NECROTIZING PANOPHTHALMITIS FROM ASYMPTOMATIC LIVER ABSCESS IN A FILIPINO MALE

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Abstract

Significance: *Klebsiella pneumoniae* is emerging as the microbiologic agent that causes hepatic abscess-related metastatic endophthalmitis in immunocompromised patients including diabetics. The aim of this study is to discuss a case of metastatic panophthalmitis from an asymptomatic liver abscess.
Case Presentation: This is a case of a 59-year-old, male, with poorly controlled diabetes mellitus, who presented with rapidly progressive unilateral visual loss, ocular pain, chemosis, external ophthalmoplegia, and proptosis of left eye.
Management : B-scan sonography showed choroidal thickening, multiple hyperechoic vitreous opacities, and positive T-sign suggestive of panophthalmitis. Orbital CT scan revealed abnormal thickening of the globe, and orbital cellulitis. Initial bacterial culture of eye discharge was negative hence, impression of possible mucormycosis was entertained. Systemic work-up showed incidental finding of elevated liver enzymes prompting abdominal ultrasound revealing a large liver abscess. Despite intensive antimicrobial therapy, the globe progressively proptosed, and corneal melt ensued with resulting rupture leading to exenteration. Liver abscess drainage culture was positive for *K. pneumoniae* similar to culture result of the eye discharge from ruptured globe.
Conclusion: *K. pneumoniae* is an aggressive causative agent of pyogenic liver abscess-related metastatic endophthalmitis in Southeast Asia. Population at risk are those with uncontrolled diabetes mellitus. An alarming increase of documented cases in this region confers high index of suspicion for timely diagnosis and management because it creates a tumultuous ward course that can progress to debilitating panophthalmitis which can cause permanent loss of vision or even disfigurement. This case emphasizes the importance of early diagnosis and treatment of metastatic eye infection from liver abscess.

Keywords: Case Report. Metastatic panophthalmitis. Liver abscess. K. Pneumoniae

INTRODUCTION

Klebsiella pneumoniae is gaining popularity as the microbiologic agent that causes hepatic abscess-related metastatic endophthalmitis in immunocompromised patients including diabetics. There has been a rise of reported cases in Taiwan, Singapore, South Korea, and other East Asian regions these past two decades[1,2,3,4,5,6]. The disease has gone far from these regions devastating also the North America[7], Europe[8] and Australia[9], obtaining a status as an emerging global threat.

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[1] Chen SC, Lee YY, et al. *Klebsiella pneumoniae* infection leads to a poor visual outcome in endogenous endophthalmitis: A 12-year experience in Southern Taiwan. *Ocular Immunology & Inflammation* 2016; doi: 10.1080/09273948.2016.1193616

[2] Heeyon C, Yong US, et al. Endogenous endophthalmitis in the American and Korean population: An 8-year retrospective study. *Ocular Immunology & Inflammation* 2016; doi: 10.1080/09273948.2016.1195000

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[6] *Yang CS, Tsai HY, et al.* Endogenous *Klebsiella* endophthalmitis associated with pyogenic liver abscess. *Ophthalmology* 2006*. doi:10.1016/j.ophtha.2006.12.035*

[7] Connell PP, O'Neill EC, et al. Endogenous endophthalmitis: 10-year experience at a tertiary referral center. *Eye* 2011;25, 66–72

[8] Karama EM, Willermain F, et al. Endogenous endophthalmitis complicating *Klebsiella pneumoniae* liver abscess in Europe: case report. *Int Ophthalmol* 2008:28:111–113

[9] Odouard C, Ong D, et al. Rising trends of endogenous *Klebsiella pneumoniae endophthalmitis* in Australia. *Clinical Science* 2016 doi: 10.1111/ceo.12827

Reports have dissimilar data showing the statistics of risk of having metastatic endophthalmitis complicating pyogenic liver abscess ranging from as little as 3% to as high as 20% cases[10]. Only 3 - 7.8% of these is caused by *K. pneumoniae* [11]. The prognosis of the infected eyes by this virulent microorganism is generally poor[12]. But far more distressing and crippling to a patient if his or her eye will be removed because of intensive infection that extends beyond the coats of the eye affecting also the surrounding intraorbital tissues because management will involve removal of the entire orbital content. There is, however, limited number of case reports published to account *K. pneumoniae*-related panophthalmitis.

Herein, we present a problematic case of a debilitating end-spectrum of the sight threatening endogenous *K. pneumoniae* endophthalmitis. The case is of a diabetic Filipino male with asymptomatic liver abscess complicated initially by endogenous endophthalmitis that rapidly progressed to a more severe panophthalmitis necessitating exenteration.

[10] Chong V H, Zainal-Abidin Z, et al. Rare complications of pyogenic liver abscess. *Singapore Med J* 2010; 51(10):e170

[11] Sheu S, Kung Y, et al. Risk factors for endogenous endophthalmitis secondary to *Klebsiella pneumoniae* liver abscess: 20-year experience in southern Taiwan. *Retina* 2011; 31: 2026-2031

[12] Sing CC, Jap A, et al. Risk factors for endogenous *Klebsiella* endophthalmitis in patients with *Klebsiella* bacteraemia: a case–control study. *Br J Ophthalmol* 2008;92:673–677. doi: 10.1136/bjo.2007.132522

CASE REPORT

This is a case of a 59-year-old Filipino male with uncontrolled diabetes mellitus type 2, non-compliant to insulin and oral hypoglycemic agents, and a heavy alcoholic beverage drinker. He initially complained of a 1-week history of persistent left eye redness refractory to prescribed Tobramycin eye drops. There were associated progressive blurring of vision, diplopia, and painful external ophthalmoplegia. The patient denied preceding trauma, contact lens use, manipulation of the eye, or illicit drug use and had no other significant medical history.

On his initial consult in our institution, his presenting visual acuity was light perception with poor light projection on the affected eye. External eye examination of the involved eye revealed tense orbit on palpation, proptosis, complete ptosis, minimal mucopurulent discharge, hyperemic conjunctiva with chemosis, slightly hazy cornea and fibrin-laden anterior lens capsule (Figure 1). Examination with slit lamp showed slight corneal edema, anterior chamber cells grade of 4+, and opaque lens with fibrin materials in the anterior chamber that was adherent on the lens capsule. The fundus could not be seen. The patient's right eye was unremarkable. Systemic physical examination was unremarkable. He was admitted with a presumptive diagnosis of endogenous endophthalmitis. Intensive antimicrobials such as IV ceftazidime, oral metronidazole, and oral moxifloxacin were initiated.

CT scan of the orbit (Figure 2) showed mild proptosis, abnormal thickening and enhancement of the left globe with minimal fat stranding of adjacent retrobulbar fat, and tiny abscesses on the lateral aspect of the orbit. B-scan ultrasound of the affected eye (Figure 3) revealed diffuse choroidal thickening, multiple hyperechoic vitreous opacities, and positive T-sign. These imaging findings were suggestive of an infectious or inflammatory process involving the eye and its surrounding tissues.

On the 2nd hospital day, the eye abruptly deteriorated to a visual acuity from light perception to no light perception despite aggressive antimicrobial therapy. Pars plana vitrectomy was no longer considered. Intravitreal antibiotic injection was initially considered, however, there was progressively advancing proptosis causing the globe to be very tense on palpation. Initial culture from the ocular surface discharge showed no bacteria. On the 7th hospital stay, corneal melt and subsequent rupture was noted (Figure 4). Due to its rapid course and a negative bacterial culture, mucormycosis in a diabetic patient was considered. He was immediately scheduled for exenteration.

During the course in the ward, patient developed fever causing an alarm to localize the systemic infection. Systemic work-up was done. Incidentally, even though the patient did not complain any form of abdominal pain, serum liver enzymes such as SGPT and SGOT were slightly elevated. Given the potential association of *K. pneumoniae* liver abscess and endophthalmitis, ultrasound of

the abdomen (Figure 5) was done showing complex masses at segment IV with mixed echoic characteristic measuring 8.8 cm x 7.7 cm. Ultrasound-guided pigtail cathether insertion with drainage of abscess was done and yielded 37 mL of pus-like fluid. Specimen was sent for microbial culture and sensitivity studies where *K. pneumoniae* was isolated.

Surprisingly, culture studies of the exenterated eye turned out to be positive for *K. pneumoniae* similar to that found in his liver abscess. The exenterated eye was also sent for histopathologic examination (Figure 6, Figure 7A to 7D). Microscopic examination showed dense neutrophilic infiltration and ulceration of the cornea with prolapse of intraocular content; dense inflammatory infiltrates and hemorrhage in the vitreous humor; detached retina, and inflammatory cells in the sclera and into the extra-scleral orbital structures. There were no fungal elements seen in hematoxylin and eosin stain, and Grocott's silver stain.

The patient was then sent home after recuperating with oral moxifloxacin for 6 weeks as take home medication. He was signed out as a case of necrotizing panophthalmitis of the left eye secondary to pyogenic *K. pneumoniae* liver abscess in a setting of poorly controlled type 2 diabetes mellitus.

DISCUSSION

Klebsiella pneumoniae is an emerging cause of endogenous endophthalmitis originating from a liver abscess in East and Southeast Asia. Potential explanation for these geographic differences include host factors such as incidence of diabetes mellitus, alcoholism, poor access to healthcare, and socio-economic factors[13].

Diabetes is known to be one of the major risk factors to develop the disease[14]. Lin, et al, stated that diabetes interferes with the ability of polymorphonuclear leukocytes to carry out chemotaxis and to impair phagocytosis of certain serotypes of *K. pneumoniae*[15, 16]. They also reported high prevalence of phagocytic-resistant capsular serotypes of *K. Pneumoniae* in liver abscess which presumably contributes to their high prevalence in these cases and uniquely in endophthalmitis. The organism induces intense inflammatory response to retinal pigmented epithelial cells resulting to highly intense inflammation in the posterior segment seen in the histopathology study of our

[13] Yu VL, Hansen DS, et al. Virulence characteristics of *Klebsiella* and clinical manifestations of *K. pneumoniae* blood stream infection. *Emerging Infectious Diseases* 2007; 13:986-993

[14] Sheu SJ, Chou LC, Hong MC, Hsiao YC, Liu YC (2002) Risk factors for endogenous endophthalmitis secondary to *Klebsiella pneumoniae* liver abscess. Zhonghua Yi Xue Za Zhi (Taipei) 65:534–539

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[16] Mowat AG, Baum J. Chemotaxis of polymorphonuclear leukocytes from patients with diabetes mellitus. *N Engl J Med* 1971;284:621–627

patient[17]. It can be hypothesized that disturbed normal architecture of the retinal blood vessels in diabetic retinopathy causing breakdown of the blood-ocular barrier contributes to the pathogenesis of *K. pneumoniae* endophthalmitis.

Ocular symptoms occur within 2-10 days of the disease course but it can manifest after several weeks especially in patients with hepatobiliary infection[18]. Sporadically, similar to our patient, the ocular infection is the initial manifestation of an ongoing systemic involvement. The eye is usually rendered with poor prognosis once it is infected because of rapidly progressing inflammation[12]. Different reports showed wide range of ocular manifestations from mild to intense anterior segment reaction and almost always fulminant posterior chamber inflammation[19]. In our case, it was only in the histopathologic examination where vitreous and posterior segment inflammations were recorded because the fundus examination was hindered by fibrin material in the anterior chamber.

Administration of intensive parenteral antibiotics is the most important step in treating endogenous bacterial endophthalmitis. Visual outcome when diagnosis

[17] Pollreisz A, Rafferty B, et al. *Klebsiella pneumoniae* induces an inflammatory response in human retinal-pigmented epithelial cells. *Biochemical and Biophysical Research Communications* 2012; 418:33–37

[18] Al-Mahmood AM, Al-Binali, GY, et al. Endogenous endophthalmitis associated with liver abscess caused by *Klebsiella pneumoniae*. *Int Ophthalmol* 2011; 31:145–148

[19] Yoon YH, Lee SU, Sohn JH, Lee SE (2003) Result of early vitrectomy for endogenous *Klebsiella pneumoniae* endophthalmitis. Retina 23:366–370

is delayed within 24 hours of onset of ocular signs and symptoms is worse than when treated early, although permanent poor visual acuity was reported despite early medical and surgical intervention[20]. It is always reiterated in different case reports that a high index of suspicion should be alerted to salvage the vision. However, we caught our patient a week after his initial clinical onset and he already had poor visual acuity.

There is a possibility of bilateral involvement in *K. pneumoniae* endophthalmitis. This is another presentation of endogenous endophthalmitis and this has been recorded in the literature[21]. However, there is a limited report on *K. pneumoniae* flourishing outside the ocular coats destroying intraorbital tissues. One report accounted *K. pneumoniae* as the etiologic agent of panophthalmitis but it was a complication of endoscopic variceal injection sclerotherapy not from a liver abscess[22]. Hence, metastatic *K. pneumoniae* endophthalmitis associated with pyogenic hepatic abscess is a rare disease that can be an end-spectrum of well-established *K. pneumoniae* endophthalmitis.

CONCLUSION

[20] Dohmen K, Okubo H, Okabe H, Ishibashi H (2003) Endophthalmitis with *Klebsiella pneumoniae* liver abscess. Fukuoka Igaku Zasshi 94:31–36

[21] Moore P, McGowan G, et al. *Klebsiella pneumoniae* liver abscess complicated by endogenous endophthalmitis: the importance of early diagnosis and intervention. *Medical Journal Australia* 2015 doi: 10.5694/mja15.00107

[22] Hung HC, Chen WC, et al. *Klebsiella pneumoniae* panophthalmitis: A possible complicaiton of endoscopic variceal injection sclerotherapy. *Am J Gastroenterol* 1998; 93:2603-2604

Klebsiella pneumoniae is rising as an aggressive causative agent of pyogenic liver abscess-related metastatic endophthalmitis in Southeast Asia. Population at risk are those with uncontrolled diabetes mellitus. An alarming increase of documented cases in this region confers high index of suspicion for timely diagnosis and management because it creates a tumultuous ward course that can progress to debilitating panophthalmitis which can cause permanent loss of vision or even disfigurement due to exenteration. This case emphasizes the importance of early diagnosis and treatment of metastatic eye infection from *Klebsiella pneumoniae*-induced liver abscess.

Competing Interests

The authors declare that they have no competing interests.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

FIGURES

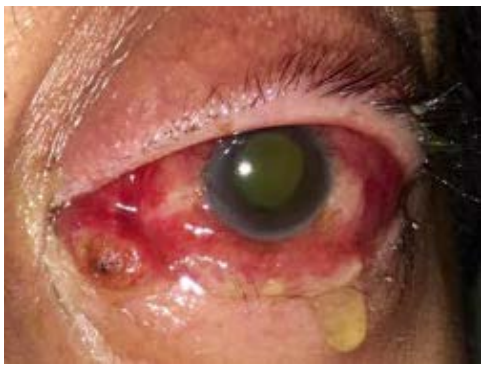

Figure 1. Presenting external left eye

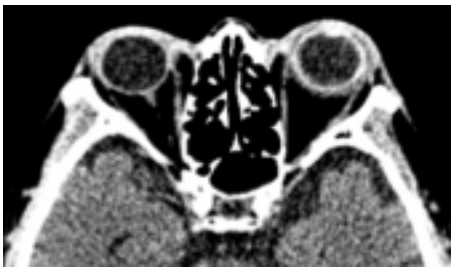

Figure 2. Orbital CT scan

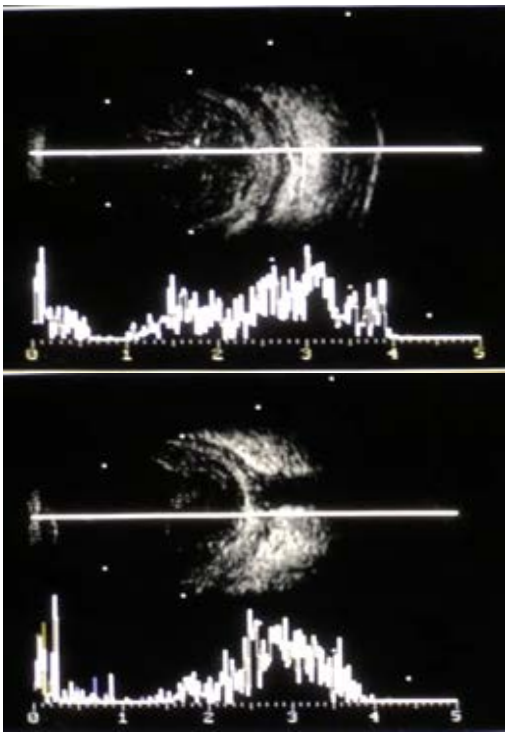

Figure 3. B-Scan ultrasound

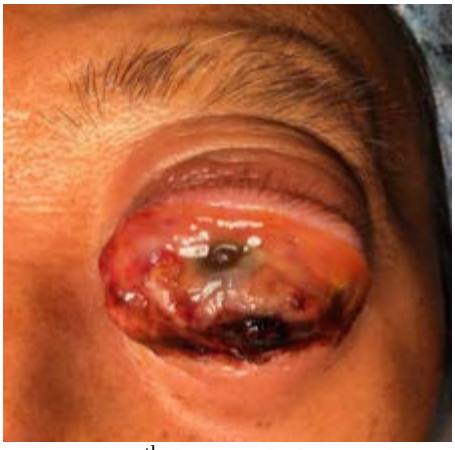

Figure 4. 7th hospital day and pre-exenteration external eye.

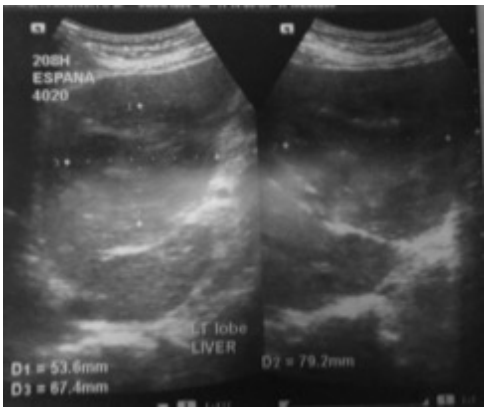

Figure 5. Ultrasound of the liver

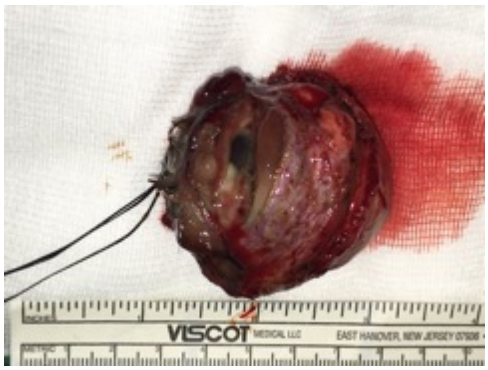

Figure 6. Exenterated left eye

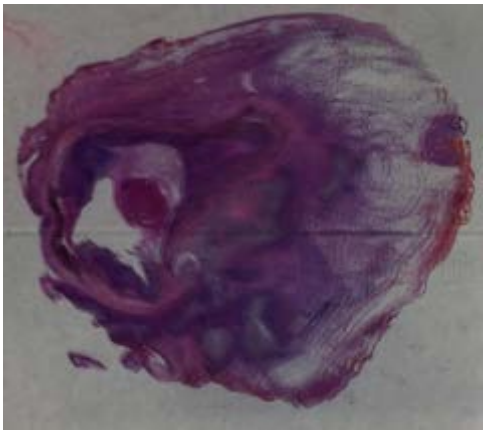

Figure 7a. Gross slide picture of the exenterated eye (H&E)

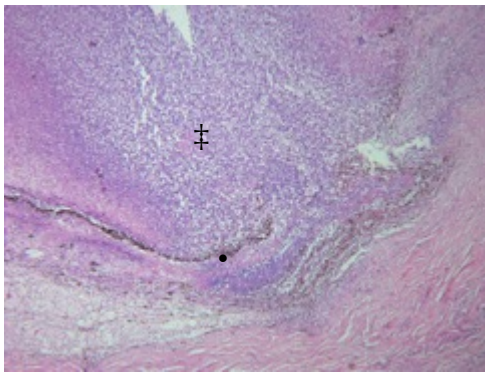

Figure 7b. Biopsy of the exenterated eye showing the detached retina (•) and vitreous (‡) (H&E)

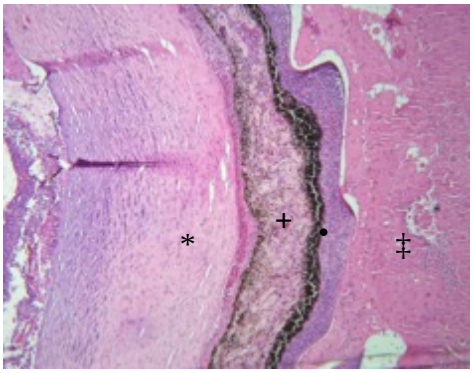

Figure 7b. Biopsy of the exenterated eye showing sclera (*), choroid (+), retina and retinal pigment epithelium (•), vitreous (‡) (H&E)

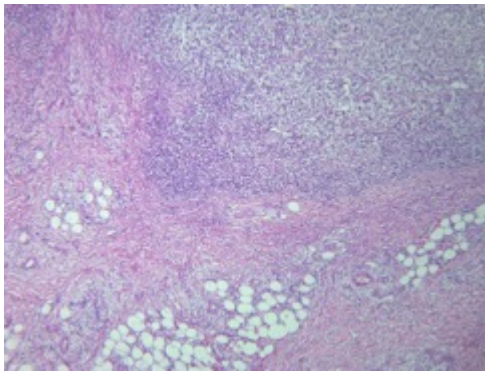

Figure 7c. Biopsy of the exenterated eye showing extraocular tissue