

# An unnoticed origin of fever: periapical tooth abscess. Three case reports and literature review

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## SUMMARY

Dental infections may lead to severe local or systemic infections such as endocarditis, brain abscesses and mediastinitis. Fever may be the only symptom. We aim to highlight dental/odontogenic abscesses as the occult source of unexplained fever by reporting on three cases and reviewing the relevant literature. Early dental evaluation and referral of patients with persistent fever (even without any oral symptoms) to

a dentist plays a critical role in preventing unnecessary, time-consuming and high-cost further diagnostic tests and invasive procedures. A simple panoramic dental radiography may suffice to establish the diagnosis.

*Keywords:* Periapical abscess, dental infection, fever of unknown origin, persistent fever, tooth.

Although almost any organ can be affected by dissemination of infection from the oral flora; endocarditis, brain and deep neck abscesses, and mediastinitis are the most well-known examples for them in clinical practice [1,2]. Herein, we would like to draw attention to another rare clinical condition caused by odontogenic infections; unexplained or persistent fever related with dental abscess, and review the relevant literature. Dental abscesses were detected as a very rare cause of fever of unknown origin (FUO) in classical textbooks and FUO clinical series [1,3]. On the other hand, many internal medicine textbooks do not address dental causes in discussing evaluation of patients with fever. Furthermore, it is very difficult to include periapical tooth abscess while making differential diagnosis of unexplained fever in a patient without any oral symptoms. Here,

we report three patients with unexplained fever due to periapical tooth abscesses who were referred to tertiary centers where they had undergone further investigation with many detailed tests.

### Case 1

A 36-year-old man presented with a 2-week history of fever with rigor and chills. He seemed well despite his fever of 39 °C. His vital signs and systemic examination were normal. Complete blood count and biochemistry panel test results were also normal. C-reactive protein was 45 mg/L and erythrocyte sedimentation rate (ESR) was 46 mm/h. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels were only slightly elevated. Blood cultures, viral serology (EBV, CMV, Parvovirus B19, Influenza, Hepatitis A, B and C virus) and Wright agglutination tests were negative. Chest radiography and abdominal ultrasonography showed no abnormality. His past medical history revealed only tooth prosthesis operation in recent months. Although, he had

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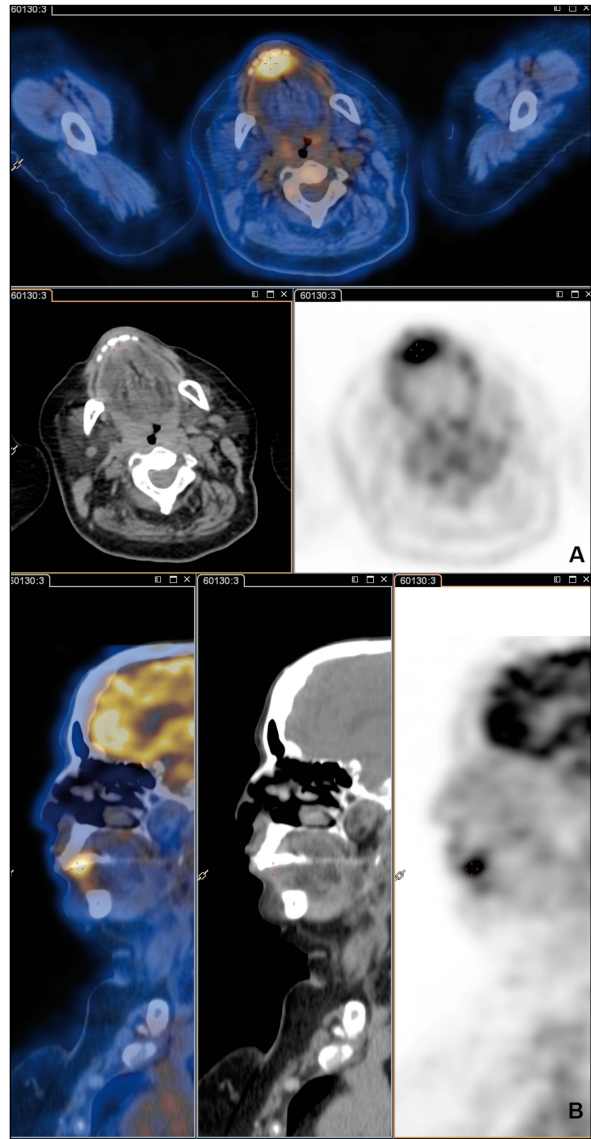
no present complaints related to his teeth, a panoramic dental radiography was performed which revealed periapical tooth abscesses on tooth number 22 and 35 at. Root-end surgery and root-end filling of teeth numbers 22 and 35 were performed by a dentist. The patient's fever disappeared in 5 days after operation.

#### Case 2

A 66-year-old woman with chronic lymphocytic leukemia was referred to our clinic with prolonged fever. Laboratory evaluation revealed the following findings: WBC count:  $13.4 \times 10^9$  cells/L ( $10.1 \times 10^9$  absolute lymphocytes/L); haemoglobin level: 8.2 g/dL; and platelet count:  $79 \times 10^9$  platelets/L, CRP: 67 mg/L, ESR: 90 mm/h. Other laboratory parameters were within normal limits. After blood cultures were obtained, the patient started receiving meropenem (2 g iv q8h) for a planned 2-week course of therapy, empirically. No abnormalities were found on thorax and abdominal computerized tomography (CT) scans. As fever did not resolve within 2 weeks, meropenem was discontinued because of suspicion of an uncontrolled fever focus. The panoramic radiograph revealed the presence of periapical abscesses on teeth number 8. The patient's high fever resolved in three days following extraction of the involved teeth.

#### Case 3

A 76-year-old woman was admitted to our hospital with the complaint of recurrent fever within the last two years. She experienced irregularly at least eight hectic intermittent fever attacks which continued approximately 7-10 days each time. The laboratory studies on admission were significant for ESR: 101 mm/h and CRP: 55 mg/dL. Cranial, thoracic and abdominal CT scans were normal. The Positron Emission Tomography and Computed Tomography (PET/CT) was considered to exclude any malignancy because of high sedimentation rate. On PET/CT (Figure 1), the only abnormal fluorodeoxyglucose (FDG) uptake was in the anterior part of maxillary bone with a SUVmax of 8. The patient did not have any oral complaints. Oral examination revealed two devital teeth and periapical abscesses. Patient defervesced following dental extraction and had no more fever episodes. Her ESR decreased from a peak of 107 mm/h to 46 mm/h within three months.



**Figure 1** - PET/CT was performed to rule out any possible malignancy. Axial (A) and sagittal (B) images of PET/CT are shown in the figure. The only abnormal FDG uptake was detected in the anterior part of maxillary bone with a SUVmax of 8.

## DISCUSSION

Periapical dental abscess is a localized purulent inflammation of the periapical region. Anaerobic gram-negative rods, such as *Fusobacterium*, *Prevotella*, and *Porphyromonas* and *Viridans streptococcus* are associated with infected pulps, and

periapical abscesses [4]. The acute form of disease may present with pain and high fever, while the chronic form can cause unexplained fever [1, 5]. Periapical dental abscesses usually occur after decays, trauma or failure of root channel therapy, and may lead to various clinical pictures from local odontogenic infections to sepsis syndrome [6]. Moreover, it is known that dental abscesses can be the source of unexplained fever. Siminovski reviewed 21 patients with persistent fever related to dental abscess [7]. In that case series, average duration of patients' episodic fever was 1.5 months and more than half of the patients reported intermittent fever. Only 19% of patients revealed dental symptoms after repeated questioning or

diagnosis of dental origin. As extra-oral findings, sinus tenderness and most frequently enlarged submandibular lymph nodes, also supraclavicular and cervical lymph node enlargement were associated with the diagnosis. Leukocyte scintigraphy and roentgenogram revealed the diagnosis in 44% of patients. Dental abscesses have been diagnosed in 60% of patients, while 29% of patients had only dental decays.

Our review included case reports with fever of unknown/unexplained origin due to dental infection, which were published in English medical literature from 1993 to August 2013 and were extracted from PubMed and Google scholar databases [7-9]. Clinical, laboratory and treatment fea-

**Table 1 - Clinical and laboratory findings, and treatment modalities of patients with unexplained fever due to occult dental abscess.**

Reference	Age/gender	Duration / type of FUO	Dental symptoms	Dental examination findings	Erythrocyte sedimentation rate	Diagnostic procedure	Dental condition	Treatment	Fever resolution
1993 (7)	64 / F	24 months/ recurrent	None	Poor dental hygiene, caries, periodontitis	56	Labeled leukocyte scan	Dental abscess	One molar tooth extraction& AB*	7 days
1999 (8)	9 / M	3 months/ recurrent	None	Normal	158	Panoramic radiograph	Periapical and inter-radicular abscess	Eight deciduous molar teeth extraction & AB	No recurrence
2007 (9) Case 1	41 / M	3 months / intermittant	None	Normal	115	Gallium scan	Molar abscess	One molar tooth extraction& AB	No recurrence
2007 (9) Case 2	32 / M	3 weeks/ classic	None	Tenderness in the mucobuccal fold and periapical region	110	Panoramic radiograph	Dental abscess	One molar tooth extraction& AB	7 days
2007 (9) Case 3	64 / F	4 months/ Recurrent	None	Tenderness in the mucobuccal fold and periapical region	85	Panoramic radiograph	Left premolar abscess	One molar tooth extraction& AB	No recurrence
PR Case 1	36 / E	2 weeks/ sudden	None	Normal	45	Panoramic radiograph	Periapical abscess	Channel treatment&pus drainage	3 days
PR Case 2	66 / F	3 weeks/ classic	None	Poor dental hygiene, caries, periodontitis	90	Panoramic radiograph	Periapical and inter-radicular abscess	Eight molar extraction & AB	3 days
PR Case 3	79 / F	24 months/ recurrent	None	Dental prosthesis Devital caries	101	PET/CT	Periapical and inter-radicular abscess	Dental extraction	No recurrence

\*AB: antibiotics.

tures of the reported cases are shown in Table 1. It is noteworthy that none of the patients had any oral symptoms at presentation. Five of the cases had recurrent fever attacks and diagnosis could be established after a long period of time, that is 11.6 months in average. Probably, clinicians considered more complex diseases in the differential diagnosis of these patients with high ESR. Indeed, mean ESR value of our patients is 95 mm/h and high ESR level may easily be attributed to rheumatological or haematological diseases, especially in patients without any localized symptoms. For instance, we firstly considered temporal arteritis in one of our old patients who had unexplained fever and high ESR. Ultimately, we detected high FDG uptake at the maxillary region on PET/CT, which is a high-cost diagnostic method that is not available in majority of centers. Indeed, a simple, non-invasive and low-cost panoramic tooth X-ray could help to establish the diagnosis if dental abscess could be considered in the first place and the patient was referred to or consulted by a dentist. As antibiotic treatments generally failed without dental extraction, at least one tooth extraction was reported in the former review. Likewise, all patients in our review were treated empirically with antibiotics. Meanwhile, fever did not resolve unless oral intervention (extraction or pus drainage) was made. While mean duration for fever resolution was reported as 15.8 days with maximally four months in one patient in a former review, continuous fever lasting more than one week or episodic fever attack was not seen in our cases. Although Siminovski reported that dental X-ray has limited contribution to diagnosis, tooth abscess was detected in all patients with dental radiography in our cases. This discrepancy may be interpreted with the contribution of new technology through the decades. However, in two case reports, clinicians diagnosed dental abscesses as the cause of fever by means of expensive scanning methods (Gallium scan, PET/CT) as they did not consider them initially. Although panoramic dental radiography is an extremely simple, low-cost and non-invasive technique, it was generally not considered as a diagnostic technique while other expensive methods (tomography, scintigraphy, PET-CT) were overused. Early dental evaluation and referral to a dentist in the diagnostic process of persistent fever has a critical role to prevent unnecessary additional

diagnostic examinations and invasive procedures. When patients with occult dental infections are referred to internal/infectious diseases specialists, they consider more complex etiologies like malignancy or systemic infections etc. and they perform many detailed high-cost and time-consuming diagnostic procedures. In conclusion, periapical dental abscesses must be considered in the differential diagnosis of patients with recurrent and unexplained fever even without any oral symptoms and a panoramic dental radiography may be performed and a dentist may be referred to in establishment of diagnosis in these patients.

**Conflict of Interest:** All authors declare that they have no competing interests.

**Informed consent:** Written informed consent was obtained from all patients who participated in our study.

#### ACKNOWLEDGEMENTS

None

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