

Kocuria kristinae Meningoencephalitis: Case Report - Literature Review

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Abstract *Kocuria (K) kristinae* is a rare pathogen, with only a few reported cases, predominantly in immunocompromised patients and occasionally in immunocompetent individuals. This report presents a case of *K.kristinae* meningoencephalitis in 34-year-old man undergoing neurosurgery for a type 1 Arnold Chiari malformation with a ventriculoperitoneal shunt. The patient developed fever and epileptic seizures, prompting an etiological investigation, including lumbar puncture and the CSF was clear, 140 leukocytes/mL with 40% neutrophil polynuclear and 60% lymphocyte, increased proteinorachy to 0.61g/L and hypoglucorachy to 0.59 mmol/L, with a positive culture for *K. Kristinae*. The patient received 45 days of antibiotic therapy with meropenem and vancomycin.Despite treatment, the patient succumbed to progressive neurological deterioration.

Keywords: *Kocuria kristinae*, meningoencephalitis, rare

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1. Introduction

Kocuria(K) are Gram-Positive cocci actinobacteria found in tetrads belonging to the family Micrococcaceae, suborder Micrococcineae, order Actinomycetales [1]. It is a normal skin flora that can be associated with urinary tract infections and have been isolated from other bodily fluids like CSF [2]. We report the case of a young man with a neurological malformation presenting with *K.Kristinae* meningoencephalitis.

2. Case Report

A 34-year-old man is undergoing neurosurgery for a type 1 Arnold Chiari malformation with a ventriculoperitoneal shunt. He presented with fever and epileptic seizures. Clinical examination revealed a disturbance of consciousness, no sensory or motor deficits, and valve dysfunction (regurgitation). Laboratory tests showed lymphopenia at 700/mm³ (normal range >1500), C-reactive-protein at 110mg/L (normal range <5), and negative procalcitonin at 0.12 ng/mL (normal range <0.5 ng/mL). Hepatic and renal function tests were normal.

A thoracic CT scan for an infectious focus has been performed, showing multiple confluent alveolar nodules in the middle lobe. A cerebral CT scan showed significant quadriventricular dilatation, discrete signs of

transependymal resorption, and herniation of the cerebellar tonsils through the foramen magnum. The eye fundus was normal. As part of the etiological investigation, a lumbar puncture was performed, the cerebrospinal fluid (CSF) was clear on macroscopic examination. The CSF formula revealed 140 leukocytes/mL with 40% neutrophil polynuclear and 60% lymphocyte, increased proteinorachy to 0.61g/L and hypoglucorachy to 0.59 mmol/L. Microbiological culture showed a positive culture for *K. Kristinae*, sensitive to gentamycin, rifampicin and vancomycin, with resistance to fosfomycin. Standard blood culture isolated the same germ. PCR for Koch's bacillus on CSF was negative. HIV serology was negative. The patient was treated with meropenem, vancomycin, and rifampicin. At 7 days, he underwent an external ventricular bypass (EVB). Biological monitoring showed C-reactive protein at 31mg/L. A follow-up lumbar puncture after 21 days showed 1 leukocyte/mL with a negative culture. In total, the patient received 45 days of antibiotic therapy with meropenem and vancomycin (rifampicin stopped on the 17th day). Neurological worsening marked the clinical course, from which he benefited from the removal of the EVB and a cerebral MRI showing cystic dilatation of ventricle 3. Antibiotic therapy was switched to clindamycin and teicoplanin with a biological control showing a C-reactive protein of 0.8mg/L, from which he benefited from DVP placement. A lumbar puncture was performed the same day showing a leukocyte count of 35/mL. Antibiotic therapy with vancomycin and rifampicin was reintroduced the same

day after stopping. The evolution was marked by an initial clinical and biological improvement within a week of DVP placement. On day 10 of the DVP break, the patient's neurological status deteriorated, with a cerebral CT scan showing pneumocephalus with intraoccipital hemorrhage of the lateral ventricle. The patient was admitted to the intensive care unit, intubated and ventilated, and died after 24 hours.

3. Discussion

K. kristinae, first described in 1974, is a natural commensal of the skin and mucosal flora in several mammals, but it acts as an opportunistic pathogen. Among the 18 recognized species within the genus *Kocuria*, five are known to be pathogenic. [3]. *K. kristinae* is facultative anaerobic, nonmotile, catalase-positive, and coagulase-negative and is known to cause catheter-related bacteremia and infective endocarditis [4,5]. In a narrative review, the most frequently reported types of infection were bacteremia, skin and soft tissue infection, endophthalmitis, infectious endocarditis, and peritonitis [5]. Additionally, a search of the PubMed biomedical database identified eight documented cases of *K. kristinae* isolation in CSF (eg.meningitis, encephalitis,...) in a review of the literature (Table 1). *K.kristinae* meningoencephalitis are most commonly observed in patients with immunosuppression, deformities, those undergoing critical care, or even neonates; however, an increase in *Kocuria* meningoencephalitis has lately been noted in immunocompetent individuals [12]. *Kocuria spp.* constitutes part of normal human flora and can be isolated from various environmental niches. More specifically, these pathogens inhabit human skin and mucus membranes, such as the oral cavity, and are usually considered non-pathogenic. So far, microbiology

laboratories have treated these bacteria as contaminants, leading to the underdiagnosis of *Kocuria spp.* Infections [13]. The spectrum of pathology requires a high index of suspicion and extensive microbiological testing to make a diagnosis [2]. The most common method of *K. kristinae* identification was biochemical phenotyping, which detected the microorganism in approximately 75% of cases [14]. Most data point toward the organism being pan sensitive to multiple antibiotics [15]. In fact, susceptibility of *K.kristinae* was highest to vancomycin, linezolid, rifampicin, teicoplanin, tigecycline, cefotaxim, ampicillin/sulbactam, minocycline and meropenem, while the highest resistance rate *K.kristinae* showed to penicillins, gentamycin and erythromycin [14]. Protocols regarding the ideal antimicrobial treatment of *Kocuria spp.* meningoencephalitis still need to be clearly defined. According to the data in the narrative review [5], vancomycin could be the agent of choice for neuromeningeal infections where pathogen identification is suggestive for *Kocuria spp.* until antimicrobial susceptibility results are available. The mortality rate of meningoencephalitis caused by *Kocuria spp.* was relatively low [5].

4. Conclusion

K.kristinae has a significant pathogenic potential to cause invasive infections of various organs in patients of any age. Vancomycin is the preferred empirical treatment for *K.kristinae* meningitis or encephalitis until antimicrobial susceptibility testing is completed. The severity and prognosis of these infections correlate with the patient's immune state. Early clinical and microbiological intervention and appropriate antibiotic therapy are crucial for managing these infections.

Table 1. Main characteristics of the studies that isolated of *K. kristinae* in CSF

Author	Setting	Study design	Participants (N)	Participants characteristics	Predisposing conditions	Clinical presentation
Ali et al. [6] (2022)	Iraq	Cohort study	1	Patients between 10-79 years old	No data	No data
Tajane et al. [7] (2022)	India	Cohort study	1	Newborns between 1-28 days	No data	No data
Amina et al. [8] (2021)	Tunisia	Case report	1	13-year-old, man	No significant medical history	Meningitis and cranial nerve palsies
Biswal et al. [9] (2023)	India	Cohort study	3	Pediatrics	No data	No data
Kumar and Chougale [10] (2018)	India	Case report	1	35-year-old, man	No significant medical history	Meningitis
Saldana Ruiz et al. [11] (2023)	Mexico	Case report	1	28-year-old, female	Pituitary macroadenoma, Surgically resection, frontal ventriculoperitoneal shunt valve	Meningitis
Our case	Tunisia	Case report	1	34-year-old, man	Arnold Chiari malformation	Meningoencephalitis

Declarations

Ethics approval and consent to participate: done

Clinical Trial: not applicable

Consent for publication: done

Availability of data and material: yes available

Competing interests: no

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