

Brain Abscess Due to *Aggregatibacter aphrophilus* and *Streptococcus intermedius*: A Case Report

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Brain Abscess Due to *Aggregatibacter aphrophilus* and *Streptococcus intermedius*: A Case Report

Brain abscess is a serious infection of brain parenchyma with high fatality rate. Here we report brain abscess due to *Streptococcus intermedius* and a rare pathogen *Aggregatibacter aphrophilus*, and analyze clinical characteristics, management and outcome of brain abscess.

A 6-year-old girl was brought to the hospital because of mild head trauma, and her cranial computed tomography revealed a mass lesion in the right parietal lobe, magnetic resonance imaging confirmed the lesion with a diameter of 27x31 mm and ring enhancement. For differential diagnosis stereotactic biopsy was done, and pus leak out. *Aggregatibacter aphrophilus* and *Streptococcus intermedius* were grown in the culture of this pus. Both pathogens were susceptible to empirically initiated ceftriaxone. She did not have any predisposing factor; such as cyanotic or acquired heart disease, sinusitis, mastoiditis or otitis. However she underwent dental filling five months ago, which was assumed to be the risk factor for bacteremia. With antibiotic treatment the abscess regressed, and treatment was discontinued at 12th weeks. Her outpatient follow up was continued, and any complication was not observed.

To our knowledge this is the first reported case of brain abscesses due to combination of *Aggregatibacter aphrophilus* and *Streptococcus intermedius*. This report has demonstrated that dental filling may be a risk factor for the development of brain abscess.

Keywords: *Aggregatibacter aphrophilus*, brain, cerebral, abscess, child

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Aggregatibacter aphrophilus ve *Streptococcus intermedius*'un Etken Olduğu Beyin Apseisi: Bir Vaka Sunumu

Beyin absesi yüksek mortaliteye sahip beyin parankim enfeksiyonudur. Bu vakayı *Streptococcus intermedius* ile beyin apsesi için oldukça ender bir etken olan *Aggregatibacter aphrophilus*'un neden olduğu beyin apsesinin klinik özelliklerini, yönetimini ve prognozunu irdelemek için sunduk.

Altı yaşında kız hasta hafif kafa travması nedeni ile hastaneye getirildi, çekilen beyin tomografisinde sağ parietal lobda kitle lezyon görüldü, beyin MRI lezyonun 27x31 mm olduğunu ve çevresinin kontrastlandığını gösterdi. Ayıcı tanı için stereotaktik biyopsi yapıldı, püy geldi. Püy kültüründe *Aggregatibacter aphrophilus* ve *Streptococcus intermedius* üredi, her ikisi de ampirik olarak başlanan seftriaksona duyarlı idi. Hastanın beyin apsesi açısından konjenital veya kazanılmış kalp hastalığı, sinüzit, mastoidit veya otit gibi herhangi bir risk faktörü yoktu. Bununla beraber, hastaya 5 ay önce diş dolgusu yapılmıştı. Bunun bakteriyemi yaparak risk oluşturduğu düşünüldü. Antibiyotik tedavisi ile apse küçüldü, tedavi 12. haftada kesildi. Hastanın ayaktan kontrolleri devam etti, herhangi bir komplikasyon gözlenmedi.

Bildiğimiz kadarı bu yazı *Aggregatibacter aphrophilus* ve *Streptococcus intermedius*'un beraber beyin apsesi etkeni olduğunu raporlayan ilk yazı ve diş dolgusu işleminin beyin apsesi gelişiminde risk olabileceğini göstermektedir.

Anahtar kelimeler: *Aggregatibacter aphrophilus*, beyin, apse, çocuk

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INTRODUCTION

Brain abscesses develop as a result of inflammation and a focal collection of infected material in the brain parenchyma. Predisposing factors include subacute or chronic otitis media, mastoiditis, sinusitis, dental infection, cyanotic congenital heart disease, trauma and operative procedures. In 20-40% of the patients

any underlying condition can not be identified ⁽¹⁾.

Bacteria invade the brain by direct spread or through hematogenous route. Causative agents differ according to the site of the primary infection, immune state and age of host. In pediatric cases viridans streptococci, anaerobic streptococci, and occasionally *Haemophilus* species are the most common isolated microorganisms ⁽²⁾. In the present case *Aggregatibacter aphrophilus* (formerly known as *Haemophilus aphrophilus* and *Haemophilus paraphrophilus*) and *Streptococcus intermedius* were grown in the culture of pus obtained from brain abscess. In contrast to *S. intermedius* *A. aphrophilus* is an unusual causative agent of brain abscesses, it is a gram-negative coccobacillus, member of the HACEK groups (*Haemophilus* species, *Aggregatibacter* species, *Cardiobacterium hominis*, *Eikenella corrodens*, and *Kingella* species) and a part of normal or oropharyngeal flora. However empyema, meningitis, sinusitis, otitis media, bacteriemia, pneumonia, osteomyelitis, peritonitis and wound infections are other described infections caused by *A. aphrophilus* ⁽³⁾. There are only few reports about brain abscesses due to *A. aphrophilus* in children, so we report this case to increase awareness about *A. aphrophilus* as causative organism of brain abscesses, and also we aim to remind management of brain abscess in general.

CASE

A 6-year-old girl was admitted to pediatric emergency room because of minor trauma to head, while she had no complaint, and her physical examination was normal. Laboratory tests revealed white blood cell count of 7100/ μ l, C-reactive protein of 14 mg/dl (normal range <3,3 mg/dl) and normal biochemistry

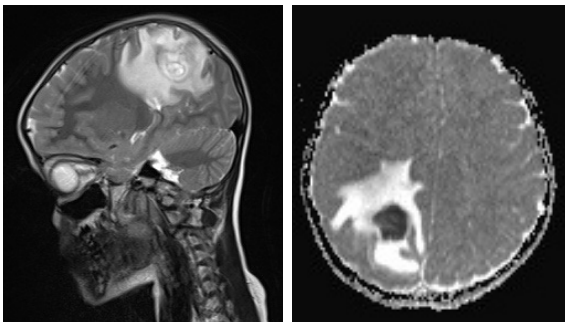


Figure 1a,b.

values. Her cranial computed tomography (CT) revealed a lesion measuring 3x3 cm in diameter. Contrast-induced magnetic resonance imaging (MRI) confirmed the ring-enhancing lesion with a diameter of 27x31 mm in the right parietal lobe (Figures 1a and 1b). Stereotactic needle aspiration was done, pus was drained and sent for culturing, then empiric antibiotic therapy was initiated with ceftriaxone and metronidazole. A day later Vitek MS identified two types microorganism; firstly *A. aphrophilus* and one day later *S. intermedius*. At following days, identification of *A. aphrophilus* was confirmed with 16S rRNA sequencing. The E-test used to describe antimicrobial susceptibility showed that both bacteria were susceptible to penicilin, ampicillin, cefuroxime and ceftriaxone. Initiated empiric antibiotic treatment with ceftriaxone and metronidazole was continued. But one week later liver function tests raised and bile sludge developed, so ceftriaxone treatment switched to cefotaxime, and metronidazole was continued.

During hospitalization predisposing factors of brain abscesses were investigated. There were no findings suggesting congenital or acquired heart disease on echocardiography, and her otolaryngological examination was normal, without any sign of mastoiditis on contrast-induced temporal CT, and blood cultures remained sterile. With thorough history taking we learned that she had 4 dental filling 5 months ago. This procedure was assumed to be the cause of bacteriemia which resulted in brain abscess.

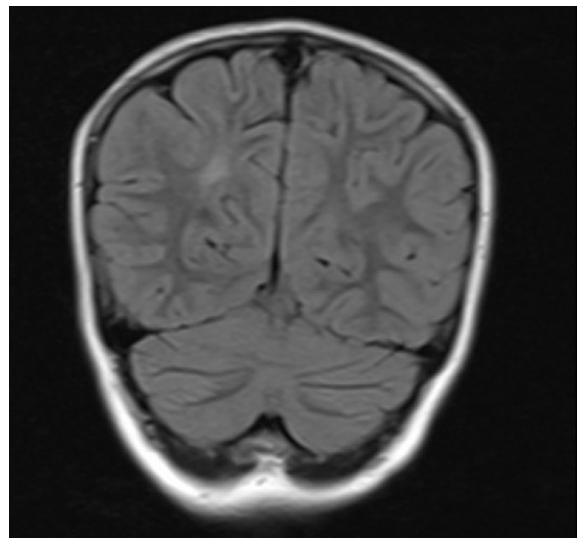


Figure 2.

At 12 week of antibiotic treatment control brain MRI was taken, and contrast- enhanced lesion regressed to 10x5 mm, which was suggested to be sequel of abscess and antibiotherapy was discontinued. Three months after the discontinuation of antibiotherapy lesion was regressed to 7x4 mm on control MRI (Figure 2). She is still coming to the outpatient clinic and has not any complaint or complication. Informed consent was taken from her parent before writing this case report.

DISCUSSION

Brain abscess is a focal intracerebral infection caused by bacteria, mycobacterium, fungi, protozoa, and helminthes. It is uncommon in children. Bacteria may spread hematogenously or directly from contagious infection to the brain. Hematogenous dissemination from a distant focus of infection usually results in multiple brain abscesses with one type of bacteria, whereas contagious infection cause single polymicrobial abscess⁽⁴⁾. Cyanotic congenital heart disease (CCHD) is an important predisposing factor for hematogenous spread of bacteria, and accounts for 6-50% of the cases⁽⁵⁾. However our patient was healthy, had not any contagious infection or predisposing factors, and had one abscess caused by two bacteria; *Aggregatibacter aphrophilus* and *Streptococcus intermedius*. Both bacteria are part of the normal oropharyngeal flora. This finding also demonstrates dental procedure as the source of infection. Criteria used to assume a dental infection as the source for brain abscess include inability to find any other source of infection, isolation of oral microorganisms from brain abscess, and clinical signs of dental infection, tooth extraction and application of braces⁽⁶⁾. So we accept that dental filling of four teeth resulted in brain abscess.

Even *Streptococcus* species are common causative agent for brain abscess, *A. aphrophilus* is rare. Last review of brain abscesses due to *A. aphrophilus* in pediatric cases was reported by Maraki et al.⁽⁷⁾ in 2013. The authors reviewed the medical literature in English language. Including their case, only fifteen cases was reported until now. Associated conditions were congenital heart disease in five, otitis media in three, dental procedure in three, sinusitis in one case, and any obvious source of infection could not be

found in the remaining four patients. *A. aphrophilus* is an oropharyngeal commensal bacterium which does not cause odontogenic disease, but it is a rare cause of invasive disease most commonly endocarditis, infrequently osteoarthritis, meningitis, endophthalmitis, and liver, spleen, and brain abscesses. Because of its extremely sensitive to antimicrobials, its isolation from sterile fluid is difficult after antimicrobial exposure. Present case had not antibiotherapy previously.

Successful management of brain abscess consists of surgical drainage combined with antimicrobial therapy⁽⁸⁻¹⁰⁾. In the present case after stereotactic needle aspiration, antibiotic treatment was continued with cefotaxime and metronidazole because strain of *A. aphrophilus* and *S. intermedius* were susceptible to penicillin, ampicillin, cefuroxime and ceftriaxone. Although clinical failure was reported with cefotaxime in a case of a β -lactamase negative strains⁽¹¹⁾, in our case good clinical response was observed. In some reports meropenem was recommended in case of brain abscess, because of its excellent penetration into the central nervous system.

The duration of antibiotherapy for brain abscess is still unclear, recommendations have been based on retrospective reports and reviews, and range between four to eight weeks⁽¹²⁾. Besides duration of therapy is decided according to assessment of clinical response and imaging studies. Longer duration of treatment are required for immunocompromised patients and patients with an organized capsules, multiloculated abscesses, lesions in vital locations, and for the patients who are undergoing needle aspiration instead of open surgical excision. In the present case because stereotactic needle aspiration was used, antibiotherapy was administered for longer time, ie. 12 weeks. Another reason for longer duration of treatment may be the presence of persisting abnormality on MRI.

Prompt surgical drainage and appropriate antibiotic treatment are critical for favorable clinical outcome. In systemic review of studies case fatality rate decreased from 40% to 10% over five decades studied, rate of full recovery increased from 33 to 70 percent^(9,10). The most common neurologic sequel is seizure⁽¹³⁾. Fortunately our case did not experience any sequels or complications. Poor prognostic factors

include rapid progression of the infection before hospitalization, severe alterations in mental status on admission, stupor, coma, rupture into ventricles ⁽¹³⁾.

In conclusion *A. aphrophilus* should be considered as one of the causative agents in brain abscesses in children. Dental procedures should be asked as predisposing factor, and antibiotic prophylaxis could be considered before dental procedure. Prompt surgical drainage and appropriate antibiotic treatment can provide favorable clinical outcome, for follow-up beside clinical assessment as radiological method CT could be preferred.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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