Non-surgical Management of a Facial Sinus Tract Originated from the Maxillary First Molar Periapical Infection: a Case Report

Yu Han WANG[1], Zu Hua WANG[1], Xiao Yan WANG[1]

The diagnosis of a facial sinus tract caused by periapical infection remains difficult due to the wide range of potential aetiologies. The canine is the only maxillary tooth that has been reported to serve as the source of infection for a facial sinus tract. The scenario encountered in the present case was extremely rare as the facial sinus tract was caused by the maxillary molar. The buccal alveolar bone of the maxillary right first molar had been destroyed due to periodontitis and aberrant occlusal force, which caused a periapical abscess in the maxillary right first molar site and ultimately drained extraorally. The purpose of this case report is to illustrate the potential for a periapical lesion of the maxillary molar to induce facial sinus tracts and propose a non-surgical therapeutic approach for such cases.

Keywords: *facial sinus tract, maxillary first molar, non-surgical management, periapical infection*

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Clinically, a periapical infection can spread and drain via the skin or the oral mucosa depending on the anatomy over the apex of the diseased tooth, and forms a facial sinus when the infection spreads through the skin. Facial sinus tracts caused by periapical disease of the adjacent tooth remain a diagnostic challenge because their initial appearance resembles that of other diseases such as skin infections, furuncles, osteomyelitis, neoplasms and tuberculosis.[1] Among all the potential causes, dental infection is one of the most underestimated factors, the neglect of which may lead to unsuccessful treatment.[2] In previous reports, the canine has been the only maxillary tooth involved in the origin of midfacial sinus tracts.[3-5] The present case report is intended to raise awareness of the possibility of facial sinus tracts originating from the periapical lesion of a maxillary molar.

1 Department of Cariology and Endodontology, Peking University School and Hospital of Stomatology & National Center for Stomatology & National Clinical Research Center for Oral Diseases & National Engineering Research Center of Oral Biomaterials and Digital Medical Devices, Beijing, P.R. China

Corresponding author: Dr Xiao Yan WANG, Department of Cariology and Endodontology, Peking University School and Hospital of Stomatology, #22 Zhongguancun South Avenue, Haidian District, Beijing 100081, P.R. China. Tel: 86 86-10-82195525. E-mail: wangxiaoyan@pkuss.bjmu.edu.cn.

Case report

A 40-year-old man presented to the Department of Cariology and Endodontology, Peking University School and Hospital of Stomatology complaining about slight pain in the right facial area with swelling and occasional purulent drainage for 1 week. Although the acute symptoms were alleviated, the patient continued to experience chronic pain and therefore sought dental consultation.

The patient's past medical history did not reveal any disease or systemic alteration, and he had not taken any medicine recently.

Clinical examination

Extraoral examination identified an area of 2 × 3 cm^2 erythematous sinus tract with purulent drainage and swollen surrounding tissue at the right cheek (Fig 1a). The lesion was tender upon palpation. Intraoral examination revealed the maxillary right posterior teeth displayed no signs of caries, fracture or restoration; however, the maxillary right first molar was discoloured with Miller Class I gingival recession of 8 mm, but without deep probing depth or mobility (Fig 1b and c). Occlusal examination revealed an unevenly distributed occlusal load, which was concentrated on the buccal

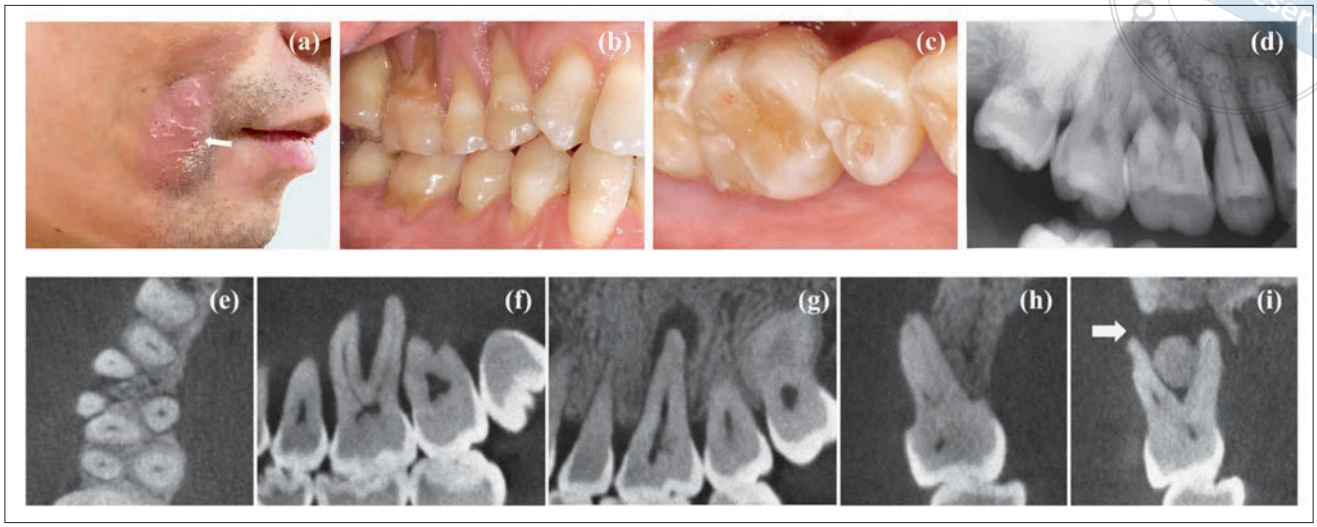

Fig 1a to i Preoperative clinical presentation and radiographic examination. An erythematous sinus tract at the right cheek. The white arrow indicates the location of drainage **(a)**. Intraoral examination showed a poorly distributed occlusal force and extensive gingival recession of the maxillary right first molar **(b and c)**. The preoperative periapical radiographic examination indicated periapical lesion of tooth 16 **(d)**. Periapical lesions were found for the mesiobuccal root, distobuccal root and palatal root on CBCT scans, which revealed signs of bone dehiscence in the buccal alveolar bone **(e to i)**.

cusps rather than the palatal cusps. The maxillary right first molar was tender to percussion and showed no response to the electric pulp test, whereas the maxillary right first and second premolar and second molar responded normally. Furthermore, the mean gingival recession of the posterior teeth was 4 mm, with the right maxillary posterior teeth reaching 5 to 6 mm or more. Wedge-shaped defects were observed in the mandibular posterior teeth bilaterally.

Radiographic examination

Periapical radiographs revealed a large periapical lesion of the maxillary right first molar that involved all apices, with an area of 12 × 4 × 8 mm^3 (Fig 1d). CBCT examination (Fig 1e to i) showed that the mesiobuccal (MB) and distobuccal (DB) roots of the maxillary right first molar protruded from the surface of the buccal cortical bone. The MB root of the maxillary right second molar approached the furcation of the palatal root and MB root of the maxillary right first molar. A focal buccal cortical bone defect originating from the periapical lesion of the MB root (white arrow in Fig 1i) was identified.

Diagnosis and treatment plan

The endodontic diagnosis for the maxillary right first molar was pulp necrosis and a chronic apical lesion. Periodontal involvement was the potential source of the pulpal infection and the indirect cause of the facial infection. The extensive gingival recession and poorly distributed occlusal force were proposed as the aetiology. Non-surgical endodontic therapy and comprehensive periodontal treatment were proposed and accepted by the patient.

Treatment history

The maxillary right first molar initially underwent occlusal adjustment to relieve its occlusal force. Following isolation with rubber dam, straight-line access opening was performed on the tooth, and the pulp was found to be completely necrotic (Fig 2a). After pulp removal, ultrasonic tips were used to remove cervical ledges on the mesial side. An operating microscope was employed throughout the procedure. Four root canal orifices were located, namely the MB, MB2, DB and P (palatal) canals. The MB and MB2 canals converged in the apical third of the root. Subsequently, each root canal was successfully negotiated to working length. An endodontic motor (Giulin Woodpecker, Shenzhen, China) and M3 nickel-titanium rotary instruments (UDG, Shanghai, China) were used to prepare the root canals (Fig 2b). The detailed irrigation protocol involved administration of 1 ml 2.5% sodium hypochlorite after each file, 17% EDTA to remove the smear layer with ultrasonic agitation and 2% chlorhexidine as the final rinse.

On the subsequent appointment 1 week after the initial visit, the sinus tract had closed with slight depression of the surrounding skin (Fig 2c). The patient

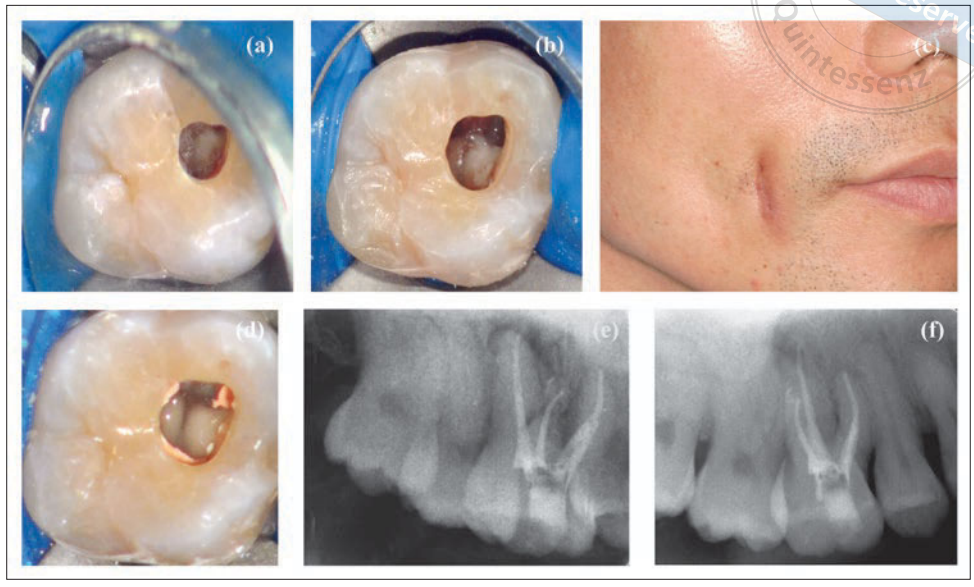

Fig 2a to f Root canal treatment process. Necrotic pulp tissue was found when access to pulp chamber was obtained **(a)**. Root canal preparation **(b)**. The skin swelling had resolved and the sinus tract closed 1 week after root canal preparation and scaling and root planing **(c)**. Root canal obturation **(d)**. Immediate postoperative periapical radiography **(e and f)**.

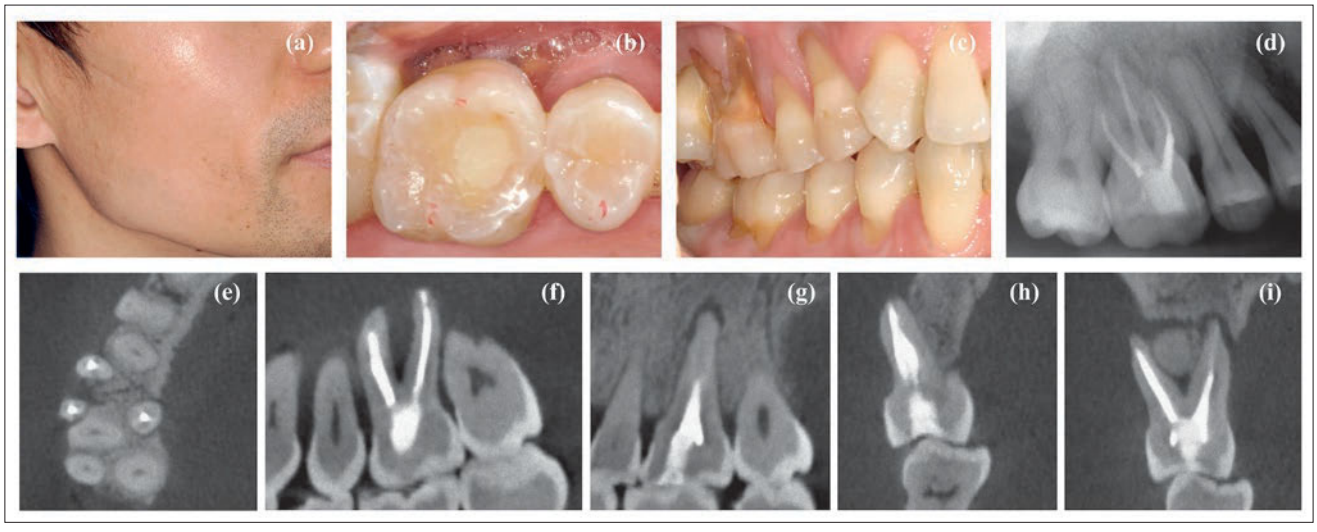

Fig 3a to i Clinical presentation and radiographic examination 1 year after treatment. The cutaneous facial sinus tract had healed completely without any scar tissue **(a)**. Intraoral photographs of the maxillary right first molar revealed a well-distributed occlusal force **(b and c)**. According to CBCT and periapical radiography, the periapical lesion had reduced in size significantly **(d to i)**.

also reported reduced swelling after treatment. After rubber dam isolation, the root canals were re-accessed and copiously irrigated, dried and obturated using the warm vertical condensation technique with gutta percha and iRoot SP sealer (Innovative BioCeramix, Burnaby, BC, Canada) (Fig 2d to f). Definitive restoration was performed with composite resin 1 week later. After the endodontic treatment, the patient underwent systematic periodontal therapy.

Outcome and follow-up

At the 1-year follow-up, the sinus tract had recovered completely and no scar was left (Fig 3a). The patient was totally asymptomatic. The composite resin restoration was intact and the occlusal force was evenly distributed (Fig 3b and c). Radiographs and CBCT scans both showed that the periapical lesion had reduced in size (Fig 3d to i). Scaling and root planing were completed by the periodontist and the possibility of periodontal surgery is to be considered further.

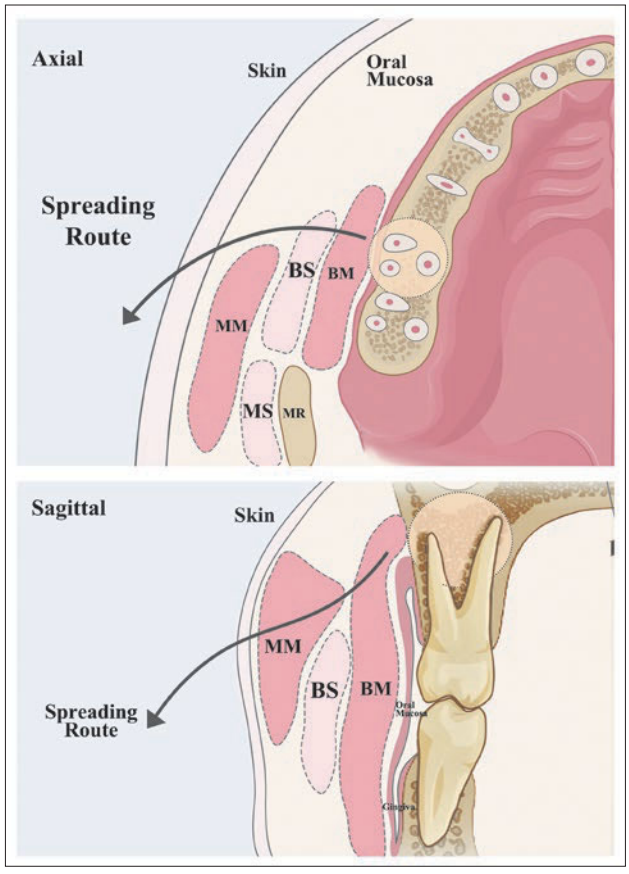

Fig 4 Potential route for spreading of the periapical abscess in the present case. BM, buccinator muscle; BS, buccal space; MM: masseter muscle; MR, mandibular ramus; MS, masticator space.

Discussion

Extraoral sinus tracts originating from chronic dental infections pose a dilemma with regard to diagnosis. This case presented a maxillary molar–related facial sinus tract, which has been rarely reported before. Based on the intraoral examination, the severe gingival recession and poorly distributed occlusal force were the potential aetiology for the necrotic pulp and periapical infection of the maxillary right first molar. This case is exceptionally rare, representing an extraoral sinus tract originating from a maxillary molar, with no prior reports found in the PubMed, Web of Science and Google Scholar databases. The maxillary molar–related facial sinus tract greatly resolved soon after root canal treatment was performed, which validated the aetiology of this case.

Apical abscesses of maxillary teeth often drain into the oral cavity through the buccal or palatal bone, or in some occasions into the maxillary sinus or nasal cavity.[6] Where the periapical abscess may drain is determined by the location of the apex and its proximity to the tissues mentioned above.[7] As shown in previous studies, the teeth that primarily cause odontogenic facial sinus tracts are mandibular molars,[8] with mandibular canines being the second most common cause.[9,10] The maxillary molar–related facial sinus tract has rarely been described before.

In this case, the extraoral sinus tract was possibly due to the abnormal buccal deviation of the maxillary right first molar. Thinner buccal bone might have increased the risk of bone perforation or sinus tracts.[11] It was speculated that the apices of the maxillary right first molar extended beyond the attachment of the buccinator muscle which led to the possibility that the periapical infection would involve the buccal space.[12] The infection further circled around the zygomaticus major and risorius muscle and penetrated the subepithelial connective tissue and epithelial layer, eventually leading to extraoral drainage (Fig 4).

In most of cases, if a restorable tooth is the source of the infection, then a cautious, non-surgical approach to therapy is sufficient.[13] If root canal treatment does not work, endodontic microsurgery or extraction is another option for curing the infection. Since cutaneous sinus tracts may have an epithelial lining in their advanced stages, long-standing lesions may result in granulation tissue and cutaneous scars.[1,14] Surgery will be necessary in some cases for cosmetic purposes, while there are other studies that described the optimal outcomes of cutaneous sinus tracts only after conservative treatment.[1,15,16] As is shown in this case, complete recovery of the facial sinus tract occurred only with root canal therapy.

Conclusion

Cutaneous sinus tracts sometimes manifest due to periapical lesions of the maxillary molars. Midfacial sinus tracts may act as drainage pathways for odontogenic infections. A comprehensive oral examination is essential to identify potential odontogenic sources.

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Conflicts of interest

The authors declare no conflicts of interest related to this study.

Author contribution

Dr Yu Han WANG collected the data and drafted the manuscript; Dr Zu Hua WANG revised the manuscript; Dr Xiao Yan WANG directed the treatment and the study.

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