

Complicated Central Nervous System Infection Developing In Association with Dental Abscess in a Child Patient

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Abstract: Dental carries are frequent and can progress to central nervous system infections if untreated. A 17-year old patient presented with fever and unconsciousness. He, who irregularly used oral antibiotic for dental abscess, had fever, unconsciousness, exophthalmus, hyperemia and edema on left side, and meningismus. He had no focal deficit. On laboratory, leukocyte, 22,000/mm³; C-reactive protein, 17.4 (0-5) mg/dL. Lumbar puncture could not be performed due to intracranial space occupying lesion suspicion. Intravenous ceftriaxone (100mg/kg/d) and vancomycin (60mg/kg/d) were started. Cranial MRG revealed pansinusitis, meningitis, subdural empyema, left frontoparietal~3x2 cm abscess, destruction and osteomyelitis on neighboring bones. Abscess drainage and resection of infected bone were performed on the fifth day of treatment. Blood, cerebrospinal fluid, and abscess cultures did not grow. He was discharged with 2-weeks of peroral antibiotics, after gradual clinical remission, 4-weeks of parenteral antibiotics, and negative acute phase reactants without any complications and residual neurological symptoms. Odontogenic infections should be considered important due to serious complications.

Keywords: dental abscess, intracranial abscess, cranial osteomyelitis, meningitis, subdural empyema.

INTRODUCTION

Tooth decay is one of the most common health problems in children. The human oral flora contains considerable quantities of gram-negative, gram-positive and anaerobic bacteria, and more than 150 bacteria associated with odontogenic infections have been described [1]. If not treated, dental infections may lead to local complications in the mouth, and severe clinical outcomes such as deep neck infections, osteomyelitis, endocarditis and central nervous system (CNS) infections may also occur. If odontogenic infections reach the CNS they may cause subdural empyema, brain abscess and meningitis [2]. This report describes a pediatric case of meningitis, subdural empyema, brain abscess and cranial osteomyelitis developing secondary to dental decay and abscess.

CASE REPORT

A 17-year-old male patient with no known previous disease was admitted due to fever and impaired consciousness over the previous few days. His history revealed that 2 weeks previously he had experienced pain in a left upper molar tooth, and was started on oral amoxicillin clavulanate with a diagnosis of dental abscess but did not use this regularly. Body temperature was 39°C and other vital signs were within normal limits. The patient was confused. Exophthalmos was present in the left eye and hyperemia and edema on

the ipsilateral side of the face, together with nuchal rigidity. No focal deficit was present at neurological examination. At laboratory investigation leukocyte values were 22,000/mm³, hemoglobin 14.1 g/dL, platelet 382,000/mm³ and C-reactive protein 17.4 (0-5) mg/dL. Blood chemistry and hemorrhage parameters were normal. Lumbar puncture could not be performed due to the presence of a space-occupying lesion at cranial tomography, and the patient was started intravenous ceftriaxone (100 mg/kg per day) and vancomycin (60 mg/kg per day). Cranial magnetic resonance imaging (MRI) revealed pansinusitis, meningitis, empyema in the subdural region, an abscess approximately 3x2 cm in size in the left frontoparietal area, destruction in neighboring osseous structures and an appearance compatible with osteomyelitis (Figure 1). The patient was started on phenytoin for the convulsions, dexamethasone due to intracranial edema and antibiotic therapies to the eye. On the fifth day of treatment drainage of the intracranial abscess and excision of the infected bone tissue in the frontoparietal region were performed. No growth occurred in blood, in cerebrospinal fluid (CSF) taken on the third day of treatment or in abscess cultures. The patient underwent periodic MRI and check-ups, and no complications developed. Following surgery, gradual improvement took place in the patient's clinical condition. He was given 4-week parenteral antibiotic therapy, acute phase

reactants turned negative. He was discharged with no residual neurological symptoms and was prescribed a

further 2 weeks of peroral amoxicillin clavulanate.

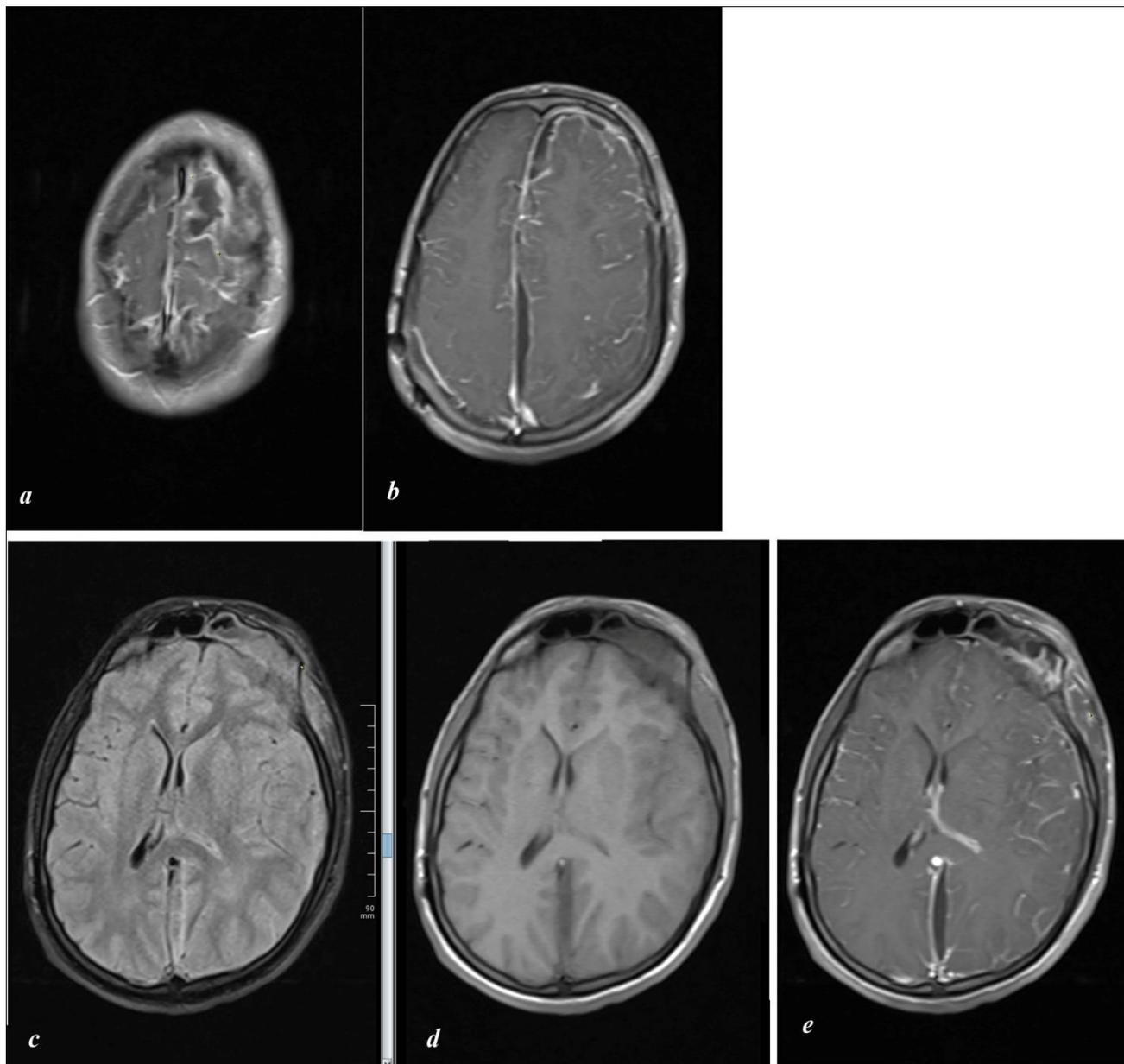


Fig-1a: Formation of an abscess exhibiting peripheral contrast involvement, approximately 3x2 cm in size in the left frontoparietal region on axial contrast images

Fig-1b: Diffuse meningeal contrast involvements indicative of meningitis, more prominent on the left side, and effusion in the left subdural subarachnoid space

Fig-c &d: A picture compatible with sinusitis in the left frontal region. Neighboring bone structures are destroyed and diffusion toward the cerebral parenchyma in this area can be seen

Fig-e: Destruction in bone structures in contrast series and contrast involvement in bone associated with osteomyelitis

DISCUSSION

Suppurative CNS infections occur by hematogenous dissemination from an underlying congenital heart disease, penetrating trauma, instrumentation or distant focal source of infection or through neighboring sinus, middle ear and mastoid

infection. CNS infections associated with tooth infections are less commonly reported [3]. Complicated intracranial infection developing progressively following dental infection was successfully treated in this case. Treatment was initiated with ceftriaxone and vancomycin therapy, as recommended [4]. Since no

response was obtained to antibiotics alone, the infectious agent was unknown and the abscess was in a superficial location, we thought that the patient would benefit from surgery, and abscess drainage was performed.

One recent review reported levels of 31.7% frontal lobe, 21.7% parietal lobe, 8.3% subdural/epidural empyema (without parenchymal involvement) and 5% isolated meningitis/ventriculitis in CNS infections of odontogenic origin [5]. Osteomyelitis of the skull is a rare condition in children. It is known to most frequently develop following trauma or by means of direct extension from the paranasal sinuses. A rather complicated presentation was also observed in our case. In this case, while frontoparietal osteomyelitis may have developed primarily, frontoparietal osteomyelitis, subdural empyema and brain abscess may also have developed secondary to meningitis.

In their review, Moazzam *et al.*; reported Viridans and other unclassifiable streptococci, peptostreptococci and gram-positive and anaerobic agents such as *Fusobacterium* and *Prevotella* as the main agents in CNS infections of odontogenic origin [5]. They also reported a 47.3% level of polymicrobial infections. In our case, however, no growth in CSF or abscess cultures was observed due to the effect of previous antibiotic use.

Pathogens causing dental infections reach the nervous system through a systemic hematogenous, the venous drainage system, the lymphatic system or contact with foreign bodies or via neighboring tissue. In diffusion via neighboring tissue, pathogens are thought to first reach the sinuses. The fact that the bone between the anterior cranial fossa and the frontal sinus and orbita is very thin and that these regions have an interconnected venous drainage system plays a facilitating role in the development of severe intracranial complications [6]. Seizure, hemiparesis, cranial nerve paralysis, hydrocephaly, personality changes, intellectual disorders, spasticity, optic atrophy and visual defects are conditions that may be expected in abscesses of the fronto temporal lobe [4]. However, two-thirds of brain abscesses in children resolve without sequelae. Subdural empyemas, however, may lead to more persistent neurological problems. Although both subdural empyema and CBS abscess developed in this case, these resolved without sequelae. However, mortality and morbidity are reported to increase in the event of a rise in abscess numbers and rupture into the ventricle [7].

If total drainage with craniotomy is established in the treatment of subdural empyema, even 2 weeks' parental treatment may be sufficient [8]. Duration of treatment is shorter in bacterial meningitis, but is 4-6

weeks in cranial osteomyelitis and most other bone infections. Surgical aspiration or debridement, together with at least 6 weeks' antibiotic therapy and evaluation of the abscess cavity through cranial imaging repeated at intervals results in cure in 90% of brain abscesses [9]. In our case too, significant benefit was observed with 4-week parenteral treatment in addition to surgical debridement, and treatment was completed in a total of 6 weeks. The patient's course was assessed both clinically with close monitoring with MRI.

CONCLUSION

In conclusion, dental infections must not be underestimated. Despite advances in antibiotic therapy and surgical techniques, dental infections still involve the possibility of complications leading to significant morbidity and mortality. Complications and mortality can be prevented with swift and appropriate intervention.

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