.

Author contribution

M.F.K. designed and lead the study and he was responsible for data collection. M.F.K. and Z.D. analyzed and interpreted the data and reviewed the literature; wrote the initial manuscript. Z.D. and A.K. critically revised the manuscript. A.K. and S.H.K. provided detailed insights of the patient's history and supervised the study. All authors have read the final manuscript.

Conflict of interest disclosure

The authors have no conflict of interest.

Research registration unique identifying number (UIN)

None.

Guarantor

Mohamad Fateh Kashkash, MD; Zain Douba, MD.

Provenance and peer review

Not commissioned, externally peer-reviewed

Acknowledgments

None.

References

- [1] Cho NH, Shaw JE, Karuranga S, et al. IDF Diabetes Atlas: global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Res Clin Pract* 2018;138:271-81.
- [2] Berbudi A, Rahmadika N, Tjahjadi AI, et al. Type 2 diabetes and its impact on the immune system. *Curr Diabetes Rev* 2019;16:442-9.
- [3] Buch PJ, Chai Y, Goluch ED. Treating polymicrobial infections in chronic diabetic wounds. *Clin Microbiol Rev* 2019;32:e00091-18
- [4] Sharifah Aisyah SH, Siti Asma' H, Nurahan M. The significant association between polymicrobial diabetic foot infection and its severity and outcomes. *Malays J Med Sci* 2019;26:107-4.
- [5] Sridhar J, Flynn HW, Kuriyan AE, et al. Endophthalmitis caused by *Klebsiella* species. *Retina*. 2014;34:1875-81.
- [6] Bouhout S, Lacourse M, Labbé A, et al. Case report. *IDCases* 2021;26:e01289.
- [7] Danapal P, Mustapha M, Syarafina N, et al. Case series on endogenous *Klebsiella pneumoniae* endophthalmitis: more than meets the eye case presentation. *Cureus*. 2021;13:e15929.
- [8] Yaguchi D, Kimura H, Shizu M, Ichikawa M: Invasive *Klebsiella pneumoniae* syndrome. *QJM*. 2019;112:878-9.
- [9] Doke P, Soman R, Purandare B, et al. *Klebsiella pneumoniae* causing liver abscess, endophthalmitis, and cavitary pneumonia. *Clin Infect Dis*. 2020;28:236-7.

- [10] Sng CCA, Jap A, Chan YH, *et al.* Risk factors for endogenous *Klebsiella* endophthalmitis in patients with *Klebsiella* bacteraemia: a case – control study. *Br J Ophthalmol.* 2008;92: 673–7.
- [11] Qi M, He L, Zheng P, *et al.* Seminars in ophthalmology clinical features and mortality of endogenous panophthalmitis in China: a six-year study.. *Semin Ophthalmol.* 2022;37:208–14.
- [12] Xu M, Li A, Kong H, *et al.* Endogenous endophthalmitis caused by a multidrug-resistant hypervirulent *Klebsiella pneumoniae* strain belonging to a novel single locus variant of ST23: first case report in China. *BMC Infect Dis.* 2018;18:669.
- [13] Wang Y, Wang X, Di Y. Surgery combined with antibiotics for the treatment of endogenous endophthalmitis caused by liver abscess. *BMC Infect Dis.* 2020;20:661.