Kocuria rosea: An emerging pathogen in acute bacterial meningitis- Case report

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ABSTRACT

Kocuria species is now increasingly being recognized as an emerging human pathogen most commonly associated with the use of medical devices in immunocompromised hosts or patients with severe underlying disease. Newer automated identification methods, such as Vitek 2 and 16S rRNA based genotypic assay have greatly contributed to its recent recognition as a human pathogen. Here, we report a case of acute bacterial meningitis caused by *Kocuria rosea* in an otherwise healthy woman in a tertiary care neuropsychiatry setting.

KEY WORDS: **Acute bacterial meningitis**
Kocuria rosea
Emerging pathogen

Introduction

Kocuria species are ubiquitous in the environment and constitute normal flora of humans and other mammals [1]. These are uncommon human pathogens and mostly infect immunocompromised individuals [2]. *Kocuria* are gram positive, strictly aerobic, catalase positive, coagulase negative non motile cocci [3]. This bacteria has been reported to cause central venous catheter related bacteraemia and peritonitis in severely debilitated chronically ill patients [4,5]. Recently, this organism has been implicated in brain abscess, acute cholecystitis, infective endocarditis and other catheter related bacteremia [6-9]. We report a case in a previously apparently healthy woman of acute bacterial meningitis due to *Kocuria rosea* with fulminant course and fatal outcome. To the best of the literature search, this is the first case report of acute meningitis caused by *Kocuria rosea* in an elderly woman.

Case Report

In April 2014, a previously healthy 80 year-old woman was admitted to the emergency department of a tertiary care neuropsychiatry center. She had history of headache, fever, vomiting with altered sensorium for 3 days duration. The previous medical history was not significant.

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She had no previous history of ear discharge or any cranial surgery. Family history was not contributory. There was no history of travel to other areas. On the day of admission, she was conscious but disoriented with poor general appearance. The temperature was 38.50°C. She had tachycardia (PR 98/minute) and tachypnea (RR 50/minute). Her blood pressure was within normal limits. Cardiovascular system and abdominal examination were all normal.

On neurological examination, neck stiffness and Kernigs sign were positive. Cranial nerve examination was normal. There was no focal motor deficit. On the basis of clinical history of fever with altered sensorium and signs of meningitis, a provisional diagnosis of acute meningoencephalitis was made. The diagnostic lumbar puncture (LP) was performed for routine biochemical, cytological and microbiological examination.

The cerebrospinal fluid (CSF) was turbid with 150 leucocytes/mm3 (95% polymorphs and 5% lymphocytes). The CSF sugar was low (5 mg/dl) with raised proteins (270mg/dl). Gram stain of CSF showed Gram-positive non capsulated cocci, predominantly in pairs with numerous polymorphs. Antigen detection by Latex agglutination

test (Remel) for Group B *Streptococcus* and *S. pneumoniae* was negative. Plain CT scan of the brain was done which showed cerebral edema. Laboratory investigations revealed hemoglobin count of 10 g/dl and a total leukocyte count of 21,800/mm3 (polymorphs 95%). The C reactive protein was elevated (350 mg/dl) with raised ESR (55 mm/h). Serum electrolytes, and liver function tests were within normal limits, whereas her serum creatinine was raised (2 mg %). Test for HIV antibodies was also negative.

She was started on Intravenous Ceftriaxone 2gms BD and injection Mannitol 100 ml, eight hourly for raised intracranial pressure. Despite prompt treatment, her clinical condition and sensorium kept on deteriorating. She developed respiratory failure and decerebrate posturing to painful stimuli. She was immediately put on ventilator support. At that time, her pupils were weakly reactive to light with absent oculocephalic reflexes.

Culture of CSF grew small greyish white, alpha hemolytic colonies on blood agar and chocolate agar after 24 hours of aerobic incubation. Gram staining of smears from colonies revealed Gram positive cocci arranged in pairs and short chain. Biochemical testing from the culture showed the organism to be weak catalase positive, coagulase negative, optochin sensitive, Bile esculin negative, with oxidative utilization of glucose on Hugh-Liefson's oxidation and fermentation (OF) test. There was no growth on MacConkey agar. The isolate was identified as *Kocuria rosea* by VITEK 2 system (bioMérieux Vitek, Inc, Marcy l'Etoile, France). As there are no published guidelines to perform antibiotic sensitivity testing for this organism, antimicrobial susceptibly testing was done by Kirby-Bauer disc diffusion method and by Vitek 2 using criteria for coagulase negative *Staphylococcus*. The isolate was found to be susceptible co-trimoxazole, ceftriaxone, cefotaxime, vancomycin, ciprofloxacin, erythromycin, clindamycin, and was resistant to penicillin. Blood culture remained sterile even after 7 days of incubation.

Her clinical condition deteriorated in spite of adequate antimicrobial treatment along with supportive treatment and the patient succumbed to her illness on second day of hospitalization. We could not collect another CSF sample to ascertain the role of this pathogen in disease causation.

Discussion:

Kocuria previously classified as one of the six genera of *Micrococcus*, have been reclassified as a separate genus based on its phylogenetic and chemotaxonomic analysis [1]. Members of the genus *Kocuria* are gram-positive cocci (1-1.8µm in diameter), occurring mostly in pairs, tetrads and irregular clusters. These organisms are obligate aerobes, catalase positive, coagulase negative and nitrate reductase negative [3. These organisms are generally of low virulence and considered to be harmless commensals of skin and oropharynx but may cause opportunistic infections in immunocompromised as well as immunocompetent individual with some underlying problem [2, 4, 10]. The most common co morbid conditions associated with *Kocuria* infection are cancers, metabolic disorders, end stage renal diseases, diabetes and short bowel syndrome [4-6, 8, 10-16]. As of now, 23 cases of infection due to *Kocuria* species have been reported in literature with *K. kristinae* as the most common pathogen followed by *K. rosea, K. marina, K. rhizophila and K. varians* (Table 1). The most common infections reported are central venous catheter related blood-stream infections in patients with some underlying disease [2,4,9,10,16,17]. The other infections reported are peritonitis, infective endocarditis, brain abscess, hydrocephalus and acute cholecystitis [5,6,8,12-16,18,19]. The most common portal of entry in majority of cases has been related to indwelling catheters. However, in reported cases of brain abscess and acute cholecystitis, its route of entry could not be established and was presumed to be hematogenous [6, 7]. Though this organism is susceptible to commonly used antibiotics and third generation cephalosporins along with catheter removal have been used to successfully treat this infection [4].

Our case is the first reported case of acute bacterial meningitis due to *Kocuria rosea*. On preliminary investigations, we could not find any evidence in the patient of being immunocompromised and there was no direct evidence of any underlying disease condition except for mild increase in serum creatinine level. In this case, route of entry of the pathogen also could not be established as the patient succumbed on second day of hospital admission. Probably infection might have resulted from direct invasion of central nervous system from oropharynx through cribriform plate as *Kocuria* species normally colonizes the oropharynx.

Table 1. Summary of reported Kocuria species infections.

S. No	*Kocuria* spp.	Age (yrs)/ gender	Disease	Co-morbidity	Reference no.
1.	*Kocuria kristinae*	51/F	CVC related bacteraemia	Ovarian cancer	Basaglia et al 2002 (10)
2.	*Kocuria rosea*	39/M	CVC related bacteraemia	Hodgkin disease	Aluntus et al 2004 (4)
3.	*K. varians*	47/F	Shunt nephritis	Ventriculo-peritoneal (VP) shunt infection	Bel ami et al (21)
4.	*Kocuria kristinae*	56/M	Acute cholecystitis	nil	Ma et al 2005 (7)
5.	*Kocuria rosea*	9/M	Hydrocephalus	nil	Behera et al 2007 (19)
6.	*Kocuria kristinae*	68/M	CVC related bacteremia	Leukemia	Martinaud et al 2008 (20)
7.	*Kocuria rhizophila*	8/M	CVC related bacteremia	Methylmalonic aciduria, pancreatic pseudocyst	Becker et al 2008 (11)
8.	*Kocuria rosea*	56/F	Peritonitis	End-stage renal disease on chronic ambulatory peritoneal dialysis (CAPD)	Kaya et al 2009 (5)
9.	*Kocuria marina*	73/M	Peritonitis	End-stage renal disease on chronic ambulatory peritoneal dialysis	Lee et al 2009 (12)
10.	*Kocuria marina*	57/M	Peritonitis	End-stage renal disease on chronic ambulatory peritoneal dialysis	Lee et al 2009
11.	*Kocuria varians*	52/M	Brain abscess	DM, HT	Tsai et al 2010 (6)
12.	*Kocuria kristinae*	2/M	CVC related bacteremia	Congenital short bowel, hypogammaglobulinemia, central venous catheter for TPN	Lai et al 2011 (16)
13.	*Kocuria kristinae*	89/F	CVC related bacteramia, infective endocarditis	Ischemic bowel status post resection, short bowel syndrome, central venous catheter for TPN	Lai et al 2011
14.	*Kocuria kristinae*	37/F	CVC related bacteremia	Gastric cancer, central venous catheter for TPN	Lai et al 2011
15.	*Kocuria kristinae*	68/F	CVC related bacteremia	Gastric cancer, central venous catheter for TPN	Lai et al 2011
16.	*Kocuria kristinae*	78/M	Peritonitis	End-stage renal disease on chronic ambulatory peritoneal dialysis	Cheung et al 2011 (13)
17.	*Kocuria kristinae*	69/M	Peritonitis	End-stage renal disease on chronic ambulatory peritoneal dialysis	Calini et al 2011 (14)
18.	*Kocuria kristinae*	29/F	CVC related bacteremia	Thyrotoxicosis with hyperemesis gravidarum on TPN	Dunn et al 2011 (2)
19.	*Kocuria rhizophila*	3/F	CABSI	Hirschprung's disease	Didier et al 2012 (9)
20.	*Kocuria varians*	70/M	Peritonites	CRF, heart failure	Meletis et al 2012 (18)
21.	*Kocuria kristinae*	4 month/F	CVC related bacteraemia	Black hairy tongue	Oncel et al 2012 (17)
22.	*Kocuria rosea*	57/M	Peritonitis	Dibetic nephropathy, End-stage renal disease on chronic ambulatory peritoneal dialysis	Purty et al 2013 (15)
23.	*Kocuria kristinae*	74/M	Infective endocarditis	Dibetic foot, Sepsis	Citro et al 2013 (8)
24.	*Kocuria rosea*	80/F	Meningitis	nil	Present case

This case underscores the need to consider *Kocuria* as an emerging neuropathogen in life threatening CNS infections and an utmost microbiological vigilance is required for its specific identification. By routine conventional tests, it can easily be mistaken for *Micrococcus* and coagulase negative *Staphylococci*. The identification in mixed

cultures is more of a challenge and requires detailed clinical history before labeling the organism as contaminant or commensal. The newer diagnostic methods such as Vitek 2 and 16S RNA based genotypic assay are more accurate in identifying this organism and thus help preventing its erroneous identification [2,15].

Conflict of Interest

We declare that we have no conflict of interest.

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