Case Report

Elizabethkingia meningosepticum Isolated from Pleural Fluid: A Diagnostic Dilemma

Tanisha Bharara[1], Shalini Dewan Duggal[1], Pragnya Paramita Jena[1], Renu Gur[1], Shweta Gupta[2] and Abha Sharma[1]

Departments of Microbiology[1] and Pulmonary Medicine[2], Dr Baba Saheb Ambedkar Medical College and Hospital, Rohini, Delhi, India

Abstract

Elizabethkingia meningosepticum has been reported in cases of pneumonia, endocarditis, wound infections, post-operative bacteraemia and meningitis. It usually affects patients with severe underlying illness/immunocompromised host. An 18-year-old female, presented with a history of fever, cough, expectoration, loss of appetite and breathlessness for two weeks. Diagnostic evaluation revealed right-sided pleural effusion with consolidation. In view of patient being an inmate at residential facility for homeless where prevalence of tuberculosis (TB) was high, anti-TB treatment was empirically initiated. Pleural fluid later grew a Gram-negative non-fermenter, identified as *Elizabethkingia meningosepticum*. **[Indian J Chest Dis Allied Sci 2019;61:91-94]**

Key words: *Elizabethkingia meningosepticum*, Pleural effusion, Diagnosis, Tretament.

Introduction

The nomenclature of *Elizabethkingia meningosepticum* has evolved over the years from Flavobacterium meningosepticum (CDC- IIa) in 1959 to *Chryseobacterium meningosepticum* in 1994. This was based on phylogenetic and phenotypic data.[1] Based on 16S ribosomal ribonucleic acid (rRNA) sequence in 2005,[2] the nomenclature was again changed to *E. meningosepticum* after its discoverer Elizabeth O. King. *E. meningosepticum* is considered the most pathogenic member of this genus.[3] It is a ubiquitous organism, which has rarely been reported in cases of pneumonia, endocarditis, wound infections, post-operative bacteraemia and meningitis.[4] Most *E. meningosepticum* infections in adults are hospital acquired and occur in immunocompromised host. It is a Gram-negative organism but inherently resistant to many antimicrobial agents commonly used to treat infections caused by Gram-negative bacteria.[1] Treatment may be difficult; therefore, definitive therapy for clinically significant isolates should be guided by antimicrobial susceptibility result.

Case Report

An 18-year-old female, an inmate of a residential facility for mentally challenged, presented to the out-patient service of Department of Chest and TB of our hospital with a history of fever, right-sided chest pain, dyspnoea along with cough and expectoration since two weeks. There was no past history of TB, asthma, diabetes, hypertension or urinary complaints. Informed consent was taken from the guardian and the patient was examined. On examination, she was conscious and oriented with poor general hygiene; vitals were stable. On general physical examination, generalised oedema and pallor were noted. Respiratory system examination was suggestive of right-sided pneumonitis with pleural effusion; rest of the physical examination was normal. She was admitted for clinical evaluation.

She was started empirically on ciprofloxacin along with symptomatic treatment. Laboratory testing showed haemoglobin 10 g/dL, white blood cell count was 21,200/mm^3 with a predominance of neutrophils (68%); platelet count was normal. Blood glucose, liver and kidney function tests were within normal limits. Chest radiograph showed right-sided pleural effusion with consolidation. Contrast enhanced computed tomography (CECT) of the chest revealed right middle and lower lobe consolidation with moderate pleural effusion along with mediastinal lymphadenopathy (Figures 1A, B and C). The pleural fluid was aspirated which was haemorrhagic in appearance with total protein of 3.5 g/dL, glucose 68 mg/dL, total cell count 8000/mm^3 with predominance of neutrophils. Facility for testing of adenosine deaminase levels in pleural fluid was not available and sputum could not be tested for acid-fast bacilli as the patient could not expectorate sputum. Considering the fact that the patient was an inmate of a residential facility based on clinical presentation and pleural fluid characteristics, a diagnosis of pulmonary TB with right-sided pleural effusion was made and category I anti-TB treatment was started.

Pleural fluid was tested negative for acid-fast bacilli on Ziehl-Neelsen staining. Pleural fluid culture grew smooth circular 1-2 mm colonies with entire edges and regular margins with a pale yellow pigmentation on nutrient agar, non-lactose fermenting colonies on MacConkey agar and non-haemolytic colonies on blood agar after 24 hours incubation. There was uniform turbidity in liquid media. The organism was Gram-negative, non-motile bacillus which

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Correspondence and reprint requests: Dr Shalini Dewan Duggal, Specialist, Department of Microbiology, Dr Baba Saheb Ambedkar Medical College and Hospital, Rohini, Delhi, India; E-mail: shaliniduggal2005@rediffmail.com

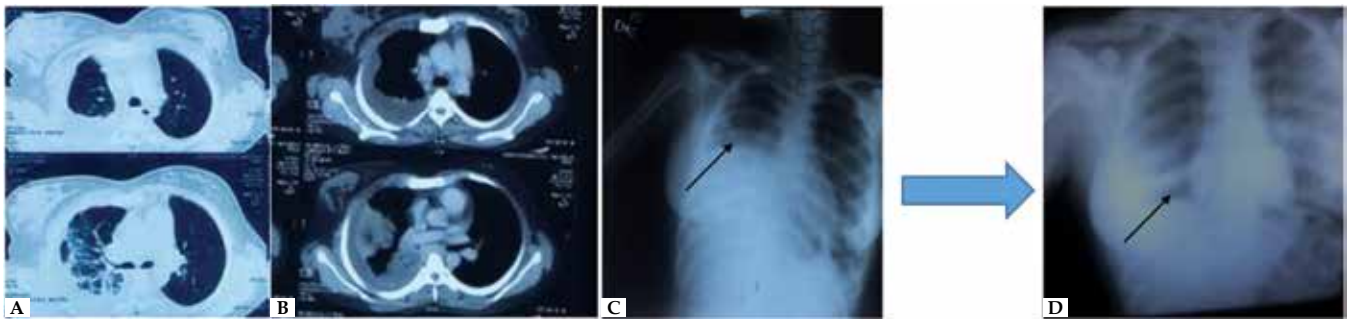

Figure. Radiological features at presentation left and resolution following treatment (right).

was catalase positive, oxidase positive, indole positive, non-fermenter, urease-negative, it did not utilise citrate as the sole source of carbon and did not reduce nitrate. Based on the above, the organism was provisionally identified as *E. meningosepticum*. The diagnosis was confirmed by the Non Entero Combo 71 panel of Microscan Autoscan-4, Beckman Coulter. Drug-susceptibility was performed by Clinical and Laboratory Standards Institute (CLSI) disc diffusion method[5] and minimum inhibitory concentration (MIC) determination by broth dilution method (Microscan Autoscan-4, Beckman Coulter). For MIC of vancomycin Epsilometer test strip was used. It was 16 μg/mL. The results were interpreted as per the CLSI (2016) criteria for non-fermenting Gram-negative bacteria and Gram-positive bacteria as no recommendation regarding breakpoints are available for this rare pathogen.[1] The organism was multidrug-resistant showing resistance to ampicillin-sulbactam, ticarcillin, ceftazidime, cefotaxime, cefepime, aztreonam, imipenem, meropenem, doripenem, amikacin, gentamicin, tobramycin, ciprofloxacin, levofloxacin, co-trimoxazole and colistin. It was susceptible to piperacillin-tazobactam, minocycline and vancomycin (MIC=16 g/mL) and intermediate susceptible to piperacillin. Blood culture was negative.

The patient was diagnosed to have right middle and lower lobe consolidation, right-sided pleural effusion and mediastinal lymphadenopathy caused by *E. meningosepticum*.

The clinicians treating the patient continued treatment with category I anti-TB treatment, patient started recovering and showed resolution both clinically and radiologically (Figure 1D).

Summary of published literature on *E. meningosepticum* pulmonary infections over the last 10 years is presented in the table.[6-12]

Discussion

In present case the clinical and demographic findings pointed to TB; culture results pointed towards a bacterial aetiology and this posed a diagnostic dilemma. *Elizabethkingia* species are inhabitants of soil and water. These resist chlorination and have been recovered from the moist hospital surfaces, such as sinks, water tanks, ventilator tubing, saline flushing devices etc.[1] Several cases of hospital-acquired infections have been reported in the past.[6,13] In the present case, pleural fluid was drained on the first day of hospitalisation and there was no history of past hospitalisation. Therefore, nosocomial infection seems unlikely. When isolated from a clinical specimen, *E. meningosepticum* is significant in up to half of the adults and in about two-thirds of the neonates[1] and carries mortality in up to 20%-30%.[14] It usually affects patients with severe underlying illness.[6-12] The respiratory tract is the most common site of infection.[1] *Elizabethkingia meningosepticum* is unique in its antibiotic profile as it is inherently resistant to most antibiotics prescribed for Gram-negative bacteria, including amino-glycosides, beta-lactam agents, chloramphenicol and carbapenems. Paradoxically, it is susceptible to antimicrobials for Gram-positive bacteria, like rifampicin, ciprofloxacin, vancomycin, trimethoprim–sulphamethoxazole.[1] Two types of beta-lactamases have been identified in this organism including class A extended spectrum beta-lactamase (GOB) and class B metallo beta-lactamase (BlaB).[1,15,16] Treatment regimens may include 3-4 weeks of combination therapy of rifampicin with trimethoprim-sulphamethoxazole, vancomycin, a fluoroquinolone, or minocycline.[1,13]

Our patient was an inmate of a residential facility for mentally challenged living together with many other children infected with TB; she appeared malnourished and also had poor general hygiene. These factors pose a risk of infection due to TB and *E. meningosepticum.* Further, *E. meningosepticum* can also colonise and complicate other infections, like TB. It is a nosocomial pathogen, especially in patients with immunocompromised status including malnutrition, diabetes,[10,11] malignancy, neutropaenia, organ transplant, steroid use or on dialysis.[12]

Heavy growth of *E. meningosepticum* in pure culture from an aspirated normally sterile body fluid after overnight incubation, ruled out possibility of colonisation or contamination. Its isolation from pleural fluid has been reported from other authors in India also.[12] However, TB being a more common infection in India, particularly in these settings, the possibility of TB could not be ruled out. The findings were discussed with the clinician and the decision was taken to continue with category I anti-TB treatment including rifampicin. The patient started recovering and

Table. Summary of published literature on *Elizabethkingia meningosepticum* pulmonary infections over the last 10 years

Study, Year (Reference)	No. of Cases	Underlying Debilitating Conditions	Nosocomial Infection	Diagnosis	Mode of Identification	Treatment	Mortality (%)
Ghafur, 2013 (7)	11	Cancer patients	Yes	Pneumonia	Automated-Vitek (Biomerieux)	Beta lactam-beta lactamase inhibitor along with rifampicin/cotrimoxazole/ tigecycline/teicoplanin	45.4
Ratnamani, 2013 (9)	8	Haemodialysis patients	Yes	LRTI	Conventional and Vitek 2 system	Combination treatment	12.5
Pereira, 2013 (10)	3	CHD, pulmonary hypertension, malnutrition, liver failure	Yes	Pneumonia	Conventional, vitek	Combination treatment, vancomycin	66.7
Kim, 2013 (11)	7	Prolonged hospitalisation, mechanical ventilation	Yes	Pneumonia	Conventional, vitek	Combination	20
Sarangi, 2015 (12)	1	Tuberculosis	No	Pleural effusion	Conventional and Vitek 2 system	Combination treatment	–
Lee, 2008 (15)	1	Diabetes	Yes	Retroperitoneal haematoma and pleural effusion	Not specified	Combination of levofloxacin and rifampicin	No
Gnanasoundran, 2014 (16)	1	Chronic kidney disease, haemodialysis	Yes	Parapneumonic effusion	–	–	–
Present case 2017	1	Mentally challenged, poor nutrition, poor hygiene, inmate of residential facility	No	Right-sided pneumonitis with pleural effusion	Conventional, Microscan Autoscan-4, Beckman Coulter	Category I anti-TB treatment	–

Definition of abbreviations: CHD=Cogenital heart disease; LRTI=Lower respiratory tract infection; TB=Tuberculosis

showed resolution both clinically and radiologically. The outcome added more to dilemma since rifampicin is also known to be effective against *E. meningosepticum*.[1] Isolation of *E. meningosepticum* from pleural fluid may either be a pure pathogen or a result of co-infection with TB. In both the situations, considering the risk factors like malnutrition leading to immunocompromised status, living in over-crowded shelter homes, low mental capability with poor personal hygiene, treatment of this pathogen is warranted.

A high index of suspicion is required, especially in immunocompromised patients when they fail to respond to conventional Gram-negative antimicrobials. In such cases, if *E. meningosepticum* is isolated in pure culture from a body fluid aspirate, it should be reported, since it is a potentially pathogenic; multi-drug resistant organism. Once clinically and microbiologically, diagnosis of this organism is confirmed, the patient should be treated for the same.

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