A rare case of pneumococcal keratitis in a patient with Herpes Zoster Ophthalmicus and compromised immune status

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Summary

Infectious keratitis is commonly encountered in the ophthalmology emergency department. *Streptococcus pneumoniae* causing bacterial keratitis is a cause of concern in developing countries, owing to its complication of irreversible corneal scarring. This is a rare case report of a 25-year-old immunocompromised patient who presented to the Ophthalmology Department in a tertiary care hospital in India with complaints of diminution of vision in the left eye with pain, redness and watering, along with a history of vesicular painful rashes involving the left side of the forehead, the tip of the nose and the supraciliary area. Gram-positive lanceolate diplococci and plenty of pus cells were seen on the Gram staining of the corneal abscess scrape. The clinical presentation of the patient led to a provisional clinical diagnosis of secondary bacterial infection in Herpes Zoster Opthalmicus (HZO), corneal abscess with herpetic keratitis. Quellung reaction yielded an 18C serotype of the isolated pneumococci. Prompt treatment was required to prevent rapidly progressive complications.

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Introduction

Though infectious keratitis is a frequently encountered disease in the ophthalmology emergency department, pneumococcal keratitis in a patient with Herpes Zoster Ophthalmicus (HZO) and compromised immune status is a rarity.

Case Report

A 25-year-old male patient presented to the Ophthalmology Department with complaints of diminution of vision in the left eye with pain, redness, and watering evolving for the past 21 days. Initially, the patient visited a private practitioner for the above complaints; on persistence of the same, he visited our healthcare facility. The patient had a history of vesicular painful rashes involving the left side of the forehead, the tip of the nose, and the supraciliary area. However, there was no history of use of steroid eye drops, trauma with vegetative matter, use of contact lenses, or past ocular surgery. Systemic evaluation was normal. He had no history of diabetes mellitus, alcoholism, and atopy.

In the ocular examination, the right eye showed a visual acuity of 20/20 (LogMAR). Anterior segment and posterior segment findings were normal. In the left eye, perception of light and perception of rays were present in all four quadrants. Extraocular movements were full in all directions. The left eye showed supraciliary healed lesions with diffuse non-tender edema, causing mechanical ptosis and medial madarosis. The right conjunctiva was within normal limits, while the left conjunctiva showed diffuse palpebral and bulbar congestion with watery discharge (Figure 1). The right cornea was clear. The left cornea had a large round-oval epithelial defect in the central-paracentral area about 7×8.5 mm with stromal thinning with less than 50% of the cornea involved. Anterior deep stromal abscess and endothelial plaque were observed. Superior superficial corneal vascularization was

noted along three o'clock hours. On slit lamp examination, the anterior chamber in the left eye was Van Herrick grading of IV with hypopyon, 4+ cells and flare [5]. The left anterior chamber had organized exudates on the endothelial surface with hyphema temporally, and only superior less than one-third of the anterior chamber was visualized. The pupil was mid-dilated. Dilated examination showed a healthy fundal glow. A B-scan of the left eye revealed normal findings of the posterior segment.

Samples were taken by means of the corneal abscess scrape after topical anesthesia. Two corneal smear slides were prepared with a spatula for the direct microscopic examination. The first slide was used for Gram's staining, and the second for KOH wet mount preparation. Gram-positive lanceolate diplococci were seen on Gram staining along with plenty of pus cells (Figure 2a). No fungal elements were observed on the KOH wet mount. The results of the direct microscopic findings were immediately communicated to the clinician for the initiation of an appropriate therapy before the culture results were available. For the identification of the pathogen, the sample was inoculated on blood and chocolate agar and incubated in 5-10% CO_2 at 37°C, as per the standard laboratory protocol.

Considering the clinical presentation of the patient, a provisional clinical diagnosis of secondary bacterial infection in HZO, corneal abscess with herpetic keratitis was made. The patient was admitted, and treatment with injectables vancomycin (1 gm 12 hourly) and ceftazidime (800 mg 8 hourly) was started. Acyclovir and acetazolamide were prescribed orally. A treatment with eye-drops based on fortified vancomycin (50 mg/mL) and ceftazidime (50 mg/mL) was prescribed hourly. Acyclovir eye drops (30 mg/mL) were also administered 5 times a day. Timolol, atropine, and carboxymethylcellulose eye drops were also prescribed along with the above eye drops. During the course of the treatment, the patient was screened for Human Immunodeficiency Virus (HIV) status, and was found to be HIV positive. The results of the culture yielded *Streptococcus pneumoniae* susceptible to benzylpenicillin, cefotaxime, ceftriaxone, levofloxacin, moxifloxacin, clindamycin, linezolid, vancomycin, chloramphenicol and tigecycline. The isolate was found to be resistant to erythromycin, tetracycline, and cotrimoxazole, as per the antibiotic sensitivity results obtained by VITEK2 systems. A bile solubility test by plate method was also performed, which yielded disappearance of pneumococcal colony on blood agar by a drop of 10% sodium deoxycholate solution showing bile solubility of the bacterial isolate to further confirm the diagnosis (Figure 2b). Further serotyping of the organism was performed by the Quellung reaction, in which type-specific antisera was added to a suspension made from an overnight pure culture of pneumococci grown on blood agar. When a type-specific antibody binds to the pneumococcus capsule, a positive Quellung reaction occurs, changing its refractive index [4]. 18C antiserum was found to be homologous with the isolate, with which a swollen capsule was observed under Cilika digital microscope (Figure 2c).

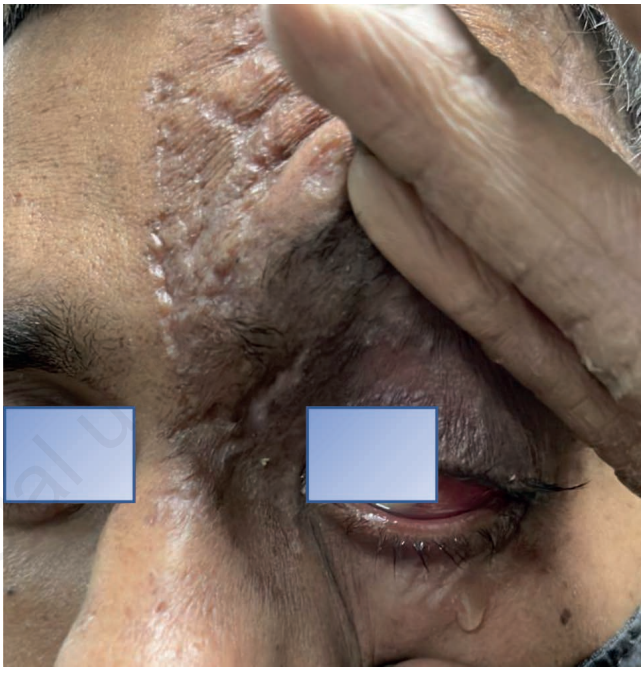

Figure 1. Left corneal abscess with rash and vesicles on left forehead.

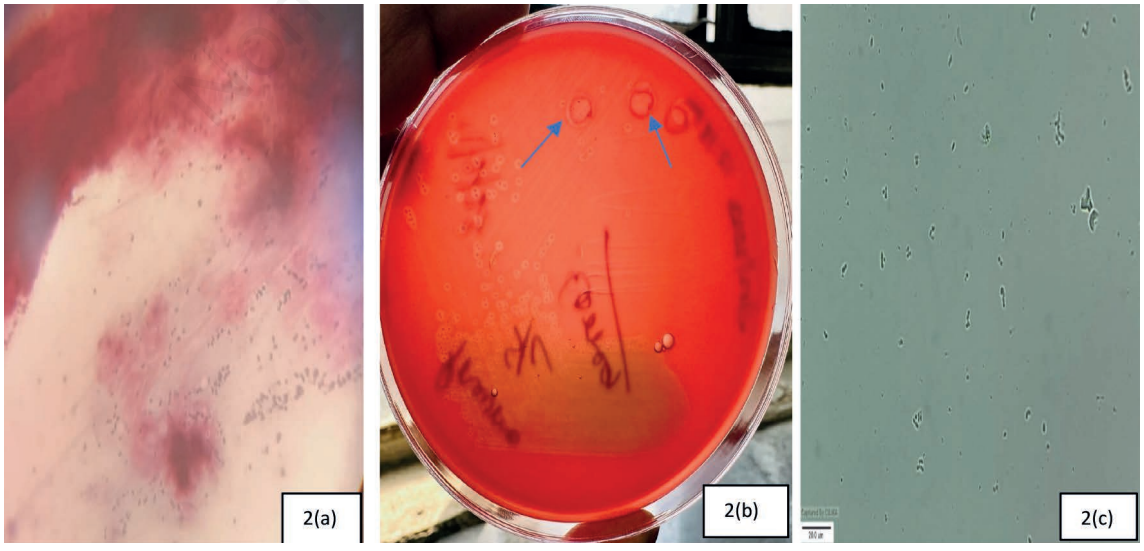

Figure 2. Microbiological techniques used for the identification of isolated bacterial pathogens. a) Gram's staining from direct sample showing diplococci; b) bile solubility test showing disappearance of colonies in the marked area; c) Quellung reaction showing swollen capsules with 18C antisera.

Discussion

In our case, the prominent risk factor which probably led to the development of bacterial keratitis was primary Herpes Zoster keratopathy, along with a positive HIV status, a cause for immunosuppression in the patient. However, another study by Bautista-Ruescas *et al*. observed ocular surgical trauma and corticoid administration as the preceding cause of pneumococcal keratitis [1]. As per the report submitted by Bourcier *et al*. in their study of 300 cases of bacterial keratitis, the major predisposing ocular conditions were the use of contact lenses (50.3%), followed by ocular surface disease (21.3%), corneal trauma (15%), and corneal surgery (4%). However, no risk factors were identified in 9.4% of the cases. Herpes keratopathy was observed in 4% of their cases [2].

Streptococcus pneumoniae usually presents with a deep round to oval central stromal ulcer with a progressive edge, while the other edge is usually healing. It is also an important cause of posterior corneal abscess and anterior chamber hypopyon [3]. Likewise, our case also presented with a deep stromal corneal abscess and hyphema in the anterior chamber. Unlike *Listeria monocitogenes, Corynebacterium, Haemophilus aegyptius,* and *Neisseria gonorrheae*, which can bring about a stromal affection without epithelial damage, *Pneumococci* are unable to penetrate intact corneal epithelium [1]. However, they do contain a cytolytic extracellular product termed pneumolysin or pneumotoxin, which is thought to have a role in the pathogenesis of pneumococcal keratitis by stimulating leukocyte migration and activating complement cascade, thus stimulating the host inflammatory response and causing immune-mediated damage to host tissues [6,7].

Growth in culture was considered significant if the same organism was isolated on more than one culture medium, or if isolated on at least two 'C' streaks of one culture medium with direct microscopy of corneal scrapes coinciding with bacterial morphology [7]. In our case, the organism isolated on both chocolate and blood agar morphologically coincided with gram stain findings and hence was considered significant. The serotyping of the isolated pneumococci by Quellung reaction yielded 18C serotype. 18C serotype is included in both the 23-valent Pneumococcal Polysaccharide Vaccine (PPSV23) and 13-valent Pneumococcal Conjugate Vaccine (PCV13) available in India, indicating the non-immunized status of the patient against the disease [8].

Conclusions

Bacterial keratitis caused by *Streptococcus pneumoniae* is not a frequently encountered disease, but owing to its sight-threatening ocular corneal pathology, it becomes important to gain a deeper insight into it.

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