**Name of Journal: *World Journal of Clinical Cases***

**ESPS Manuscript NO: 31356**

**Manuscript Type: Case Report**

**Rare case of cryptogenic brain abscess caused by *Raoultella ornithinolityca***

Luongo M. Brain abscess caused by *Raoultella ornithinolityca*

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**Author contributions:** Luongo M finished this manuscript solely.

**Institutional review board statement**: This case report was exempt from the Institutional Review Board standards at San Carlo Hospital, Potenza.

**Informed consent atatement**: The patient involved gave her verbal informed consent authorizing use and disclosure of her protected health informations.

**Conflict-of-interest statement**: The author has no conflict of interests to declare.

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**Manuscript source:** Invited manuscript

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**Received:** November 12, 2016

**Peer-review started:** November 13, 2016

**First decision:** February 17, 2017

**Revised:** March 2, 2017

**Accepted:** March 21, 2017

**Article in press:**

**Published online:**

**Abstract**

Cerebral abscess is a potentially fatal neurosurgical condition, despite improvements in technologies, new antimicrobial agents and modern neurosurgical instruments and techniques. I report the case of 64 year old female, affected by a right frontobasal brain abscess, compressing the homolateral frontal horn of lateral ventricle, with a second mass partially occupying the right orbital cavity. She presented also an inflammatory sinusopathy involving right maxillary, ethmoid and frontal sinuses. After some days of clinical observation and antimicrobial therapy, the patient received a CT scan, showing a growth of the cerebral mass, with a ring peripheral contrast enhancement and surrounding oedema. She promptly underwent neurosurgical treatment and she recovered well, except for her sight from her right eye, which resulted compromised, as before the operation. To the best of known literature, this is the first case of cryptogenic cerebral abscess determined by *Raoultella ornithinolityca*, with more than one year follow up.

**Key words**: Brain abscess; Headache; *Raoultella ornithinolityca*; Visual loss

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**Core tip:** Brain abscess is a focal intracranial infection that evolves in a collection of pus; it could have cryptogenic origin in about 10% to 35% of cases. I present a 64 year old female affected by a frontal brain abscess surgically treated, from which *Raoultella ornithinolytica* (*R. ornithinolytica*) has been isolated. The patient, after more than one year, is doing well, except for her right eye that had already lost its visual power before surgery. To the best of known literature, this is the first case of cryptogenic cerebral abscess determined by *R. ornithinolytica*.

Luongo M. Rare case of cryptogenic brain abscess caused by *Raoultella ornithinolityca*. *World J Clin Cases* 2017; In press

**INTRODUCTION**

Brain abscess is a focal intracranial infection characterized as an area of cerebritis that evolves in a collection of pus surrounded by a vascularized capsule. Organisms can reach the central nervous system by spread from contiguous source of infections, hematogenous dissemination, or trauma, but there are cryptogenic brain abscesses in about 10% to 35% of cases. The frontal lobe is the predominant site of cerebral abscess in patients with paranasal sinusitis. *Raoultella ornithinolytica* (*R. ornithinolytica*) is an encapsulated Gram negative bacterium, member of the *Enterobacteriaceae* family. Human infections determined by genus *Raoultella* are quite rare. I describe a case of cryptogenic cerebral abscess, with a good recovery after over one year from surgery.

**CASE REPORT**

A 64-year-old female was admitted to our hospital for fever and headache. She was hospitalized in the Infectious Disease Department for observation and study. She had a chest X-ray that was normal so as her abdominal ultrasound examination. A magnetic resonance imaging (MRI) scan with gadolinium revealed the presence of a right frontobasal brain abscess, slightly compressing the homolateral frontal horn of lateral ventricle, with a second mass partially occupying the right orbital cavity (Figure 1A). She presented also an inflammatory sinusopathy involving right frontal, ethmoid and maxillary sinuses. After some days of clinical observation and intravenous broad spectrum antibiotic therapy, the patient received a nasal culture on hospital day 14 (with the evidence of *Candida albicans* at low microbial levels), an ophthalmologic consult, revealing a visual loss from her right eye, and a CT scan with contrast, showing an increase in the abscess size, so that the patient underwent to prompt surgical operation with a right frontobasal craniotomy (Figure 1B). Thanks to neuronavigation and under operative microscopy, the abscessual capsule was widely opened, in order to drain its content, and it was coagulated to avoid damage~~s~~ on nervous structures, given that cerebral parenchyma in the right orbit appeared to be involved by an inflammatory reaction. A certain amount of the mass content was sent for microbiological examination within Bactec broth and, 8 d after surgery, a *R. ornithinolytica* was isolated by conventional microbiological tests. On the basis of antibiogram, determined according to the European standard EUCAST, and after consulting the infectologist, the patient started an intravenous therapy with Metronidazole and Ceftriaxone, respectively four times and twice a day (Table 1). She received a basal CT scan showing no residual nor recurrence of the known brain abscess.

Her general clinical conditions were improved but, on hospital day 30 (about two weeks after surgery) she harboured a right pneumonia with pleural effusion, caused by *Klebsiella pneumoniae*, that was treated always by intravenous therapy with Ceftriaxone and Ciprofloxacin twice a day, together with Amphotericin b and Amikacin once a day (Table 1). During the last month she was free from antimicrobial therapy, without infectious problems, but it was necessary to correct a persistent hypokalemia, presented by the patient from the first time. The patient was discharged after almost three months of hospitalization and she was well.

**DISCUSSION**

*R. ornithinolytica* is an encapsulated, aerobius, non motile, blood-borne Gram negative bacterium belonging to the family *Enterobacteriaceae* and frequently misidentified as *Klebsiella species*. It was first described by Kosako et al. in 1989 and it could be isolated in aquatic environments, insects, fish and brackish water[1]. It could determine fish poisoning because of its capacity of producing histamine and it could cause headache, red skin flushings, abdominal cramps, pruritis and rarely bradichardia, bronchospasm and hypotension. Over the years, *R. ornithinolytica* has emerged as infrequent responsible of human infections, reported in about ten cases linking the bacterium to bacteraemia, sepsis, soft tissue and other infections, as described by Nakasone *et al*[2] in their article about a case of community acquired urinary infection.

A very important report on clinical characteristic of *R. ornithinolytica* bacteraemia, focused the attention on its not so favourable outcomes, compared to other *Raoultella* bacteraemia, by analysing 16 patients (11 males and 5 females) over 10 years, with a mean age of 55.7 years, all but one having an underlying malignant condition and, among them, seven patients with infections associated with the biliary tract. They found that the overall mortality of *R. ornithinolytica* bacteraemia can be compared to that of other *Klebsiella species* and it’s reported to be about 20%-25%, with a worse outcome in patients with is a bacterium with potent virulence, very rare in clinical environments. In addition, from their analysis seems to emerge a sort of increased risk for *R. ornithinolytica* bacteraemia for patients affected by underlying malignant conditions extending to the biliary tract[3]. Even if some cases of biliary tract infection, urinary infection and bacteraemia have been reported, there is not much information about clinical features and outcomes of *R. ornithinolytica*. A very interesting review recently published by Seng and colleagues, representing the largest series reported by collecting data from four French Universities of about 86 cases over 12 years, underlines different important characteristics such as a high rate of hospital acquired infection (49%), with half of cases registered in 2015. Besides comorbidities and risk factors previously reported such as solid cancer, post-urethra trauma, post-invasive procedures, Seng et al. have found that half of the patients had diabetes or an immonudeficiency and, in this study they observed and described infections not previously reported, including pleural effusion, meningitis, cerebral abscess, etc. As regards the cerebral abscess described, it was secondary to a craniotomy for head trauma and not spontaneous as in this case[4].

The frontal lobe is the predominant site in patients with brain abscess secondary to paranasal sinusitis, so I have thought that the cerebral abscess of my patient was secondary to her sinusopathy but from her nasal culture was isolated only a low growth rate *Candida albicans*. The patient is diabetic and experienced a *Klebsiella pneumoniae* pleural effusion during the hospitalization, more than two weeks after surgery, so her case could not be referred to any condition previously described.

In summary this is the report of a rare case of brain abscess caused by *R. ornithinolytica* successfully treated, thanks to the synergy between intravenous antibiotics and prompt surgical operation. To the best of known literature, this case is the first cryptogenic brain abscess caused by *R. ornithinolytica*, with a MRI showing a complete surgical removal and no recurrence after more than one year (Figure 2). It could be important to focus the attention on this agent in order to better understand and eventually prevent, the occurrence of this potentially fatal condition.

**ACKNOWLEDGMENTS**

The author thanks Dr. Luigi Armignacco, Department of Infectious Diseases, San Carlo Hospital, Potenza (Italy), for his precious help, willingness and expertise in treating the patient. A special thank goes to Noreen Turyn for her precious support.

**COMMENTS**

***Case characteristics***

A 64-year-old woman with an inflammatory sinosupathy and, few days later, a visual loss from the right eye.

***Clinical diagnosis***

Fever and headache with visual disturbs.

***Differential diagnosis***

Central nervous system inflammatory conditions, cerebral abscess, meningitis, brain tumors.

***Laboratory diagnosis***

Nasal culture, microbiological examination of the cerebral mass surgically removed.

***Imaging diagnosis***

Magnetic resonance imaging with gadolinium revealing the presence of a right frontobasal brain abscess and a second mass partially occupying the right orbital cavity.

***Pathological diagnosis***

A certain amount of the mass content was sent for microbiological examination and a *Raoultella ornithinolytica* (*R. ornithinolytica*) was isolated by conventional microbiological tests.

***Treatment***

A right frontobasal craniotomy was performed and the abscessual capsule was widely opened and coagulated then, on the basis of antibiogram and after consulting the infectologist, the patient started an intravenous therapy with antibiotics.

***Related reports***

*R. ornithinolytica* is a Gram negative bacterium belonging to the family *Enterobacteriaceae* frequently misidentified as *Klebsiella species,* with potent virulence, very rare in clinical environments but determining a higher risk of bacteraemia for patients affected by underlying malignant conditions extending to the biliary tract.

***Term explanation***

*R. ornithinolytica* brain abscess is an extremely rare condition because, of over the years, the bacterium has mainly appeared as responsible for infrequent but important human urinary infections.

***Experience and lessons***

Even if it has not been described before, the brain abscess from *R. ornithinolytica* is a rare condition to be aware of in daily clinical practice in order to understand, prevent and treat it, through a synergy between prompt surgical operation and intravenous antibiotics.

***Peer-review***

This is a very interesting presentation about a rare ethiology for brain abcess. It's a case that reminds us to be aware of this condition in our daily practice. The paper is well structured and written.

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**P-Reviewer:** Grigoriadis S, Hall WA, Nagashima G, Nedelcuta RM

**S-Editor:** Kong JX **L-Editor: E-Editor:**

fig. 1.tif

**Figure 1 Preoperative images.** A: Magnetic resonance imaging with gadolium showing the presence of right frontobasal brain abscess and a second mass occupying the right orbit; B: Contrast enhanced computed tomography scan.

rm post one year later.tif

**Figure 2 Magnetic resonance imaging performed 14 mo after surgery.**

**Table 1 Scheme summarizing the antimicrobial drugs assumed by the patient during the hospitalization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Drug** | **Dosage** | **Administration Route** | **Days of therapy** | **Frequence of administration/d** |
| Ceftriaxone | 2 g | Intravenous | 50 | 2 |
| Amphotericin b | 50 mg | Intravenous | 20 | 1 |
| Amikacin | 500 mg | Intravenous | 12 | 1 |
| Ciprofloxacin | 200 mg | Intravenous | 11 | 2 |