Case Report

Brainstem abscess treated conservatively

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ABSTRACT

Background: Brainstem abscess is a rare condition with a variety of treatment approaches. In this paper, we report an unusual case of a brainstem abscess with a positive outcome in an immunocompetent patient who was treated with antibiotic therapy.

Case Description: A 22-year-old female presented with bilateral tetraparesis that was worse on the left hemibody, appendicular tremor, and left upper eyelid ptosis. Brain magnetic resonance imaging showed an abscess in the pons and midbrain due to possible nocardiosis. She was treated with dexamethasone, phenytoin, vancomycin, and meropenem for 8 weeks and trimethoprim-sulfamethoxazole for 6 weeks. The brain injury decreased, and the patient’s neurological status significantly improved.

Conclusion: Brainstem abscess may be treated conservatively, leading to improvement of the clinical condition and decreased lesion size on imaging.

Keywords: Antibiotic therapy, Brain abscess, Brainstem, Nocardia infections

INTRODUCTION

Brainstem abscess is an uncommon and severe condition.¹²,¹³ The pons and midbrain are more commonly affected than other brain regions.¹²,¹³ This condition is frequently associated with HIV and diabetes.¹² The most common causative microorganisms identified are Streptococcus spp., Staphylococcus spp., Listeria spp., Mycobacterium tuberculosis, Cytomegalovirus, Nocardia spp., Toxoplasma gondii, and Haemophilus influenzae type b (Hib).¹²,¹³,¹⁴

The clinical manifestations depend on the size and stage of the infection. Symptoms include fever, headache, vomiting (due to an increase in intracranial pressure), tetraparesis, and diplopia, with or without sepsis.⁹,¹²,¹³,¹⁶ Treatment depends on the clinical presentation, the affected area, and the etiology of infection.⁷

CASE REPORT

A 22-year-old immunocompetent female was referred to Ophir Loyola Hospital presenting a 6-day history of tetraparesis, which was worst in the left hemibody, appendicular tremor, and left upper eyelid ptosis. On admission, the Glasgow coma scale (GCS) was 13, and she presented tetraparesis,
which was worst in left hemibody, ataxia, hypoesthesia of the left side of the face and the left hemibody, left upper eyelid ptosis, right 6th cranial nerve paresis, right peripheral facial paralysis, vertigo, and nausea. She could not walk and was using a nasogastric tube. No other alterations were observed. Magnetic resonance imaging (MRI) of the brain showed an encapsulated lesion with peripheral contrast in the brainstem (pons and midbrain), suggestive of abscess; after spectrometric study, the lesion measured 18.7 mm axially and 23.2 mm sagittally [Figure 1]. In addition, chest computed tomography (CT) showed a right pulmonary intraparenchymal lesion suggestive of fungus, and biopsy of the collected pulmonary fragment demonstrated pulmonary tissue and bronchial mucosa without significant histological changes and with no granulomas or atypia. All bacterial cultures and serological tests were negative. The liquor was cloudy and purulent, with 15872 cells, 85 erythrocytes, 100% polymorphonuclear leukocytes, and total protein: 149 mg/dL. Therapy with vancomycin (2 g/day), meropenem (3 g/day), and dexamethasone was introduced. On the 4th day of hospitalization, phenytoin was added to the therapeutic regimen. Every 15 days, MRI of the brain was performed to monitor evolution, and the images indicated a gradual decrease in the size of the abscess.

On the 42nd day of hospitalization, the patient underwent a new chest CT that showed improvement in lung injury, and a presumptive diagnosis of nocardiosis was established by a pneumologist. Thus, trimethoprim-sulfamethoxazole (160 mg + 800 mg) was added to the antibiotic regimen.

On the 49th day of hospitalization, after 8 weeks of vancomycin and meropenem and 2 weeks of trimethoprim-sulfamethoxazole, the patient was discharged. On physical examination, she was conscious and oriented, with GCS 15 and normal reflexes, presenting retardation of movement of the arm, strength graduated on 4/5 of the left arm, and hypoesthesia of the left hemibody. In addition, the patient presented with right 6th cranial nerve paresis and right peripheral facial paralysis and did not walk. The image examination showed a lesion measuring 4.9 mm (axially) × 11 mm (sagittally) [Figure 2]. The patient was prescribed outpatient treatment with ciprofloxacin (500 mg/day) for 2 weeks and prednisone (40 mg/day) for 2 months, and trimethoprim-sulfamethoxazole (160 mg + 800 mg) was maintained for more 30 days.

After 2 weeks, she returned to the neurosurgery ambulatory service; she was walking with support and had right 6th cranial nerve paresis, right peripheral facial paralysis, diplopia, and GCS 15.

DISCUSSION

Here, we described the evolution of a case of a female patient who was treated at the neurosurgery service of a hospital for brainstem abscess after pulmonary nocardiosis. She was treated with antibiotic therapy, which resulted in improvement of neurological condition and neuroimaging, with a decrease in lesion size of 13.8 mm axially and 12.2 mm sagittally.

Drug therapy must be considered the first choice for brainstem abscesses, principally due to the difficulty of surgical access. We found 14 case reports describing antibiotic therapy for the treatment of brainstem abscesses. A summary is shown in [Table 1]. The outcomes of those case reports support our outcome.
**Table 1**: Clinical summary of patients with brainstem abscess treated with antibiotics only.

| References         | Year | Sex/age (year) | Presenting symptoms                                                                 | Location                                      | Organism                                      | Empiric treatment                                      | Etiologic treatment                                      | Outcome                                      | Size of abscess after treatment |
|--------------------|------|----------------|-------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|------------------------------------------|----------------------------------|
| Kumar et al.       | 2017 | Female/0.8     | Left eye medial rectus palsy and plantar reflexes were flexor                       | Midbrain, pontine, right basal ganglia, thalamus, and corona radiata | *Burkholderia pseudomallei*                  | Ceftriaxone and vancomycin for 5 days                  | Meropenem for 6 weeks and cotrimoxazole for 6 months       | No residual neurological deficits               | n.m.                             |
| Chen et al.        | 2013 | Male/59        | Right 6\textsuperscript{th} cranial nerve palsy, mild ptosis, dysmetria, and left-sided facial, and body paresthesia | Pons                                           | n.m.                                          | Ampicillin/ sulbactam (4.5 g/day), ceftriaxone (4 g/day), clindamycin (600 mg) and betamethasone (12 mg/day) | Voriconazole, linezolid, ceftriaxone, and metronidazole | n.m.                                      | Left-sided facial dysesthesia            | Decreased                       |
| Chow et al.        | 2013 | Male/60        | Diplopia, gait instability and right facial droop                                    | Right posterior pons                           | *Nocardia farcinica*                         | Ceftriaxone and linezolid                                | Meropenem and vancomycin for 6 weeks                    | Without neurological deficits               | Decreased                       |
| Faisant et al.     | 2012 | Female/28      | Babinski’s sign on the left and anisocoria                                           | Right frontal lobe, right peduncle, left internal capsule | *Neisseria meningitidis group B*             | Amoxicillin/ sulbactam (10 g/day)                      | Amoxicillin and ceftriaxone for 6 weeks                  | Without neurological deficits               | Punctiform lesion of the right cerebral peduncle     |
| Tanaka et al.      | 2011 | Male/67        | Diplopia, dizziness, and dysesthesia of the left upper and lower extremities         | Right pons                                     | n.m.                                          | Meropenem (6 g/day) for 2 months                        | Meropenem and cotrimoxazole for 6 months               | Neurological deficits improved             | Without abscess                    |
| Ramalho et al.     | 2008 | Female/68      | Hypoesthesia on the right, right cerebellar alteration, alteration of the 3\textsuperscript{rd}, 4\textsuperscript{th}, 5\textsuperscript{th}, 6\textsuperscript{th}, and 7\textsuperscript{th} cranial nerves | Pons, left middle cerebellar peduncle, and midbrain | *Streptococcus viridans*                      | TMP-SMX, metronidazole, vancomycin, and fluconazole     | Meropenem and cotrimoxazole for 6 months               | Patient’s neurological status significantly improved | n.m.                             |
| Ricard et al.      | 2008 | Male/63        | Meningeal signs, right hemiparesis and Parinaud syndrome                             | Left peduncle                                  | *Listeria monocytogenes*                     | TMP-SMX (3200 mg-640 mg/day) and cefotaxime 8 g/d for one day | Amoxicillin (8 g/day) for 1 month and Gentamicin Ampicillin (8 g/day) for 8 weeks and gentamicin (300 mg/day) for 4 weeks | Right hemiparesis and left 3\textsuperscript{rd} cranial nerve palsy | n.m.                             |
| Soares-Fernandes et al. | 2008 | Female/46     | Comatose, with conjugate eye deviation to the right, left hemiparesis and neck stiffness | Right thalamus, basal ganglia and frontal white matter and midbrain | *Listeria monocytogenes*                     | *Listeria monocytogenes*                              | Amoxicillin (8 g/day) for 1 month and Gentamicin Ampicillin (8 g/day) for 8 weeks and gentamicin (300 mg/day) for 4 weeks | Slight bilateral restriction of ocular abduction and moderate left-sided hemiparesis (grade 4/5) | Residual enhancement in the right basal ganglia |

(Contd...)
| Year | Sex | Age | Presenting symptoms | Location | Organism | Empiric treatment | Etiologic treatment | Outcome | Size of abscess after treatment |
|------|-----|-----|---------------------|----------|----------|-------------------|--------------------|---------|--------------------------------|
| 2006 | Male | 24  | Vertigo, dysarthria, dysphagia with pharyngeal and palatal areflexia, nystagmus, paresis with paresthesia of the right leg, positive Romberg and neck stiffness | Dorsal region of the brainstem and deep structures of the left hemisphere | Listeria monocytogenes | Ceftriaxone, doxycyclin and acyclovir for 6 weeks | Ampicillin for 6 weeks, Gentamycin for 10 days and dexamethasone | Without abscess | Without abscess |
| 2004 | Male/11 | Midbrain and pons | Partial palsy, a dilated sluggishly reacting pupil, and restricted elevation and abduction involving the left eye, right leg positive Romberg and neck stiffness | Right pons | Crystalline penicillin, cloraminophenicol, metronidazole and dexamethasone | Metronidazole (1500 mg/day) and ceftriaxone (4 g/day) for 6 weeks | n.m. | Without abscess | Palatal and pharyngeal areflexia and slight dysmetria |
| 2000 | Male | 33  | Partial palsy, a dilated sluggishly reacting pupil, and restricted elevation and abduction involving the left eye, right leg positive Romberg and neck stiffness | Right pons | Crystalline penicillin, cloraminophenicol, metronidazole and dexamethasone | Metronidazole (1500 mg/day) and ceftriaxone (4 g/day) for 6 weeks | n.m. | Without abscess | Without abscess |
| 1996 | Male/62 | Midbrain and lower pons | Partial palsy, a dilated sluggishly reacting pupil, and restricted elevation and abduction involving the left eye, right leg positive Romberg and neck stiffness | Right pons | Crystalline penicillin, cloraminophenicol, metronidazole and dexamethasone | Metronidazole (1500 mg/day) and ceftriaxone (4 g/day) for 6 weeks | n.m. | Without abscess | Without abscess |
| 1994 | Female | 31  | Partial palsy, a dilated sluggishly reacting pupil, and restricted elevation and abduction involving the left eye, right leg positive Romberg and neck stiffness | Right pons | Crystalline penicillin, cloraminophenicol, metronidazole and dexamethasone | Metronidazole (1500 mg/day) and ceftriaxone (4 g/day) for 6 weeks | n.m. | Without abscess | Without abscess |
| 1989 | Male/26 | Midbrain and medulla | Partial palsy, a dilated sluggishly reacting pupil, and restricted elevation and abduction involving the left eye, right leg positive Romberg and neck stiffness | Midbrain and medulla | Crystalline penicillin, cloraminophenicol, metronidazole and dexamethasone | Metronidazole (1500 mg/day) and ceftriaxone (4 g/day) for 6 weeks | n.m. | Without abscess | Without abscess |

*n.m.: Not mentioned. TMP-SMX: trimethoprim-sulfamethoxazole*
Empirical treatment with broad-spectrum antibiotics must be started immediately and maintained for 6 to 8 weeks or more, with sequential brain MRI to monitor the effectiveness of the treatment every 2 weeks.\textsuperscript{[2,9,12,13,15]} The antibiotic used may be vancomycin or meropenem at high doses.\textsuperscript{[26]} After diagnosis or presumed diagnosis of microorganisms that might cause symptoms, the drug must be reviewed.

Infections caused by nocardia may affect the skin, lung, and lymph nodes and may disseminate to the central nervous system (CNS).\textsuperscript{[5,24]} Chest images may demonstrate a single or multiple nodules or a cavity.\textsuperscript{[13]} The treatment recommended by experts is trimethoprim-sulfamethoxazole for 12 months in cases of brainstem abscess.\textsuperscript{[1,3]}

In this case report and literature review, we showed that conservative treatment of brainstem abscess may lead to a positive outcome.

\textbf{Declaration of patient consent}

The authors certify that they have obtained all appropriate patient consent.

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Nil.

\textbf{Conflicts of interest}

There are no conflicts of interest.

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