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A 26-year-old woman with brainstem abscess at third trimester of pregnancy: Case report

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ABSTRACT

We describe an unusual case with a modified treatment approach in an interdisciplinary setting, of a pregnant woman with a pyogenic pontine abscess. After acute cesarean section, contrast-enhanced MRI confirmed the finding of severe pontine abscess. The patient was treated with antibiotics, glucocorticosteroids, and acute stereotactic evacuation. She improved during eight weeks of treatment with antibiotics and steroids, and the postoperative MRI showed reduction in abscess size and brainstem edema. The patient recovered to a near-normal state of CNS function, with only slight sensory deficits remaining at the nine-month follow-up. The suggested main cause of successful outcome in this rare case was acute stereotactic evacuation of the pontine abscess in combination with postoperative cavity injection of antibiotic solution (Vancomycin 5 mg) and modified broad-spectrum antibiotics due to the polymicrobial etiology. The main bullet point and the aim of this article is to emphasize the importance of modified antibiotic treatment in combination with an interdisciplinary approach for related cases.

1. Introduction

Intracranial abscess is a rare, but serious condition with significant morbidity and mortality [1] and a life-threatening brain abscess requires emergency drainage as previously described [2]. Streptococci and staphylococci are causative agents in 34% and 18% of the cases, respectively. Most patients with intracranial abscesses have predisposing conditions but not all have a known infectious origin [3]. This was the case in the presented case report. The mortality rate has decreased from 40% to 10%, and full recovery rate has increased from 33% to 70% [1,4]. This might be due to improved and modified antibiotic treatments and neuroimaging in addition to modern Fluorescein-guided neurosurgery for puncture and decompression [3]. Of all brain abscesses, only a minority are found in the brainstem [3,5]; we present a case of pontine abscess in a young pregnant woman where these techniques were employed by a multidisciplinary team with the requirement of several modification steps for the antibiotic treatment. The fact that our patient was diagnosed with pontine abscess co-existing with a pregnancy at the third trimester was considered to be a result of an immunological alteration during pregnancy.

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2. Case report

A 26-year-old previously healthy pregnant woman (gestation week 33 + 5) was hospitalized with four days history of headache and dizziness. She developed photophobia and diplopia at day 1 of admission, and presented with GCS 15, nystagmus, left side abducens paresis, right arm paresis and bilateral Babinski’s sign. Contrast-enhanced MRI demonstrated a left side 25 × 19 × 28 mm pontine lesion, with surrounding edema. 18F-FDG PET/CT did not show any other origin of infection. The patient had not had any recent dental or otorhinolaryngological surgical procedures prior to admission, and she had no history of drug abuse. Transthoracic and transesophageal echocardiography was normal. Blood leukocyte count and C-reactive protein were normal. Treatment was initiated after MRI with 100 mg Prednisolone daily and 5 million units Benzylpenicillin four times daily, i.e. a similar approach as described by Chaovarin et al. [7]. This was our final antibiotic modification, and the treatment duration time was eight weeks. At discharge, she had GCS 15, a slight left-sided facial palsy, slight deviation of her tongue and uvula, and improved right-side motoric function. Ambulation was normal with a walking cane due to persistent sensory disturbances and reduced right-side coordination. At the follow-up nine months after the re-puncturing, the MRI showed a significant abscess size reduction and reduced surrounding brainstem edema (Fig. 4). Her clinical status in terms of feeding, speech, and daily life activities was normal. The only residing neurological deficit was left-sided V1-V3 analgesia.

3. Discussion

Brainstem abscess is a rare and serious condition. Due to high morbidity and mortality, it is important to diagnose the lesion early. Identified predisposing factors include immunodeficiencies, cancer, congenital heart disease, and infectious endocarditis. Intravenous drug abuse and diabetes are moreover described as known risk factors [8,9]. For the presented case, our patient was previously healthy and had none of the predisposing factors. However, it is well-known that brainstem abscesses occur through the spreading of pathogens from adjacent regions (e.g. ear infection) or by hematogenous spreading (infective endocarditis, for example), but the underlying infection is not always
Fig. 2. MRI, axial plane, at pons level. Upper row (A–C): Before the first stereotactic puncture. MRI demonstrating a lesion in the pons with smooth ring enhancement on T1 + Gd. Centrally located high DWI signal and low ADC signal representing a true restricted diffusion pattern compatible with an abscess. Lower row (D–F): At the follow-up, MRI showing diminished lesion size.

Fig. 3. The intervention planning was gained by using the Stealth S8 navigational system for the left side pontine abscess. The image shows the entry point and the target in coronal, sagittal and axial plan, and the 3D model. Target alignment error was < 2 degrees. The stereotactic puncture was performed in general anesthesia and after 1 cm burr hole procedure 6 cm from the midline and 3 cm under the left lambdoid suture. After dural opening the transpeduncular penetration was guided by a navigus probe, and then by a 1 mm aspiration needle introduction, where the trajectory was followed (blue line) to the target (center of the red cross). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)
As in our case, development of brainstem abscess without known etiology and co-existing with pregnancy at the third trimester was likely a coincidence. However, a likely role of reduced immune response (primarily adaptive immune response) during pregnancy as noted by Curcio et al. can be suggested as a primary cause, resulting in polymicrobial opportunistic infection, and leading to the development of pontine abscess [11]. The pontine lesion was not found to be associated with primary infectious focus and the patient presented normal immunological status both prior to pregnancy and postpartum.

In critically ill patients, pontine lesions might lead to both motor and sensory deficits of a wide variety, including reduced consciousness and respiratory and circulatory failure, which might explain the significant mortality associated with these lesions. The severe bradycardia as noted for our patient was thought to be related to the critical compression of the brainstem. Because of the rarity and the complexity of this case, management of the pontine abscess could not be followed by a single protocol. However an interdisciplinary approach was thought to be highly important, with several antibiotic treatment modifications and protocol. However an interdisciplinary approach was thought to be related to the critical compression of the brainstem. Because of the rarity and the complexity of this case, management of the pontine abscess could not be followed by a single protocol. However an interdisciplinary approach was thought to be highly important, with several antibiotic treatment modifications and Vancomycin injection into the postoperative cavity. A decision of performing stereotactic evacuation was based on the most minimally invasive rule.

Open surgical decompression has previously been used, but current neurosurgical treatment most often utilizes navigation-aided puncture and aspiration, which has demonstrated similar outcomes as compared to open surgery and fewer deficits after surgery [12]. Conditions that might argue for open surgery with intraoperative neuromonitoring include a multilobulated abscess that can be hard to empty completely stereotactically. When a brainstem abscess is demonstrated, empirical antibiotic treatment usually involves antibiotics that enter the central nervous system and provide broad-spectrum coverage of gram-positive and gram-negative bacteria as some of these infections are polymicrobial [6,10]. A polymicrobial nature was present in our case, associated with a rare pathogen causing intracerebral infection, as described by Chaovarin et al. [7]

For the presented case report, the first brainstem abscess stereotactic puncture and aspiration was performed without post-drainage administration of antibiotics into the post-operative cavity. It was only after the re-puncturing, in combination with Vancomycin injection into the post-operative abscess cavity, intravenous Meropenem, and then Ceftriaxone and Metronidazole treatment for eight weeks, that the patient recovered from the infection. The role of antibiotic injection into brainstem abscess post-drainage cavity is unclear. There are only few publications on similar topic and primarily focusing on supratentorial brain abscesses [3,13,14]. Ranging from 0 – 43% the abscess cultures can be found negative [3], and intravenous administration of antibiotics can predispose for negative culture, if they are administered before the puncture. After the initial culture, the antibiotic treatment in our case was changed to monotherapy with Benzylpenicillin. For cerebral abscesses in general and with growth of streptococci, the microbiological etiology is often polymicrobial and includes anaerobic bacterial etiology. This may have contributed to the need for the second stereotactic evacuation in our case. It is therefore important to consider the risk of anaerobic bacteria when deciding on antibiotic therapy, and the addition of Metronidazole should be considered for treatment of concomitant anaerobic infection. For brain abscesses in general and perioperative drug treatment e.g. with steroids the mean seizure-free survival time has been shown to have no significance [13]. Steroids might have benefits if significant surrounding edema is present with a risk of brainstem herniation. A similar study as that by Lee HS et al. [13] is needed to answer if perioperative and abscess post-drainage cavity Vancomycin injection, as in our case, is to be recommended in treatment of patients suffering from brainstem abscess and awaiting neurosurgery.

4. Conclusion

Opportunistic polymicrobial infection during pregnancy and the development of pontine abscess is presented by this rare case. Due to severe clinical deterioration and GCS 13 an acute cesarean section was performed, followed by stereotactic evacuation of the pontine abscess. We conclude that our patient and her child both survived and against all odds only because of the interdisciplinary approach. We additionally suggest that Vancomycin injection into the postoperative cavity after stereotactic pontine abscess evacuation should be considered in similar rare cases.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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