Case Report

ENT Infection Caused by *Raoultella Ornithinolytica*

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Date of Acceptance:
15-Feb-2017

Abstract

Raoultella ornithinolytica is an encapsulated gram-negative aerobic bacillus belonging to the Enterobacteriaceae family. It is one of the three species of *Raoultella*. Human infections related to *R. ornithinolytica* are exceedingly rare. This case report describes an ENT infection caused by *R. ornithinolytica* successfully treated with antibiotic therapy.

Keywords: *ENT, infection, Raoultella ornithinolytica*

Introduction

Raoultella ornithinolytica is an encapsulated gram-negative aerobic bacillus belonging to the Enterobacteriaceae family. Initially, *Raoultella* species were classified as *Klebsiella* species, however, on the basis of 16S ribosomal RNA and *rpoB* gene sequences, these two genera were later discriminated.[1] These bacteria are found in aquatic environments, fish, and ticks.[2] This bacterium along with the closely related species *R. planticola* has been shown to be a causative agent of histamine toxicity from fish (also known as scombroid syndrome). Histamine toxicity produces symptoms that include flushing of skin, headache, pruritus, and abdominal cramping.[3] Human infections caused by *R. ornithinolytica* are rare. Over the past decade, *R. ornithinolytica* has emerged as an infrequent but important causal agent of human infections. *R. ornithinolytica* expresses b-lactamase, which provides resistance to commonly used antibiotics.[4] In this report, we describe and discuss ENT infection caused by *R. ornithinolytica*.

Case Report

A 70-year-old woman was admitted to the emergency room (ENT ward) of Govt. Medical College and Rajindra Hospital (Patiala, Punjab, India) with complaints of difficulty in swallowing and pain in the throat, pain and itching in the right ear, postnasal discharge, and change in voice for the past 3 days. She had a history of chewing tobacco for the last 20 years. On physical examination, the patient's blood pressure was found to be 148/70 mmHg, pulse was 100 beats per minute, temperature was 38°C, and respiratory rate was 39 breaths per minute. On local examination of the oral cavity, it was found that she had poor oral hygiene with artificial denture. The patient had bluish discoloration of the left buccal mucosa where she used to apply tobacco patch. Gag reflex was absent on the right side. The patient had oral ulceration over right side of the palate, right palatal paralysis (IX nerve) with right oropharyngeal gutter full of creamy yellow slough. On laryngoscopic examination, the patient showed right vocal cord palsy (X nerve) [Figure 1]. On nasal endoscopy, it was found that the patient had mucoid discharge in the right osteomeatal complex. On local examination of the right ear, patient was found to have otitis externa with excoriation of the skin of the right ear with right external auditory canal filled with mucopurulent blood-stained thick foul-smelling discharge. After thorough suction cleaning of the right ear, examination under microscope showed a single medium-sized perforation with slightly irregular margins located in posterosuperior quadrant extending posteroinferiorly. On functional examination of the right ear, Rinne test was found to be positive and Weber was lateralized to the left ear. Facial nerve examination (VII nerve) showed grade III House-Brackmann facial nerve paralysis of the right side with moderate dysfunction [Figure 2].

Laboratory data obtained on admission revealed a hemoglobin level of 8.9 g/dl, white blood cell count of 12400 per microliter with 70% neutrophils. Inflammation markers were high: erythrocyte

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Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/njcp.njcp_337_16

PMID: 28791990

How to cite this article: Singh M, Kaur I, Mundi DK, Kaur A. ENT infection caused by *Raoultella ornithinolytica*. Niger J Clin Pract 2017;20:914-7.

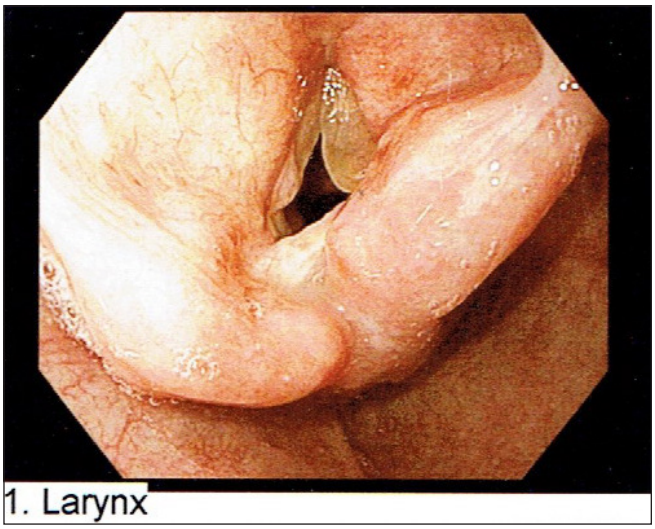

Figure 1: Vocal cord palsy of right side

sedimentation rate (ESR) was 38 mm/h in the first hour and the level of C-reactive protein (CRP) was 20 IU/ml. Throat swab and blood was taken for culture and sensitivity, and empirical antimicrobial treatment with amoxiclav and metronidazole was commenced. During her stay in the hospital, the patient received medical therapy with intravenous (IV) fluids, prednisolone tablet (60 mg tapering dose), amlodipine tablet (5 mg OD), and liquid diet. On the third day of admission, the patient complained of vertigo (VIII nerve) on turning the head toward the right side while lying down. The patient was put on betahistine tablet (8 mg t.d.s.) after which her symptoms improved. The noncontrast Computed Tomography of Nose and Paranasal Sinuses (CT PNS) axial view [Figure 3] reported complete filling of the right maxillary sinus with soft-tissue density material.

The culture from throat swab yielded a gram-negative bacillus *R. ornithinolytica* (bionumber 6627735773577252). The isolated bacterium was identified with the help of an automated VITEK 2 Compact system and was found to be resistant to ampicillin as per susceptibility profile [Table 1]. The medication was changed to IV pipericillin with tazobactam 4.5 g IV six hourly, which was continued for 7 days. With this drug therapy, patient became afebrile, excoriation of skin of right ear and pruritus disappeared, and her clinical status significantly improved, i.e., oral ulceration and slough subsided, nasal discharge decreased considerably on nasal endoscopy, discharge in her right ear subsided, facial nerve paralysis started recovering, and she started taking orally. No other active intervention was done because the patient was very frail. On the eighth day, a throat swab was taken for follow-up, which was negative; the patient recovered

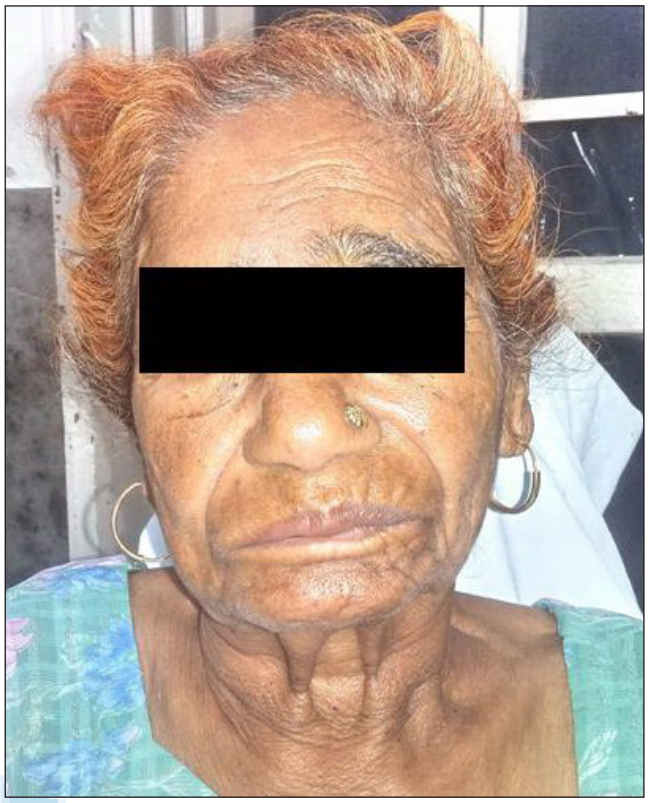

Figure 2: Grade III House–Brackmann facial nerve paralysis of the right side

Table 1: Susceptibility profile of R. *ornithinolytica*

Antimicrobial	MIC	Interpretation
Ampicillin	≥32	*R*
Amoxicillin/Clavulanic acid	≥32	*R*
Ticarcillin	≥128	*R*
Piperacillin/Tazobactam	≤4	*S*
Ertapenem	≤0.5	*S*
Amikacin	≤2	*S*
Gentamicin	≤1	*S*
Nalidixic acid	≤2	*S*
Ciprofloxacin	≤0.25	*S*
Norfloxacin	≤0.5	*S*
Fosfomycin	64	*R*
Cefoxitin	≥64	*R*
Cefixime	0.5	*S*
Ceftazidime	≤1	*S*
Ceftriaxone	≤1	*S*
Trimethoprim/Sulfamethoxazole	≤*20*	*S*

markedly. This suggested the usefulness of the treatment administered. The patient was discharged on oral medication with ciprofloxacin 500 mg (b.d.) for 5 days. On follow-up after 2 weeks, the patient persisted with change in voice with vocal fatigue and occasional nasal regurgitation of liquid food, which decreased further when patient was followed up at 6 months after which patient did not come [Figure 4].

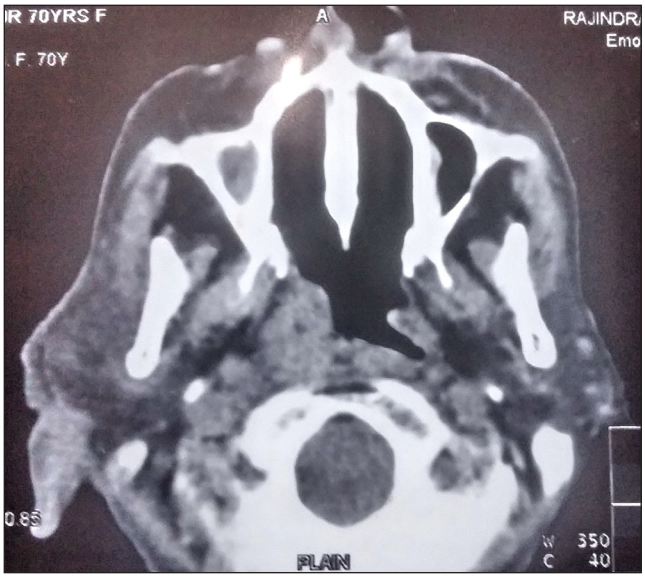

Figure 3: Noncontrast computed tomography para nasal sinuses axial view with complete filling of the right maxillary sinus

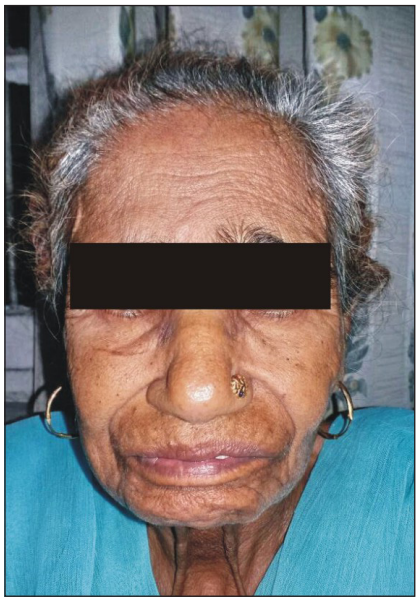

Figure 4: Posttreatment picture of the patient

Discussion

R. ornithinolytica is a gram-negative aerobic bacillus belonging to the Enterobacteriaceae family. In 2011, the genus *Raoultella* was created based on the analysis of the sequences of the 16S rRNA and *rpoB* genes from *K. ornithinolytica*, *K. planticola*, and *K. terrigena*.[1] With respect to antibiotic susceptibility, *R. ornithinolytica* has been shown to be resistant to ampicillin,[4] similar to our findings. *R. ornithinolytica* has rarely caused human infections since it was first described in 2009. It has been associated with enteric fever-like syndrome,[2] renal cysts,[5] bacteremia,[6] soft tissue infection,[7] peritonitis,[8] and urinary tract infection.[9] This is, to the best of our knowledge, the first case of a spontaneous *R. ornithinolytica* ENT infection and associated nerve palsies and isolation of *R. ornithinolytica* from a throat swab.

Virulence factors involved in the pathogenicity of *R. ornithinolytica* are its ability to adhere to human tissues and its ability to convert histidine to histamine and its ability to form biofilms in urinary catheters.[10] In our case, the patient being old and frail had low immunity, and hence, suffered from this unusual infection. The virulence of the organism produced a severe ENT infection and related nerve palsies, however, she responded very well to the drug therapy given. Her symptoms and signs improved markedly without any surgical intervention. Our findings of response to the drug therapy are similar to the findings of Sekowska *et al*., which reported catheter-related blood stream infection caused by *R. ornithinolytica* and their patient improved on treatment with course of IV pipericillin and tazobactum.[11]

With her initial symptoms and signs of ear pain and itching accompanied with facial nerve paralysis of right side, other differential diagnoses of malignant otitis externa or herpes zoster oticus would had been possible, however, later her clinical status got complicated with involvement of throat, nasal regurgitation of food, nasal discharge and change in voice (multiple cranial nerve involvement), which could not be explained by above diagnoses. Our study results agreed with those of other studies in finding the multidrug-resistant nature of the organism, that is, all strains of *Klebsiella* spp. are resistant to ampicillin, penicillin, and amoxicillin.[4]

Conclusion

R. ornithinolytica is an uncommon human pathogen. This organism can be misdiagnosed as *K. pneumoniae* or *K. oxytoca*, and its expression of b-lactamases confers resistance to ampicillin and other commonly used antibiotics. Here, we here report a case of *R. ornithinolytica* ENT infection and associated nerve palsies in a previously healthy patient. Our case report describes ENT infection with associated nerve palsies caused by R.ornithinolytica, which was successfully treated with applied antibiotic therapy (pipericillin with tazobactum). *R. ornithinolytica* is emerging as a causative agent of a wide array of human infections that pose a potential challenge to the identification and treatment of these infections.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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