

Bacterial meningitis after tooth extraction

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IN BRIEF

- Systemic infections such as bacterial meningitis following tooth extraction are rare, but often threatening.
- An immediate admission to in-patient care is required for further diagnostic work-up and immediate treatment.
- Severe infection following tooth extraction may indicate undiscovered immunologic compromise and warrants further investigation (eg diabetes mellitus, HIV).

Wound infections after tooth extraction may occur in up to 5%. A systemic infection is a rare but threatening complication often caused by an underlying immune deficiency (immunosuppression, diabetes, HIV) which requires prompt adequate care. This case report describes bacterial meningitis as a possible systemic complication two days after the extraction of a molar in a patient with previously undiagnosed latent diabetes mellitus.

INTRODUCTION

After tooth extractions, the most frequent complication observed is bacteraemia in up to 96% of cases (primarily anaerobes).^{1,2} However, an alveolitis sicca only occurs in 5%.^{3,4} In very rare cases a systemic infection can occur, mostly in connection with an underlying disease, such as an immunosuppression related to rheumatic conditions or after an organ transplant, in cases of diabetes or HIV infection. Descriptions of systemic infections include endocarditis, mediastinitis, orbital abscess, abscess of the brain, or septic venous sinus thrombosis.⁵⁻⁸ The most frequent agents are *Streptococcus viridans* (55%), *Staphylococcus aureus* (30%), *Enterococcus* (6%).⁹ Meningitides after tooth extraction or oral surgery have also been described.^{5,10,11} Since, depending on the agent, bacterial meningitides are still associated with a mortality rate of 10 to 15 % (WHO 2000), they remain a seriously threatening disease. Hence, it is important for general dentists to recognise this clinical

picture in order to be able to initiate the necessary treatment.

We present a case in which bacterial meningitis developed after the extraction of a molar.

CASE REPORT

The 36-year-old previously healthy smoker had an extraction of the right upper third molar (18) (Fig. 1) due to carious destruction. The patient did not complain of any pain prior to treatment and there were no signs of a local inflammation or an associated abscess. The simple extraction was performed in local anaesthesia without complications. In agreement with the recommendations of the American Heart Association¹² and the NICE clinical guideline 64¹³ no antibiotic prophylaxis was administered perioperatively. On the following day she visited her general dentist complaining of pain at the extraction alveole and shivers. Clinically, after a non-pathological radiographic finding (Fig. 2), a purulent inflammation of the extraction alveole was identified and a treatment with clindamycin as a common antibiotic in German dentistry was started. On the following day, the patient developed fever and strong headaches, so that her general practitioner had her admitted to in-patient hospital care.

At the time of admission, the patient was febrile (38.6°C), complaining of holocephalic headaches (visual analogue pain scale 9/10), sound sensitivity and photophobia as well as nausea



Fig. 1 Extracted molar

and vomiting. Neurological examination revealed mild meningism and no focal neurological deficits. The site of the extracted alveole showed no signs of inflammation. Brain imaging by computer tomography was normal.

The blood tests showed a mild leukocytosis and a moderate increase in CRP levels. The cerebrospinal fluid (CSF) findings are summarised in Table 1. The clouding of the CSF (Fig. 3) is caused by an increase in protein content. The elevated cell count showed a clear dominance of granulocytes. A microbial agent could not be detected, neither in the blood cultures nor the CSF. In the

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process of identifying potential causes of an immune deficiency, a pathological glucose tolerance test was recognised (blood glucose level after 1h: 10.7 mmol/l, after 2h: 8.7 mmol/l), which indicated a previously undiagnosed diabetes mellitus. There was no evidence of an occult neoplasia or an autoimmune disease.

An antibiotic treatment with Ceftriaxone and Flucloxacillin iv was started immediately after admission and continued for 14 days. The patient was put on a diabetic diet and advised by a diet assistant. The symptoms regressed during the course of treatment. After two weeks, the patient could be released without any sequelae.

DISCUSSION

Bacterial meningitides have been described as a rare systemic complication of a tooth extraction or an oral surgery intervention.^{5,10,11} A prophylactic administration of antibiotics can not be justified by literature. The American Heart Association¹² recommends an antibiotic prophylaxis in the prevention of the much more frequent endocarditis only for high-risk patients. According to the new guideline of the National Institute for Health and Clinical Excellence¹³ there is insufficient evidence for the prophylactic administration of antibiotics even in such cases, so that an antimicrobial prophylaxis is no longer recommended.

Because a bacterial meningitis still represents a highly threatening clinical picture^{14,15}, immediate diagnosis (blood cultures and CSF samples) and therapy are indispensable.¹⁶

The typical clinical signs of meningitis are severe headaches, neck stiffness and fever. However, especially at the beginning, not all components of this pathognomonic trias have to be present. The patient in this case complained of two out of three meningitic signs when consulting her general dentist two days after the extraction: headaches and fever. Of course, these findings are not uncommon in cases of general infection, but regarding the severity of the headaches (9/10 VAS), the additional symptoms like nausea, sound sensitivity and photophobia strongly support the suspected meningitis. Other clinical warning signs

Table 1 Laboratory findings (CSF)

Liquor	At time of admission	Nine days after start of treatment
Colour	Slightly cloudy	Clear
Cell count	443/3 µl (>95% granulocytes)	166/3 µl
Protein	82 mg/dl	42 mg/dl
Glucose	3 mmol/l	2.97 mmol/l



Fig. 2 X-ray

may be hearing loss, seizures, cognitive impairment or impairment of consciousness. All these symptoms should give reason for further diagnostic studies. Besides testing for meningism, the signs of Lasègue, Kernig and Brudzinski (Fig. 4) should be examined. All signs are based on a pain reaction to the distension of the inflamed and therefore irritable meninges. The next diagnostic step should include blood cultures, a lumbar puncture and a CT scan of the head to exclude a brain abscess as a complication of meningitis or a subarachnoidal bleeding, which is also associated with severe headaches and neck stiffness, but in general not with fever. Furthermore, the CT scan may reveal sources of infection such as otitis media or mastoiditis. A clouded CSF as a result of the lumbar puncture with pleocytosis and granulocytic cell profile confirm bacterial meningitis. The diagnosis can be complicated by an antibiotic treatment started prior to taking the CSF sample.¹⁷ Hence, in the presented case only a moderate pleocytosis could be found. Nevertheless, viral meningitis occurring coincident to the

molar extraction is unlikely due to the granulocytic cell profile. Although viral meningitides can present with a granulocytic cell profile at the beginning of the disease,^{18,19} a shift to a lymphomonocytic cell profile should have been expected in this particular case because of the duration of the symptoms for more than 48 hours.

Normally, at the beginning of treatment microbiological results are not (yet) available. As in the present case, in up to 30% of the samples no agent can be detected at all.²⁰ Thus, it remains uncertain whether the agent that caused the purulent inflammation of the extraction alveole also caused the meningitis either by haematological spread via bacteraemia or per continuitatem via the maxillary and frontal sinus. However, no other source of the meningitis could be detected. There were no other cases of meningitis at this time. The patient did not undergo any neurosurgical interventions, nor had she a trauma of the head nor a liquor drainage. Other local or systemic infections like otitis media, mastoiditis, pneumonia or endocarditis

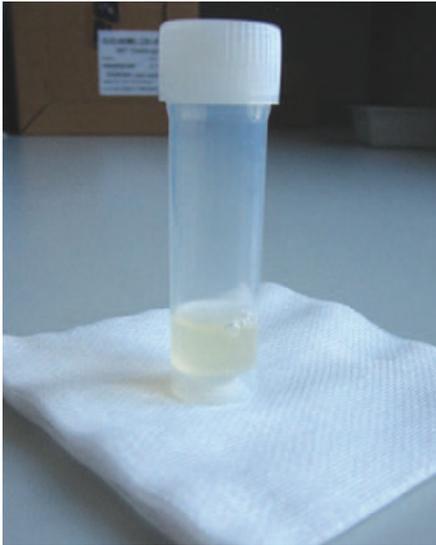


Fig. 3 Clouded cerebrospinal fluid

could not be found, making a specific antimicrobial chemotherapy impossible. A calculated treatment should always cover a broad spectrum of bacteria. The selection of an antibiotic depends on the presumed spectrum of agents which varies in correlation to the path of infection. The treatment in the present case followed the guidelines of the German Neurological Association [Deutsche Gesellschaft für Neurologie].

As described by Montejo and Aguirrebeugere,¹⁰ in this particular case as well, a previously undetected diabetes mellitus was diagnosed as a predisposing factor. Combined with a tendency to a delayed wound healing the compromised immune system – besides diabetes for instance as a result of alcohol or drug abuse, splenectomy, HIV infection or therapeutical immunosuppression – might have enabled the local infection of the alveole in the first place. It could also explain why a young otherwise healthy patient would develop a meningitis, whether coincidental or as a threatening complication of a procedure as simple and normally uncomplicated as a molar extraction. This should be a reminder that serious complications may occur unexpectedly and, if so, that an underlying systemic disease may be the cause requiring further examinations.

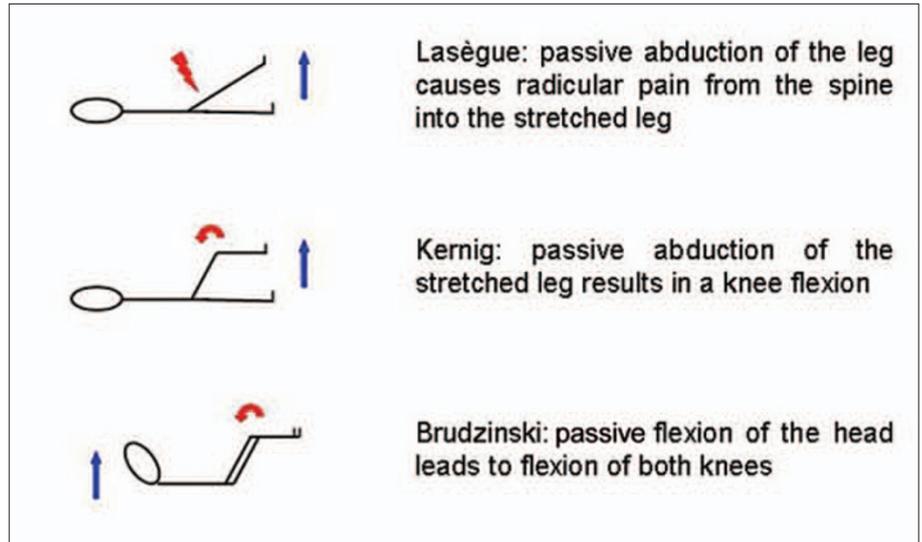


Fig. 4 Meningeal signs

CONCLUSION

Bacterial meningitis is a rare but seriously threatening systemic complication of tooth extraction which requires immediate response since any delay of the antibiotic treatment significantly worsens the prognosis.^{16,21} Furthermore, unexpected serious complications may be indicative of an underlying undiagnosed condition.

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