American Journal of Pediatrics
2021; 7(3): 159-162
http://www.sciencepublishinggroup.com/j/ajp
doi: 10.11648/j.ajp.20210703.23
ISSN: 2472-0887 (Print); ISSN: 2472-0909 (Online)

Kocuria Kristinae Meningitis and Cranial Nerve Palsies Secondary to Sphenoid Sinusitis: About a Case

Werdani Amina[1, *], Yahyaoui Omar[1], Jammeli Nesrine[1], Rassas Ahmed[1], Boussofara Raoudha[1], Khedher Mohamed[2], Mahjoub Bahri[1]

[1]Department of Pediatrics, Taher Sfar University Hospital, Mahdia, Tunisia

[2]Department of Microbiology, Taher Sfar University Hospital, Mahdia, Tunisia

Email address:
werdani_amina@yahoo.fr (W. Amina)

[*]Corresponding author

To cite this article:
Werdani Amina, Yahyaoui Omar, Jammeli Nesrine, Rassas Ahmed, Boussofara Raoudha, Khedher Mohamed, Mahjoub Bahri. *Kocuria Kristinae* Meningitis and Cranial Nerve Palsies Secondary to Sphenoid Sinusitis: About a Case. *American Journal of Pediatrics*. Vol. 7, No. 3, 2021, pp. 159-162. doi: 10.11648/j.ajp.20210703.23

Received: July 25, 2021; **Accepted**: August 9, 2021; **Published**: August 23, 2021

Abstract: Kocuria spp, previously classified as the members of Micrococcacae family, was rarely reported as a human pathogen. *Kocuria Kristinae* could cause invasive infections of large variety of tissues in patients of any age. We report the first case of meningitis with sixth and third nerve palsies secondary to sphenoid sinusitis caused by *Kocuria Kristinae* in a previously healthy 13 year-old boy. In effect, his cerebrospinal fluid (CSF) showed a cloudy appearance of the CSF, white blood cells count was 600 cells/µl (polymorphs 90% and 10% lymphocytes), red blood cells count was 200 cells/µl, protein level was elevated at 5.3 g/l and glucose level was low at 0.1 mmol/l. The direct examination showed positive-gram diplococci. The patient was initially treated with intravenous cefotaxim and vancomycin. The CSF culture was positive for gram-positive diplococci, which was identified as *Kocuria kristinae*. The meningitis was characterized by insidious evolution and persistent very low CSF glucose level. It was difficult to diagnose the sphenoid sinusitis because it is not accessible to direct clinical examination. It was diagnosed after the occurrence of a complication due to its anatomical location and proximity to the intracranial and orbital content. At day 5, the patient had remarkable resolution of symptoms. Complete recovery of cranial nerve palsy was noted at day 8. The aim of this case report is to present the first isolation of *Kocuria Kristinae* from cerebrospinal fluid sample and describe the clinical presentation and management outcomes.

Keywords: *Kocuria Kristina*, Meningitis, Sphenoid Sinusitis, Cranial Nerve Palsies

1. Introduction

Kocuria species are ubiquitous in the environment, commensal of the skin and mucosa [1]. Infectious pathologies caused by Kocuria species are uncommon and mostly present in immunocompromised individuals [2]. Meningitis caused by Kocuria is still limited in the literature. There are two documented cases of meningitis caused by *Kocuria rosea* [3, 4]. Here, we report a case of peadiatric bacterial meningitis with sixth and third nerve palsies secondary to sphenoid sinusitis. To the best of our knowledge, this is the first report of meningitis caused by *Kocuria kristinae.* The purpose of this case report is to describe the clinical presentation and management outcomes of this condition.

2. Case Report

A 13-year-old boy presented to our emergency department with headache, fever and asthenia of 8 days duration. Other symptoms were present including nausea, vomiting, photophobia and sleepiness. He had not no nasal obstruction nor rhinorrhea. The patient had no significant medical history, no ear discharge or any cranial surgery or trauma and no family history suggesting any significant illness.

The physical exam revealed poor general appearance and walking instability. He was febrile, with a temperature reaching 40°C, heart rate of 93 beats per minute, polypnea with respiratory rate of 40 breaths per minute, blood pressure of 130/80 mm Hg and transcutaneous oxygen saturation on

room air of 96%. His blood sugar test was 133 mg/dl. Neurological examination revealed neck rigidity and Kernig's sign. He was able to speak coherently and his Glasgow coma scale was calculated at 15/15. The oropharyngeal examination was normal, as was the rest of the physical examination. The funduscopic examination showed no papilledema. With this meningeal syndrome, blood cultures and a diagnostic lumbar puncture were performed prior to the administration of antibiotics. His cerebrospinal fluid (CSF) showed: a cloudy appearance of the CSF, white blood cells (WBC) count was 600 cells/µl (polymorphs 90% and 10% lymphocytes), red blood cells (RBC) count was 200 cells/µl, protein level was elevated at 5.3 g/l and glucose level was low at 0.1 mmol/l. The direct examination showed positive-gram diplococci.

Laboratory investigations revealed a total leukocyte count of 17490/mm^3 (polymorphs 82,8%), hemoglobin count of 11.3 g/dl. The C reactive protein was elevated up to 192 mg/l, hyponatremia (Na+=131 mmol/l) and hypokalemia (k+=2,57 mmol/l). Renal and liver function tests were within normal limits.

The patient was initially treated with intravenous cefotaxim at the dose of 300 mg/kg/day (3 g every 6 hours), vancomycin 60 mg/kg/day (650 mg every 6 hours). The CSF culture was positive for gram-positive diplococci, which was identified as *Kocuria kristinae*.

The bacteria was sensitive to penicillin G, amoxicillin, cefotaxime, erythromycin, spiramycin, lincomycin, pristinamycin, ofloxacin, levofloxacin, teicoplanin and vancomycin but it had low-level bacterial resistance to streptomycin, kanamycin and gentamicin. Therefore, cefotaxim and vancomycin were continued.

At day 3, the patient had developped binocular diplopia, right ptosis (third right nerve palsy), an abduction deficit of the left eye (sixth left nerve palsy) (Figure 1).

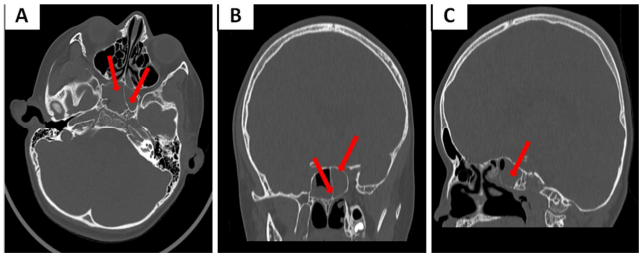
Cerebral computed tomography (CT) demonstrated mucosal thickness and opacification of sphenoid sinuses. The brain was normal (Figure 2). Brain Magnetic Resonance Imaging (MRI) revealed acute sphenoiditis (Figure 3). So, the patient underwent endoscopic sphenoidotomy.

The fever persisted on day 4 of antibiotic treatment. So, a second lumbar puncture was performed that showed: WBC count was 620 cells/µl (polymorphs 80% and 20% lymphocytes), RBC count was 100 cells/µl, proteinorrachia at 1.84 g/l, hypoglycorrachia at 0.13 mmol/l, direct examination and CSF culture were both negative. Chest x-ray, transthoracic echocardiography (TTE) and abdominal ultrasound were negative for infection.

At day 5, the patient had remarkable resolution of symptoms. Improvements were observed in a repeat CSF analysis. Both CSF and blood culture were negative. Complete recovery of cranial nerve palsy was noted at day 8.

The patient was treated with IV cefotaxim and vancomycin for 2 weeks. He was discharged from the hospital within 17 days.

Figure 1. *Photograph of the patient showing right ptosis (third right nerve palsy), an abduction deficit of the left eye (sixth left nerve palsy).*



A: axial section B: coronal section C: sagittal section

Figure 2. *Brain computed tomography demonstrates fluid collection in the sphenoid sinuses.*

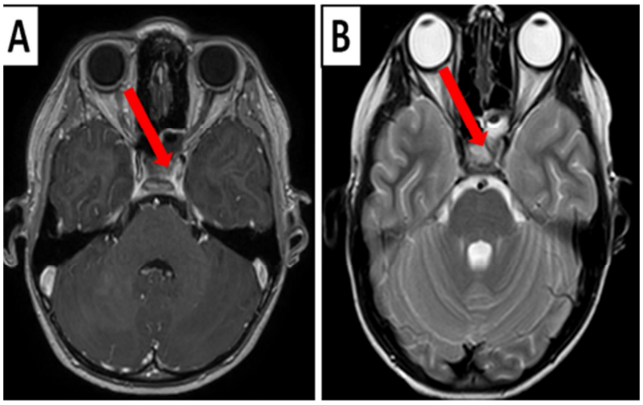


Figure 3. *Brain Magnetic Resonance Imaging (MRI) showing sphenoid sinusitis (opacified sphenoid sinus and enhanced peripheral mucous membrane).*

A: T1-weighted image axial section after gadolinium
B: T2-weighted image axial section

3. Discussion

Bacterial meningitis are associated with significant morbidity and risk of mortality. They are typically caused by virulent bacteria such as *Streptococcus Pneumoniae*, Neisseria Meningitidis. *Streptococcus pneumoniae* appears to be the pathogen most frequently associated with development of meningitis as a complication [5].

Kocuria Kristinae (or *Micrococcus kristinae*) is a Gram-positive coccoid bacteria with tetrads often seen on smear, coagulase negative, oxidase positive and glucose fermenter positive [6]. It belongs to normal flora of skin and mucosa [6]. Infection is mostly associated with immunocompromised patients using intravenous catheter or peritoneal dialysis [2, 7]. Among the Kocuria species, K. kristinae, K. marina, K.

rhizophila and K. varians have been observed to cause human infections [8]. It has been reported that *Kocuria marina* caused spontaneous bacterial peritonitis in a 2 year-old boy [9] and endocarditis in 10-year-old, immunocompetent girl [10]. Two cases of acute bacterial meningitis due to *Kocuria rosea* were reported [3, 4].

Only few cases infected with K. kristinae have been reported worldwide. The human infectious diseases caused by *Kocuria kristinae* are endocarditis [11], urinary tract infection [12], cholecystitis [13], peritonitis [7], bacteraemia [14], abdominal abscess [15], synovitis and periarticular bursitis [16], pneumonia [17], umbilical sepsis [18], bacteremic empyema [19] and interface keratitis [20]. We report the first case of meningitis caused by *Kocuria kristinae*, which was characterized by insidious evolution and persistent very low CSF glucose level.

Sphenoid sinusitis is a rare disorder of paranasal sinuses infection and most acute cases are related to Gram-positive cocci [21]. It appears to be difficult to diagnose because it is not accessible to direct clinical examination. There are many atypical presentations and may occur with complications due to its anatomical location and proximity to the intracranial and orbital content [22]. Sphenoid sinusitis may spread to the meninges or cavernous sinus via direct penetration [5]. It may present with isolated sixth nerve palsy [21–23] but also as with fulminant bacterial meningitis [5]. In a case series of 17 ocular cranial nerve palsies secondary to sphenoid sinusitis, the abducent nerve was the most common cranial nerve affected (76%), followed by the oculomotor nerve (18%) [24].

This is the first reported case of sphenoid sinusitis simultaneously complicated by both meningitis due to *Kocuria Kristinae* and ocular nerve palsy (right oculomotor and left abducens nerves).

Kocuria Kristinae is susceptible to amikacin, ampicillin, bacampecilin, cefazoline, abrekacin and debekacin, cefotaxime, ceforixim, clarythromycin, clindamycin, dalbavancin, doripenem, fusidic acid, gentamicin, imipenem, isepamicin, lincomycin, meropenem, meropenem/veborbactam, netilmicin, penicillin G, rifampin, rifaximin, teicoplanin and vancomycin [6].

Initial treatment of *Kocuria Kristinae* infections should involve parenteral vancomycin in combination with some other antibiotic to which this bacteria is susceptible [25].

4. Conclusion

Sphenoid sinusitis is uncommon paranasal sinuses infection. Intracranial complications of sinusitis, including meningitis, ocular nerve palsy are severe and associated with significant morbidity. In immunocompromised but also immunocompetent patients, unusual organisms such as *Kocuria Kristinae* may cause significant infection. Imaging of the brain should be performed in all cases with insidious fever and headache, to rule out causes such as sphenoid sinusitis.

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