
Case report

Rare case of pyogenic brain abscess in a immunocompetent children caused by *Streptococcus intermedius*

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Background:

Brain abscess is rare but life-threatening infection in children. It caused by parameningeal infections like otitis, sinusitis and mastoiditis.

Case description

A twelve-year-old boy without any antecedent was admitted to the emergency room with complaints of palpebral tumefaction increased after treatment of ethmoiditis. A cranial computed tomography (CT) examination showed an intra-orbital abscess 23 x 17mm with intracranial extension. The patient underwent surgery to drain abscess. A microbiological sample was sent to the laboratory and empirical antibiotic treatment with ceftriaxone, gentamicin and metronidazol were started. The therapy was continued for four weeks. Postoperative cranial CT examination showed a resolution of the abscess. The child was discharged without any sequelae.

Discussion

This risk is much more present in children with immunodepressed state and congenital heart disease. *Streptococcus intermedius* is commonly found in oral, oropharyngeal, or gastrointestinal flora, which can cause brain abscess rarely in children. Brain abscess still induce a mortality relatively high, even if advancement of imaging techniques, the association between surgical drainage and antimicrobial therapy.

Conclusion

Our case is one of the few reported cases of brain abscess caused by *S. intermedius* in an immunocompetent child. The rapid management of this case at diagnostic and therapeutic made it possible to heal completely the child and change the outcome.

INTRODUCTION

Brain abscesses are rare and life-threatening complication and frequently caused by otic infection, as well as penetrating head trauma and neurosurgery, and bacterial endocarditis [1]. Furthermore, dental disease can be also the origin of brain abscesses. [2,3].

The prognosis of the brain abscesses was changed in the second part of the 20th century, essentially by the development of antibiotics with good cerebral diffusion. Although the use of new tools of diagnostic like (tomodensitom Surgery, stereotactic biopsy, resonance imaging (Magnetic Resonance Imaging) contribute to make an accurate diagnosis [4]. Before the 1970s, streptococci Aerobic, *Staphylococcus aureus*, pneumococci and enterobacteriaceae were the most common bacteria incriminated in the formation of brain abscesses [4,5]. Several cases reported of brain abscess due to *S. intermedius* in adult but it still rare in children [5-7].

Streptococcus anginosus is a group of streptococcal species that includes *S. anginosus*, *Streptococcus intermedius*, and *Streptococcus constellatus*. Before they were formerly and collectively, known as the single species, *Streptococcus milleri*. [8] Members of the *S. anginosus* group possess proteolytic enzymes that cause necrosis of tissue and promote abscess formation [9].

Although relatively rare in children and the mortality rate seems to be decreasing, they still have a high mortality and morbidity [10].

We report a rare case of brain abscess in an immunocompetent child caused by *S. intermedius*, which is commonly found in oral, oropharyngeal, or gastrointestinal flora.

Case report

A twelve-years-old boy without special pathological antecedent, he was referred to our hospital. Before admission, he was treated 15 days before for ethmoiditis by cefixime and corticoids. Furthermore, the infection evolution expanded to a right palpebral tumefaction.

In the emergency department, the patient was conscious with good hemodynamic status. He denied headache or weakness.

The clinical examination showed no fever and no neck stiffness. On the other hand, he presents an inflammatory swelling in right periorbital with palpebral occlusion without other associated signs.

Laboratory tests reveal a white blood cell of 21,000/ μ L (normal range 4000-10,000) and neutrophils at 18,000/ μ L (normal range 2500-7500), C-reactive protein of 44 mg/dL

(normal range 0-5) and normal biochemistry values. A peripheral blood cultures were obtained and incubated at BactAlert (Biomérieux France) for both aerobic and anaerobic bottles.

The computed tomography was realized and indicated an intra-orbital abscess 23 x 17mm with intracranial extension (extra-dural empyema) and facial pansinusitis. (**Figure 1**)

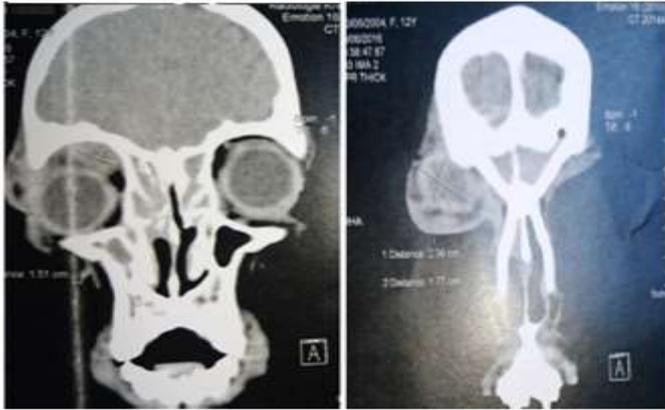


Figure 1: Contrast enhanced scan showing an intra-orbital abscess with intracranial extension

An emergency intervention surgery was done. The drainage of abscess removed 100 cubic centimeters of purulent fluid, and sent to the laboratory for bacteriological and mycological studies. An empirical antibiotic treatment with ceftriaxone (2g/day), gentamycin (80mg/day) and metronidazol (1g/day) were started. The others infections investigations were negative such as HIV, tuberculosis diagnostic test (smear and culture). Echocardiography was also performed and any congenital or acquired heart disease was detected.

The puncture of the pus was rapidly sent to the laboratory of Microbiology. Gram staining was realized and it has showed a very important cellularity made of neutrophils cells and a very abundant flora made of Gram-positive cocci. A systematic culture is carried out in chocolate agar plate which added a polyvitamin complex, Columbia agar supplemented with 5% defibrinated horse blood agar, and Sabouraud chloramphenicol agar (**Figure 2**).



Figure 2: culture in chocolate agar plate which added a polyvitamin complex, Columbia agar supplemented with 5% defibrinated horse blood agar. Presence of monomorphic fine colony.

Subsequently, the solid culture mediums are incubated in at 37 ° C under 5% CO₂ atmosphere. An enrichment of the pus was carried out on broths of BHI (brain heart infusion). After 24 hours of incubation the Petri dishes were positive and demonstrated the presence of fine monomorphic colonies. A gram was performed on the colonies established the presence of gram-positive cocci. The catalase test is negative. The identification and the antibiotic susceptibility testing are carried out on BD Phoenix™ automated microbiology system (Becton Deckinson)

The phoenix ID broth was inoculated from bacteria colonies from a pure culture adjusted to 0.5 to 0.6 McFarland standards using a PhoenixSpec Nephelometer (BD Diagnostics). After the transfer of 25 µL of the ID broth suspension to the Phoenix AST-S broth, the remaining suspension was poured into the ID side of the panel. Once inoculated the panel was labeled, logged and loaded into the instrument and incubated at 35°C. Purity plates were prepared for the isolate susceptibility testing.

The European Committee on Antimicrobial Susceptibility Testing - EUCAST (EUCAST) recommendations was adopted to validate and interpret susceptibility tests results.

Identification of the stain reveal a *S. intermedius* with a sensitivity to penicillin G, ampicillin, ceftriaxone, gentamycin 500µg, norfloxacin, teicoplanin, vancomycin, clindamycin. The treatment with ceftriaxone, gentamycin and metronidazole were continued for four weeks with good clinical evolution. The gentamicin was stopped at the 5TH day.

The patient was discharged to home on the ninth postoperative day, while continuing his favorable evolution and the normalization of his radiological and bacteriological analysis. However, a continuing treatment of intravenous antibiotics were making by visiting nurse. The clinical and biological evolution after 4 weeks was favorable.

Discussion

Brain abscesses are purulent collections in the parenchyma of the central system or meningeal spaces.

The most common origin of brain abscess in children is direct or indirect (blood-borne invasion) cranial infection arising from the middle ear, paranasal sinuses or teeth. Ear and mastoid infections are associated with formation of an abscess at the temporal or cerebellar locations. Contiguous spread of mastoiditis and the other contiguous site infections may result as brain abscess [11,12]. We thought that the route of infection in our patient is the direct invasion of bacteria from sinusitis and ehtmoiditis. Hematogenous spread was also possible, however the blood cultures remained sterile. Immunodepressed state, congenital cyanotic heart disease, head trauma and neurosurgical procedures can ease abscess formation. The most common preceding infections are face and head infections such as sinusitis, otitis and meningitis [13]. In a multicenter clinical study, sinusitis is reported as the commonest preceding infection of brain abscess in children

[14]. Predisposing factors for viridans streptococcal brain abscess include chronic otitis media, congenital heart disease, head trauma [15].

S. intermedius belongs to *S. anginosus* group which contains *S. anginosus* and *S. constellatus*. Clinically, this group is characterized by its property to produce suppurative infections of the liver, lung and brain. These strains take part of the normal flora of the oral cavity, mainly on the surface of the teeth and gums, upper airways, and gastrointestinal tract [16, 17].

Some studies showed that hyaluronidase, an enzyme that breaks down host tissues and allows the bacteria to utilize the products for growth, plays a role in the dispersal of *S. intermedius* biofilms. [18].

Several retrospective studies and cases reports have identified *S. intermedius* as the pathogen of the *S. anginosus* group most frequently incriminated in the development of brain abscesses [17, 21]. However, No study has compared brain abscesses *S. intermedius* with other members of the same group or with other infectious agents [7]. Several risk factors of infection with *S. anginosus* including sinusitis, a periodontal infection, pneumonia, alcoholism, diabetes and immunodepressed state have been reported in the literature [4, 19]. Hepatic abscess is also an important cause of brain abscess [19].

There are no guidelines for the management of brain abscess in children so approach of pediatric brain abscess is variable. Optimal therapy is a combination of surgical drainage and antibiotic treatment with isolated medical treatment in selected cases such as neurologically intact children with small abscess.

Jouhadi and al, report 4 cases of brain abscesses in children and the characteristic was the absence of these predisposing factors or underlying diseases, which shows that the infections caused by *S. intermedius* are a community acquired [20]. The children received ceftriaxone, gentamycin and metronidazol, with a good evolution [20]. In vitro studies have shown that *S. intermedius* was generally sensitive to penicillin, cephalosporins, clindamycin, and erythromycin, but resistant to sulfamethoxazole and nitrofurazone [22,23,24]. However, the good prognosis of treated *S. intermedius* infections is conditioning by the seat of infection [22].

Conclusion

S. intermedius may be the cause of brain abscess in the children. The main key to their care is early diagnosis and adequate drainage if necessary. The combination of surgical drainage and the antibiotics choice are very important to control the infection and change the outcome.

It is important to recognize *S. intermedius* as a pathogenic agent of brain abscess and to be aware of its predisposing factors. Identification of the species in the *S. anginosus* group is difficult with routine methods, while methods of molecular biology, such as the polymerization chain reaction, is

interesting. Additional studies will be required to determine the prevalence and of the diseases caused by this microbiological group.

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