

Case Report

Cerebral abscess as a complication of a dental abscess

Jeroen Regeer^{1*}, Bert De Groot², Emmi van Damme²

¹Department of Oral and Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium

²Department Pediatrics, ZNA Jan Palfijn, Antwerp, Belgium

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*Correspondence:

Dr. Jeroen Regeer,

E-mail: jeroenregeer@gmail.com

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ABSTRACT

A dental abscess, most often caused by inadequate oral hygiene, can be easily treated if timely diagnosed. However, delay in treatment can lead to bacterial dissemination and serious complications, such as development of a cerebral abscess. Authors retrospectively analyzed a case of a 15-year-old boy admitted to our pediatrics department with a cerebral abscess due to a dental abscess. A 15-year-old patient presented with supra-orbital swelling which due to previous delay in dental treatment had caused dental, orbital and cerebral abscess formation. After extraction of the affected tooth and six weeks of IV antibiotics the size of the cerebral abscess was practically unchanged. An epidural drainage and further treatment with IV antibiotics were needed to eliminate the cerebral abscess. The urgency of dental treatment to inhibit further microbial spread is of great importance and delay can have serious consequences.

Keywords: Cerebral abscess, Dental abscess, Epidural drainage, Pediatrics dental screening

INTRODUCTION

A dental abscess is often the end result of a cascade, starting with caries that leads to microbial pulp invasion, pulpitis, necrosis, bacterial invasion of the bone and abscess formation. There is often a causal relation with inadequate oral hygiene and delay in dental treatment. Odontogenic sources of infection include *Streptococcus*, *Bacteroides*, *Prevotella*, *Fusobacterium* and *Heamophilus*.^{1,2} If not timely and adequately treated it can lead to further bacterial dissemination and serious complications such as osteomyelitis, cavernous sinus thrombosis, Ludwig angina, maxillary sinusitis and buccal, sublingual or submandibular swelling.

A cerebral abscess due to a dental abscess is rare, with a reported incidence of 0.3 cases per 100,000 people per year.³ However, the consequences can be severe.⁴ Therefore, a timely diagnosis and treatment is imperative.

CASE REPORT

A 15-year-old boy was seen by the emergency department of a hospital in Antwerp, Belgium with a toothache for four months. Clinical investigation led to the diagnosis of a severely carious right 1st upper molar.

He was given painkillers and advised to consult a dentist the next day for urgent root canal treatment of the affected tooth. Four months later, the patient consulted the emergency department again. He complained of a headache for three months and right eye pain, vomiting and fever (38.3°C) for 1 week. Clinically, a right supra-orbital hematoma was present. Vision and eye movements were normal. Lab results showed normal white and red blood cell counts, a hemoglobin of 10.1 g/dL and a C-reactive protein of 168.7 mg/L. A CT-scan (Figure 1) of the cerebrum and paranasal sinuses showed osteolytic lesions around the roots of the right 1st upper

molar with discontinuity of the bottom of the right maxillary sinus.

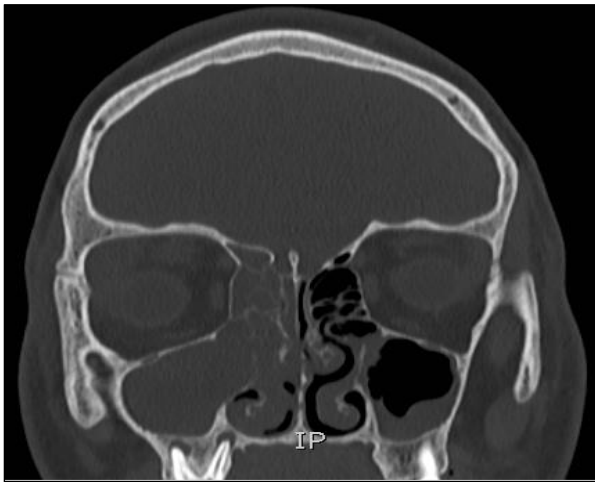


Figure 1: Cerebral CT-coronal view.

Complete soft tissue obliteration of the right maxillary and frontal sinus, and partial soft tissue obliteration of the right ethmoidal sinus was also present along with a thickening of the right peri-orbital subcutis.

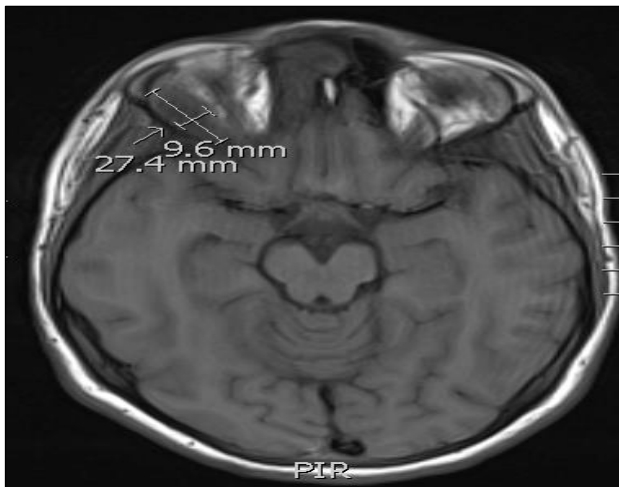


Figure 2(a): Cerebral MRI - axial view subperiosteal right orbital abscess (2.7 cm x 1.0 cm x 0.7 cm).

Para-median cranially, right more than left, a subdural collection was visualized. An MRI-scan (Figure 2) confirmed the CT-scan findings, a subperiosteal right orbital abscess (2.7 cm x 1.0 cm x 0.7 cm) and a frontal epidural abscess (4.4 cm x 3.7cm x 1.3 cm).

Osteolytic lesions around the roots of the right 1st upper molar with discontinuity of the bottom of the right maxillary sinus. Complete soft tissue obliteration of the right maxillary and frontal sinus, and partial soft tissue obliteration of the right ethmoidal sinus along with a thickening of the right peri-orbital subcutis.

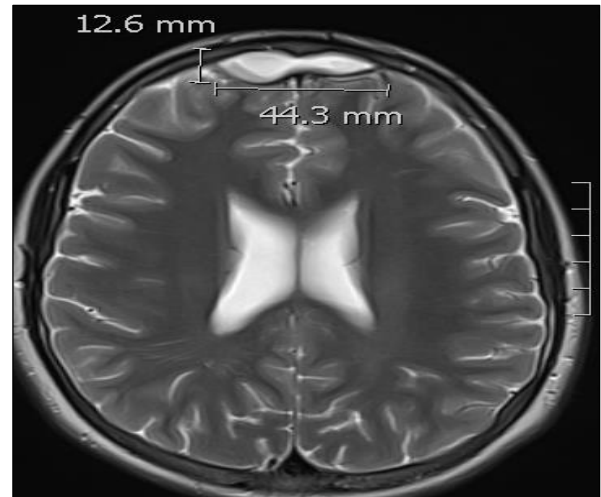


Figure 2(b): Cerebral MRI - axial view.

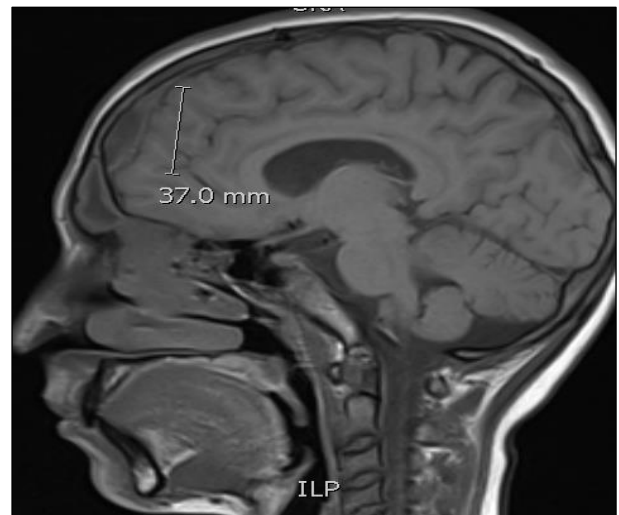


Figure 2(c): Cerebral MRI-sagittal view frontal epidural abscess (4.4 cm x 3.7cm x 1.3 cm).

The patient was admitted to the pediatrics unit, a hem culture and nose culture were taken, and IV antibiotics (augmentin 1 g, 4x/d and cefotaxim) and solu-medrol 80 mg 1x/d were administered. The aim was to remove the tooth after reduction of the dental abscess in order to reduce the chance of antrum perforation. An ophthalmologic consultation showed no visual abnormalities. After consulting the department of microbiology, an antibiotic switch was advised, ceftriaxone 1 g, 3 x/ day and metronidazole 1.5 g, 1x/ day was started. The clinical situation of the patient progressively improved and the 1st right upper molar was extracted after two weeks. A functional endoscopic sinus operation was also performed. The follow-up CT-scan after a total of eight weeks IV antibiotics showed almost no reduction of the orbital and cerebral abscesses. Therefore, the department of neurosurgery performed a trepanation to drain the epidural collection and cultures were taken. A follow-up MRI-scan of the frontal epidural abscess showed a significant reduction when compared to

the pre-operative CT-scan. However, a rest collection of 6mm was still present. Another two weeks of IV antibiotics were administered before the patient was discharged from the hospital. Subsequent follow-up MRI's showed gradual resorption of the rest collection. Three weeks after discharge from the hospital the patient presented with pain in both feet, possibly neuropathic in origin due to extended use of IV metronidazole.

DISCUSSION

Caries and a subsequent dental abscess are a pathologic entity not to be taken lightly. It is important for pediatricians to be able to identify carious teeth and a dental abscess.^{5,6} Early detection can prevent further damage and spread to the cerebrum.^{7,8} Urgent referral to a dentist or maxillofacial surgeon for diagnostic work-up and further treatment is essential in order to decrease the chance of serious complications.⁹ The treatment procedure for a dental abscess, incision and drainage along with a root canal treatment, is straight forward if the patient is diagnosed quickly. If there is breakthrough of the abscess into the maxillary sinus and subsequent spread to the cerebrum (most often the frontal lobes) an MRI is the imaging of choice. A full blood work-up including blood cultures and a culture of the abscess if a puncture is possible.¹⁰ This can often help to identify the bacteria that is responsible for the infection. In our case a puncture was not possible at time of admittance and antibiotics were started empirically. Cultures were taken after drainage of the epidural collection; these were however inconclusive due to long term treatment with IV antibiotics. Treatment of a cerebral abscess includes a combination of IV antibiotics (metronidazole and ceftriaxone for 4-6 weeks) and surgical drainage is often required.^{11,12}

It is also important to note the socioeconomic implications of a cerebral abscess which requires lengthy antibiotic treatment and/or invasive surgical drainage. Therefore, most patients are treated in a hospital for an extended period of time. Studied patient was admitted for a total duration of three months which caused him to miss a significant part of the school year. Communication with the school proved to be difficult at times and because of the nature of his technical studies most of the assignments could not be performed in a hospital environment. Moreover, the societal cost of such a long stay in the hospital cannot be overlooked.¹³

CONCLUSION

This case report describes a 15-year-old patient who presented with a headache and supra-orbital swelling which due to previous delay in dental treatment had caused dental, orbital and cerebral abscess formation. After extraction of the affected tooth and six weeks of IV antibiotics the size of the cerebral abscess was practically unchanged. An epidural drainage and further treatment with IV antibiotics were needed to eliminate the cerebral

abscess. This highlights that the urgency of dental treatment to inhibit further microbial spread is of great importance and delay can have serious consequences. A total hospital stays of three months had a significant socioeconomic impact causing our patient to miss school for an extended period of time.

Further research must be conducted to explore how to optimize basic dental screening for paediatricians and simplify the referral process to a dentist or maxillofacial surgeon. A good partnership between paediatricians and dentists can form a stepping stone to better paediatric dental care and reduce the incidence of complications and lengthy hospital stays.

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Ethical approval: Not required

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