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Case Report

Aberrant root canal anatomy: two canals in mandibular lateral incisor - A case report

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ABSTRACT:
Abnormalities in the root canal anatomy are commonly occurring phenomenon. A thorough knowledge of root canal anatomy and its variation is necessary for successful completion of endodontic treatment.The aim of the thisclinical report is to present a different or rarest root canal anatomy which is tworoot canals in mandibular lateral incisor. A 28 -year-old lady reported to the Department with chief complaint of pain in lower anterior teeth. While taking dental history, patient reveals the story that she had visited private dental clinic for pain in lower front teeth. where she had undergone some dental treatment with all lower anterior teeth. But, even after several visits, there was no relief from pain in lower front teeth. When we carried out radiographic examination we found two canal in mandibular lateral incisor. Start with endodontic treatment Immediate relief of pain after location and debridement of second canal confirmed the reason of pain to be the missed lingual canals. Complete removal of the lingual shoulder is critical, because these teeth often have two canals that are buccolingually oriented and lingual canal most often is missed. This case report is given to increase the awareness of clinicians on aberrations in tooth morphology of anterior teeth and to show that special care is needed to detect and treat possible extra canals.

Keywords: Lateral incisor, Debridement, Examination

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CASE DESCRIPTION

A 28-year-old female patient presented to the Department of Conservative Dentistry and Endodontics at Surendera Dental College and Research Institute, Sri Ganganagar, with a chief complaint of persistent pain in the lower anterior region. Her dental history revealed that she had previously sought treatment at a private dental clinic for discomfort in teeth 31, 41 and 42, where access openings and preliminary endodontic therapy had been commenced; however, despite multiple visits, the pain in tooth 42 remained unrelieved. The patient's medical history was non-contributory, indicating no systemic conditions that could influence treatment outcomes. On clinical examination, tooth 42 exhibited tenderness to percussion, and vitality testing elicited a painful response to heat application, suggestive of irreversible pulp involvement. A periapical radiograph demonstrated prior access preparations in teeth 31, 41 and 42, and notably revealed the presence of two distinct root canals in tooth 42. Based on these findings, a diagnosis of acute apical periodontitis superimposed on chronic irreversible pulpitis in tooth 42 was established, and a definitive treatment plan consisting of nonsurgical root canal therapy for tooth 42 followed by full-coverage crown restoration was formulated. Anticipating the possibility of a missed canal, local anesthesia was achieved with 2% lidocaine containing 1:100,000 epinephrine, and coronal access was refined using an Endo Access bur and an Endo Z bur. The initial access cavity in tooth 42 was modified by widening it in the buccolingual dimension and extending it gingivally into the cingulum, which

revealed a previously undetected lingual canal orifice alongside the buccal canal. Canal patency was confirmed with a no. 10 K-file. Working lengths were determined under digital radiography by placing a no. 15 K-file in the buccal canal and a no. 10 K-file in the lingual canal, and the presence of two separate canals was further corroborated by angulated radiographic views. Biomechanical preparation was carried out using conventional stainless steel hand files up to a master apical size of no. 30 K-file in both canals. During instrumentation, copious irrigation with 2.5% sodium hypochlorite and 17% EDTA was performed, with normal saline rinses between each file change to enhance debridement and prevent canal blockage. The patient was recalled after 24 hours, at which time she reported a significant reduction in pain and tenderness. Eight days later, all lower anterior teeth were asymptomatic, and root canal obturation of tooth 42 was completed using gutta-percha cones and AH Plus sealer via the lateral condensation technique. A post-endodontic restoration was placed with glass ionomer cement to seal the access cavity. A final radiograph confirmed dense filling of both buccal and lingual canals and satisfactory apical seal. The patient was scheduled for full-coverage crown preparation and placement at the subsequent visit to restore function and esthetics. At the two-week follow-up, the patient remained symptom-free, demonstrating successful resolution of periapical inflammation and confirming the importance of thorough canal exploration and appropriate modification of access cavities in teeth with complex root canal anatomies.

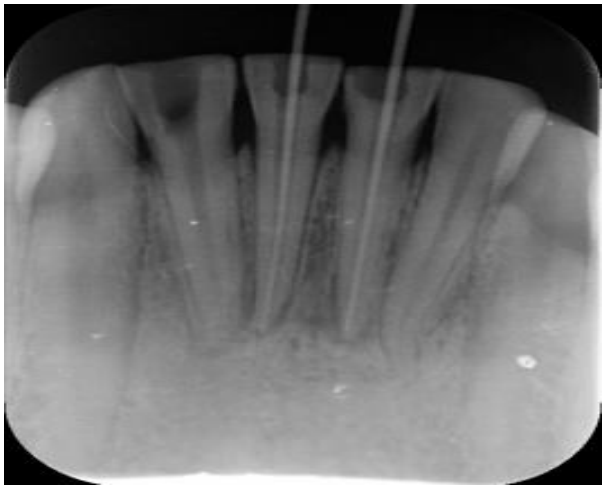

Figure 1: Preoperative radiograph.

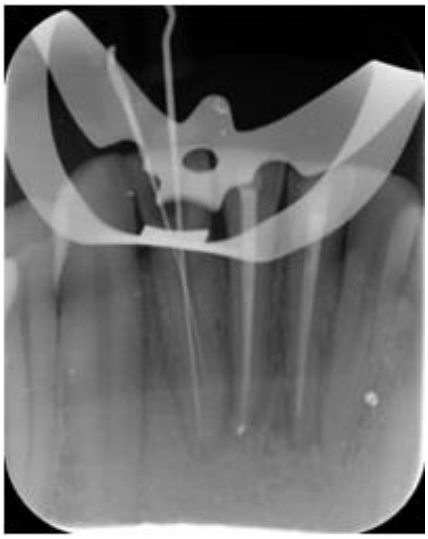

Fig 2 :- working length wrt 42

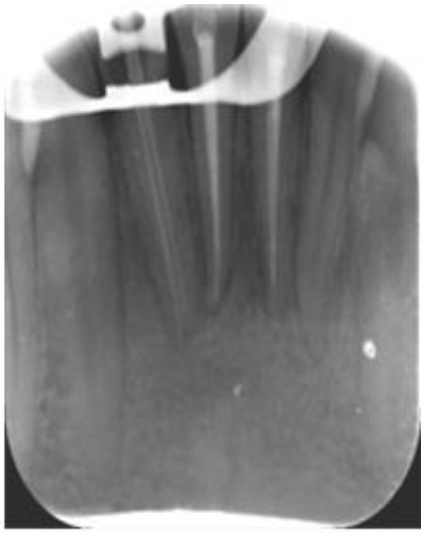

Fig 3 :- shows mastercone determined wrt 42

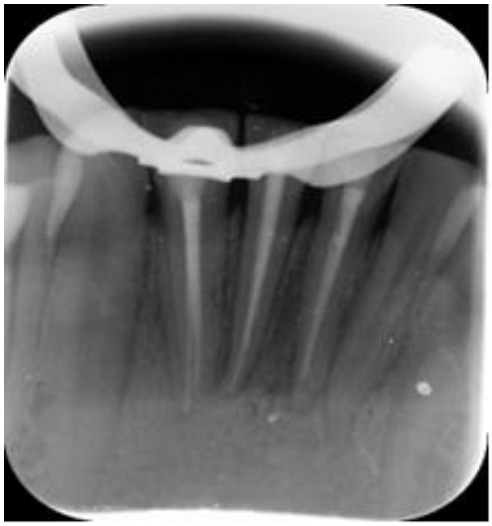

Fig 4:- shows obturation wrt 42

DISCUSSION

The main reason for the failure of endodontic therapy is incomplete knowledge about the anatomical variation of root canals. A canal is often left untreated because the dentist fails to recognize its presence either due to lack of knowledge of root canal morphology or due to lack of experience and skill to negotiate the canal. The dentist must have a thorough knowledge of root canal morphology before starting endodontic treatment. For good prognosis following root canal treatment, the entire root canal system must be explored, adequately debrided, and filled. Therefore, clinicians must be familiar with the various root canal configurations.[1]Various authors have studied the root canal morphology of extracted mandibular incisors and have reported a prevalence of two canals in 12–35% of the cases.[1]Vertucci has classified morphological patterns of the root canal systems into eight types.[2,3] In general, the mandibular incisors have one root canal with one apical foramen (Vertucci Type I) or two root canals with one apical foramen (Vertucci Type II). However, the occurrence of two root canals with two separate foramina (Vertucci Type IV) in the mandibular incisors is very rare viz., 3% and 2% in the mandibular central incisors and lateral incisors, respectively, and in canines, it is 6%.[3,4]This case report presents the endodontic treatment of mandibular incisor, having two separate canalshaving Vertucci Type IV root canal morphological system.

A well-designed access preparation is essential for a good endodontic result. Without adequate access, instruments and materials become difficult to handle properly in the highly complex and variable root canal system. Proper access cavity preparation provides straight or direct line access to the apical foramina or at least to the initial curvature of canal to all root canal orifices and it also conserve sound tooth structure.[5]Mandibular incisors because of their small size and internal anatomy may be most difficult access cavities to prepare. Complete removal of the lingual shoulder is critical, because these teeth often have two canals that are buccolingually oriented and lingual canal most often is missed. To avoid missing this canal, the clinician should extend the access preparation well into cingulum gingivally, which, if present, is located directly beneath it[6]. When there are two canals, the buccal canal is the easiest to locate and is generally straighter than the lingual canal, which is often shielded by lingual shelf[7]. According to another study, 15% of the teeth studied showed a bifurcated canal, 7.7% had a lateral canal, and 25% had an accessory canal, which was defined as a secondary canal that emanated from the main canal and travelled at an angle alongside it before exiting into the periodontal ligament space[8]. They also reported that 3% of the specimens with furcations possessed two separate canals[9]. Benjamin and Dowson found that of their total sample of 364 mandibular incisors, 151 (41.4%) had two separate canals when examined clinically; that is, the probe could be inserted only in a single direction labially and in another direction lingually, but not between the two[10]. It is thus generally agreed that the presence of two root canals within single-rooted permanent mandibular incisors is the rule, not the exception.

Funato et al. reported a case of a mandibular central incisor with two root canals and two separate apical foramina[11]. Failure by the operator to recognise the anatomy of a root canal system as well as the possible developmental anomalies and their consequences might lead to inadequate debridement of the root canal system which, in turn, may contribute to unfavourable endodontic treatment outcomes and the subsequent need for endodontic retreatment or surgical intervention[12,13,14].

In this case, extension of the access opening lingually beneath the cingulum revealed the missed lingual canals in mandibular incisors. In this case, the private practitioner whom patient visited earlier was not well aware about root canal morphology of lower anterior or he/she must have been unable to detect the

presence of second root canal, which is the main reason why the pain was possibly in lower anterior, even after the patient visited that dentist so many times. One of the main reasons for endodontic treatment failure in mandibular incisor teeth is the failure to locate, debride, and obturate the missed lingual canal. Immediate relief of pain after location and debridement of second canal confirmed the reason of pain to be the missed lingual canals. Thus, careful interpretation of the radiographic feature taken from different angles should be done before starting endodontic treatment. One must be careful while access opening, and initial buccolingual widening of mandibular incisors and gingival extension beneath the cingulum must be made to search for a possible second canal lingually.

CONCLUSION

This report shows a case of the presence of a second canal in a single-rooted maxillary lateral incisor. This case report is given to increase the awareness of clinicians on aberrations in tooth morphology of anterior teeth and to show that special care is needed to detect and treat possible extra canals.

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