

BRAIN ABSCESS IN A PEDIATRIC PATIENT: CASE REPORT AND LITERARY REVIEW

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Abstract: The study is a Case Report on “Brain Abscess”, which was treated in the pediatric ward of a Municipal Hospital in Rio de Janeiro, in 2021. This disease is characterized by being a focal suppurative infection (neutrophils and necrotic tissue) located within the brain parenchyma, caused by a variety of bacterial, fungal and parasitic organisms. Disorders that predispose to Brain Abscess include otitis media, paranasal rhinosinusitis, pyogenic infections of the chest, head trauma, among other sites that usually proliferate hematogenously (25%). The most important pathogens are Streptococcus, Enterobacteriaceae, anaerobes and staphylococci, and their clinical manifestations reflect a triad characterized by the infectious nature of the lesion, focal brain involvement and progressive intracranial mass effect, with the evolution of signs and symptoms being extremely variable, and may present as headache, altered consciousness, fever, neck stiffness, nausea and vomiting to convulsive crises, dysarthria, hemiparesis and sepsis. Currently, there are two types of treatment for this disease in pediatric patients, the first aspect being the indication of the use of intravenous antibiotics to treat the infection and in more severe cases, surgical interventions are recommended for a better prognosis of these patients.

Keywords: Suppurative Infection. Brain parenchyma. pathogens.

INTRODUCTION

Brain abscess is characterized as an infectious collection located in the brain parenchyma, which can arise after trauma, neurosurgery and infections, usually bacterial, spreading directly or hematogenously.

Clinical findings mostly depend on the duration of the disease, but tend to present a classic triad of symptoms, which are fever, headache and focal neurological signs. As it

is a situation that can also present with non-specific signs and symptoms, it is noted that its diagnosis can become difficult and often late.

Its management includes treatment with antibiotics and surgical drainage, either by needle aspiration or neurosurgical excision.

A study with pediatric patients showed that meningitis was the most prevalent infection in the course of Brain Abscess, followed by sinusitis and acute otitis media.

Currently, we can find in the bibliographies described on the subject that brain abscess is a rare disease that affects 1.8 individuals per 100,000 inhabitants throughout the year. This being considered a complication that generates low mortality, around 10% within the group of children and adolescents who are affected.

METHODOLOGY

This work will discuss a clinical case described by medical students under the supervision of the guiding professor. Throughout this scientific study, the case of a boy who was admitted to the Municipal Hospital of Rio de Janeiro, with symptoms of intense frontal headache, emesis and pyrexia, will be portrayed, carrying a previous diagnosis of bacterial Meningitis and Brain abscess for an evaluation with the neurologist. Therefore, a more in-depth debate on the topic and the conduct carried out in the case in question.

A bibliographic search was carried out in order to find scientific studies that could propose a basis for the dissertation of the theme, through three independent researchers in the databases of PubMed, Scielo and Google Scholar, through descriptors with Brain Abscess, Case reports on Brain Abscess, Brain Abscess in pediatric patients, among others. It focused on articles in Portuguese and English, serving as exclusion criteria for this study,

studies that we consider outdated on the case.

CASE PRESENTATION

03/01 – HC:32450 Leuco 11 B 73 Seg 9 Linf 688 mil PCR: 2,29

- Skull CT: No signs of ICH or gross changes.

04/01 - HC:37590 Leuco 13 B 71 Seg 12 Linf 724 mil PCR: 2,57

06/01 - HC:22770 Leuco 05 B 78 Seg 14 Linf 695 mil PCR: 2,13

- Negative liquor culture.
- Assessed by Neurosurgery, with no indication for surgery, with ATB guidance for 6 weeks and MRI of the Skull in 3/4 weeks or in case of clinical worsening.

08/01- Hospital internment

Imaging: Poorly defined hypodense areas with imprecise boundaries in the left frontal lobe. Frontotemporoparietal extra-axial hypodense image on the left, measuring approximately 0.5 cm in maximum thickness, with faint peripheral enhancement by contrast medium (which may correspond to an abscess). Suggested to continue diagnostic investigation. Correlate with clinical and laboratory data.

- Blood Tests: TGO: 96, TGP: 102.5, CPK: 31, Glucose: 113
- On examination: Spontaneous eye opening, responsive, aphasic. With 02 episodes of epileptic seizures (on the day).
- Started Phenytoin.
- Already using Ceftriaxone (D6), Vancomycin (D3), Acyclovir (D5) and Metronidazole (D2). Did 05 days of Dexamethasone.

10/01 - Left frontotemporal subdural empyema drainage was performed by Neurosurgery

- He continues to use Ceftriaxone, Vancomycin, Metronidazole and

Phenytoin.

11/01 - Collaborative patient, with good peripheral capillary refill. SatO₂; 98%, HR 103 bpm, BP: 107 x 63 mmhg, with no changes reported on physical examination.

12/01 - He is still using Ceftriaxone, Vancomycin, Metronidazole and Phenytoin

15/01 - Leuco 14600 0/3/0/0/5/65/20/7

- PCR 8,1

17/01 - Patient denies any complications and/or seizures.

- 7th postoperative day. Discharge to the infirmary.

22/01 – Leuco 7300 0/3/0/0/2/66/23/1

- PCR: 5,8

27/01 – Leuco 7700

- PCR 4,4

31/01 – 21st postoperative day. He continues to use Ceftriaxone, Vancomycin and Metronidazole.

- Reported nausea and one episode of vomiting in the last 24 hours

01/02- Patient with no reported changes.

02/02- Patient with no changes reported.

03/02 – Patient with no reported changes

- Leuco 6700
- PCR 2,1

07/02 – Patient with no reported changes

- Skull CT: Enlargement of the CSF space in the retrocerebellar region, which may correspond to megacistern or arachnoid cyst.
- Mucosal thickening of the left frontal sinus and sphenoid sinuses.

08/02 - Leuco 7000

- PCR 2

10/02 – Hospital discharge

DESCRIPTION OF THE HEALTH-DISEASE PROCESS

The two routes of infection for triggering brain abscess are: direct infection by contiguity or dissemination via hematogenous route.

Thus, direct infection by contiguity

develops from areas proximal to the brain region, an example of situations that can lead to this prognosis: head trauma, dental abscess, otitis and primary neurosurgery.

In scenarios of contamination via hematogenous, conditions that can cause brain abscess are: pulmonary disease, underlying heart disease, foci of infection (intra-abdominal, cutaneous, dental), among others.

Under this logic, a possible brain abscess must be suspected in pediatric patients in the following circumstances: intracranial hypertension in the presence of an adjacent infectious focus, skull fracture, aseptic meningitis with neurological signs of cranial or focal hypertension, fever in addition to hemiparesis and congenital heart disease, hemiparesis plus purulent meningitis, among others.

In this sense, other contexts that favor the appearance of brain abscess are highlighted: immunocompromised patients, transplant patients and patients using immunosuppressive drugs.

Therefore, it is worth mentioning the main agents that cause brain abscess, among them are anaerobic bacteria and the most evident in this group are: anaerobic streptococci, *Bacteroides* spp, *Prevotellamelanogenica*, *Cutibacterium*, among others.

Regarding aerobic GRAM positive bacteria, the main ones are: *Streptococcus Viridans*, *Streptococcus Milleri*, *Streptococcus Microaerophiles*, *Streptococcus Pneumoniae* and *Staphylococcus Aureus*. Regarding aerobic GRAM negative bacteria, it is worth mentioning: *Klebsiella pneumoniae*, *Pseudomonas* spp, *Escherichia coli*.

THEORETICAL FOUNDATION

Brain abscess is a neurological disease that consists of the accumulation of purulent secretion in the region of the brain

parenchyma that can expand and rupture in some cases. This organic dysfunction can be caused by opportunistic bacterial infections in pediatric patients, as well as infections by the human immunodeficiency virus (HIV), primary immunodeficiency, neoplasms, autoimmune conditions and patients who use chemotherapy, radiological procedures or drugs. immunomodulators of the immune system, have a greater predisposition to develop the disease.

Patients usually present a classic clinical triad during the manifestation of disease symptoms that progress with fever, headache and focal neurological signs. However, in some cases, this condition may be associated with the onset of convulsions, drowsiness, nausea, vomiting and papilledema. According to a case study carried out at Hospital Pequeno Príncipe, symptoms such as headache, seizures and drowsiness were present in most of the cases evaluated.

This is a disease that is difficult to diagnose and presents nonspecific signs and symptoms, which is why many patients end up receiving clinical evidence of the disease late, so if it is not treated in a timely manner, the patient can progress to a poor prognosis. Therefore, even today the best diagnostic method for this disease is through imaging. The gold standard exam is magnetic resonance imaging with contrast due to its high resolution and low toxicity index of the substance administered to the patient, but it can be replaced by computed tomography with contrast, if the former is not available at the institution where the service is provided.

Characteristically, the CBT of the patient with brain abscess presents an annular contrast enhancement and edema surrounding the lesion (FICA; BUSTOS; MIRANDA, 2006). According to studies, lumbar puncture is still a questionable diagnostic aid method, while it may not show changes in 16 - 30% of cases.

A case study, carried out with patients between 2 and 15 years old diagnosed with brain abscess, showed that all patients developed the disease due to a previous infection. The most recurrent infection is meningitis, followed by sinusitis and acute otitis media. These infections can be termed as opportunistic infections, where the host will benefit from a weakened immune system in order to develop and generate the disease.

It was observed in scientific studies that the brain abscess is formed in four distinct stages, two in the initial phase and two in the final phase, namely:

- Early cerebritis phase = Infection and inflammation processes occur between one to three days after the onset of infection. During this stage, there is infiltration of neutrophils and development of the area of brain necrosis, developing a region of succinct edema around the inflammatory lesion.
- Late cerebritis stage = It occurs between the fourth and ninth day after the date of infection and it is possible to observe a growth in the area of necrosis, with the appearance of vascularization around the lesion associated with an important process of edema.
- Encapsulated phase = During this stage, we can call the lesion that was forming as a purulent exudate composed of necrotic tissue and viable neutrophils. A capsule also begins to form in this same phase, which will envelop the purulent lesion until the formation of the necrotic center is completed.
- Late capsule phase = It begins after the fourteenth day of brain abscess formation and is caused by the formation of granulation tissue that is positioned between the necrotic tissue and the viable tissue, as well as by the complete formation of the capsule that

already has the well-defined necrotic center.

Assessing the pathological development of this disease, it can develop in two ways, they are: Unicentric or Multifocal. Most cases are unicentric, resulting from a pericranial infection. Furthermore, when we refer to multifocal involvement, we are talking about disseminated hematogenous diseases, such as bacterial endocarditis.

The treatment currently used for pediatric patients consists of the administration of intravenous antibiotic therapy, which may vary according to the result of the GRAM stain and the source of this abscess, or the indication for treatment of the most prevalent germs. control the infectious process. In cases where the patient has an increase in ICP in order to reduce cerebral edema, the administration of Dexamethasone 10mg intravenously is recommended.

In some cases, surgical procedures, known as craniotomy, are indicated, as well as open drainage guided by computed tomography or stereotaxic, which is a procedure to drain the brain abscess.

Surgical treatment is indicated for patients with abscesses with a diameter greater than 2 - 3 cm, with a mass effect or after failure of medical treatment (CALFEE & WISPELWEY, 2000).

RESULTS

Through a retrospective observational analysis, we can review the case reported above in which a 9-year-old male patient admitted to the Miguel Couto Municipal Hospital, reporting a sudden onset of motor aphasia, fever for 5 days, which progressed to two episodes of partial epileptic seizure.

On imaging, an extra-axial hypodense fronto-temporo-parietal region was found on the left, measuring approximately 0.5 cm in maximum thickness, with a slight peripheral

enhancement by the contrast medium, generating a diagnostic hypothesis of brain abscess.

This patient started using some medications, such as: Ceftriaxone 1g 12/12 hours, which consists of an antibiotic for intravenous (IV) use capable of eliminating the excess of bacteria that were infiltrating his body. Vancomycin 450mg 6/6 hours, which is a tricyclic glycopeptide antibiotic and acts by inhibiting bacterial cell wall synthesis through its high affinity binding with the ends of D-alanyl-D-alanine, being unable to penetrate the membrane of the gram-negative bacteria. Metronidazole 80mg 8/8 hours is an active that acts against anaerobic organisms, being a prodrug that holds compounds in the transport of electrons with action potential, when metronidazole receives an electron it transforms into highly reactive nitroradicalanionic, which it has the ability to destroy susceptible organisms in the face of the action of its radical on DNA. Phenytoin 3mg/kg/day orally, which is a drug that exerts anticonvulsant action without causing depression in the patient's Central Nervous System, generating effects on sodium channels, reducing the speed of its recovery after inactivation and Dipyrone in case of fever or pain.

In view of this analysis of the therapeutic approach proposed for the patient in question, we believe that the therapeutic approach offered to him was adequate and consistent with the symptoms and clinical history reported in his anamnesis, having presented a good evolution in the condition.

FINAL CONSIDERATIONS

This work was of relevant importance for the medical students who were involved in the development process of this scientific work, since it is a disease with insidious characteristics, but which can lead to

serious conditions. Therefore, attention and knowledge are necessary when performing the physical examination of the individual, since false diagnoses can occur, especially in its initial phase, delaying the correct start of treatment and possibly leading to a possible worsening of the condition. The importance of constant updating and improvement of the professional is notorious, thus expanding their knowledge of the most diverse existing pathologies, so that they can better direct the management of this disease.

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