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Case Report

Funnel Tooth: Endodontically Challenged Mandibular Second Premolar

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Abstract

Macrodontia of a single tooth is a rare event. This has been reported on very few occasions in scientific journals when affecting a mandibular premolar. Once pulpally involved, because of its unusual coronal and radicular anatomy, the management of such teeth can become a challenging task for the operator. The endodontic management of such a premolar has never been reported in literature so far and there is no published protocol on the management of such a tooth. The use of cone beam computed tomography scan in this rare case significantly contributed towards detailed analysis of the root canal anatomy and its successful endodontic management thereafter. This report extends the range of known possible anatomical variations associated with premolars which may pose a challenge for its endodontic management. This report also highlights the role of cone beam computed tomography as an objective method to confirm the three-dimensional anatomy of teeth.

Keywords: Macrodontia; Funnel tooth; Computed beam cone tomography; Monoblock.

Introduction

The primary objective of endodontic treatment is efficient debridement of the root canal followed by disinfection and three dimensional obturation which can seal off the apical and coronal entries to the canals, thereby preventing the ingress of micro-organisms.[1] After endodontic treatment the teeth invariably become brittle, hence in a case of teeth with thin root canal walls, the obturating material has an additional responsibility of reinforcing the root.[2]

The morphological anomalies of the macrodont premolars appear quite distinct and may justify a unique categorization.[3] The semacrodont premolars usually present with a short single root having a large pulp chamber and an acute convergence apically, resembling a funnel (Figure 1a, 1b). Hence the author prefers to term such a tooth as a FUNNEL TOOTH, which is more descriptive about its radicular anatomy.

Conventional intra-oral periapical radiographs are an important diagnostic tool in Endodontics for assessing the canal configuration. However, it is not completely reliable due to its inherent limitation. Recently, newer diagnostic methods such as computed tomography (CT) and cone beam computed tomography (CBCT) have overcome the disadvantages of radiographs by producing a three-dimensional image. These imaging techniques have emerged as a potent tool for evaluation of root canal morphology.[4]

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Figure 1(a)

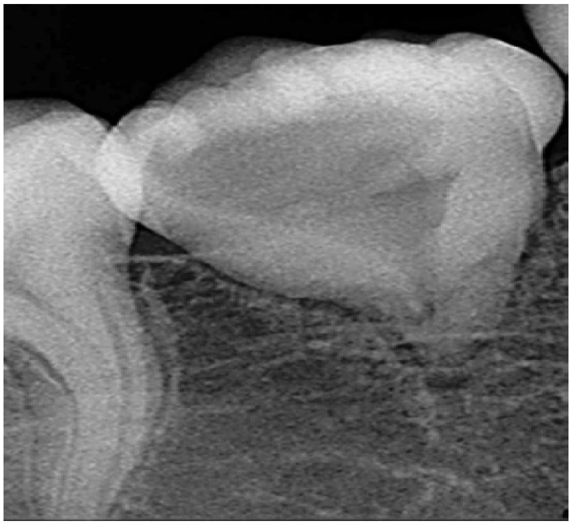


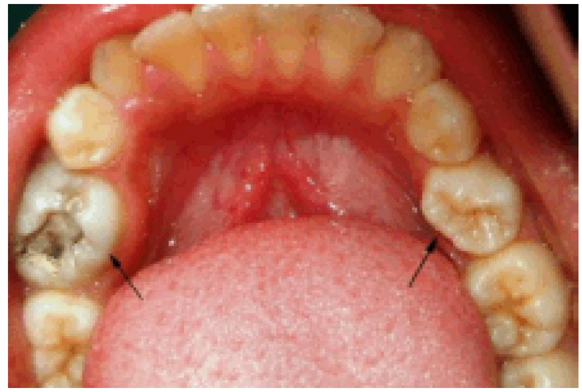
Figure 1(b)

Case report

A 14-year-old girl patient reported to our Department with the chief complaint of pain in the lower right back region of the jaw since 7 days. She gave a history of intermittent pain from the past 3 months, which had increased in intensity in the past 2 days. Clinical examination revealed deep occlusal caries in her right mandibular second premolar. The tooth was tender on vertical percussion. Thermal and electric pulp testing elicited negative response. The patient did not give a history of any general medical illness.

An intra-oral examination revealed the second mandibular premolars on both sides were having molariform appearance and a greater mesiodistal diameter than the usual

Figure 2



second premolar. The #45 was having 5 buccal and 4 lingual cusps (Figure 2). The intra-oral periapical radiograph, of #45 presented itself as a funnel tooth in the alveolar bone having an abnormal morphology along with slight widening of the periodontal ligament space. An orthopantamograph revealed a similar appearing #35 with a blunt and conical root. Since the anatomic make up of the root canal system of the involved tooth was quite unusual, dental imaging with the help of Cone Beam Computed Tomography (CBCT) was planned to ascertain the complex root canal anatomy in a three-dimensional manner. The CBCT image revealed that tooth #45 had apartially intact roof of its pulp chamber and a broader, abruptly converging funnel shaped canal with a laterally opening wide apex (Figure 3a, 3b). On the basis of the clinical and radiographic appearance, the condition was diagnosed as bilateral molarization of the second mandibular premolars with a funnel shaped pulp canal. A literature search was performed to ascertain the management of such an unusual tooth, but none could be

Figure 3(a)

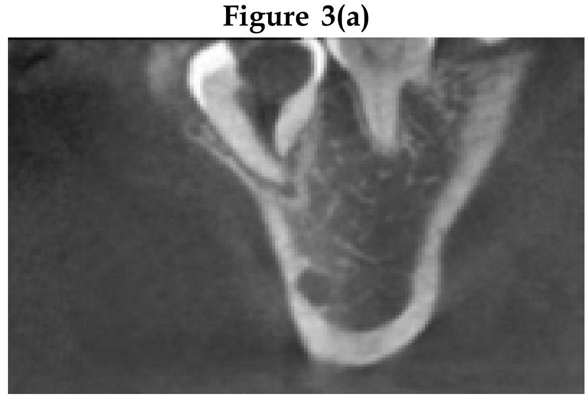


Figure 3(b)

Figure 4

found. Hence the root canal treatment with #45 was planned.

The pulp chamber was accessed in #45 after complete excavation of the carious lesion. A wide canal orifice was detected in the center of the pulpal floor. Working length was determined using radiographs (Ingle's method). Cleaning and shaping was done using step-back technique followed by irrigation between each instrumentation.

The most challenging part in treating this tooth was obturation because of the short funnel shaped canal, limited amount of dentine and a wide apex. Thus a method of restoration which can provide both good apical seal and root reinforcement was preferred. The canal of #45 was dried with paper points and wide open apex was plugged with MTA (Densply International, Ballaigues, Switzerland) about 4 mm from the apex.[5] A layer of GIC was placed at the corono-radicular junction to enable acid etching for subsequent composite restoration (Figure 4). Finally restoration was carved to imitate the occlusal anatomy. The patient was asked to report for follow up after every three months for two years.

Discussion

Considering the fact that so many aberrations exist in these teeth, it becomes mandatory to analyze the root anatomy of these teeth entirely, prior to attempting endodontic treatment. Radiographs produce only a two-dimensional image of a three-dimensional object resulting in superimposition of images. Hence, they are of rather limited value in cases with complex root canal anatomy.[6] CBCT imaging provides clinicians with sub-millimeter spatial resolution images of a high diagnostic quality and relatively equivalent radiation dose to that needed for 4 to 15 panoramic radiographs.[7]

Table 1: Summary of morphological anomalies associated with mandibular premolar teeth

Authors	Year	Type of premolar	Management
Primack [13]	1967	Macrodontia of premolars	No
Hermel [14]	1968	Macrodontia of premolars	No
Ekman [15]	1974	Macrodontia of premolars	No
Reichart [16]	1977	Macrodontia of premolars	No
Peck [17]	1983	Macrodontia of premolars	No
Groper [18]	1987	Macrodontia of premolars	No
Beltes [19]	1997	Fusion or gemination of premolars	Yes (endodontic Rx)
Dugmore [3]	2001	Macrodontia of premolars	No
Rodig [20]	2003	Three root canals	Yes (endodontic Rx)
Gomes [21]	2006	Divided canal at apex	Yes (endodontic Rx)
Cleghorn [22]	2008	Three roots and c-shaped canal	No
Gurmeet [1]	2008	Four roots and root canals	Yes (endodontic Rx)
Mahesh V. Dadpe [23]	2010	Molarization of premolars	No
Current report	2012	Funnel tooth	Yes (endodontic Rx)

A wide range of opinions are reported in literature regarding the number of root canals, but there are very few reports on the variations in the morphology of root that occur in mandibular premolars.[8,9](Table 1)

With the rigidity of the root weakened by endodontic and restorative instrumentation, the sealing quality and tooth strengthening potential of endodontic replacement monoblocks become important issues.[21] Strengthening of a funnel root canal with open apices and reduced circumferential dentin thickness are also issues of concern.[22,23]

Unlike Hydron, MTA should theoretically be able to strengthen roots.[24] However, as conventional root canal sealers do not bond strongly to dentin and gutta-percha and not behave as a mechanically homogenous unit with the root dentin.[25] iRoot SP includes a similar composition to white mineral trioxide aggregate (MTA) material and has both excellent physical properties and biocompatibility. It can form a hermetic seal inside the root canal and be used for filling root canals with or without gutta-percha points. However because of unavailability of iRoot SP as it is a newer material, so MTA was the material of choice.[26]

Any polymerizing endodontic sealer will be subjected to large polymerization stresses during setting that may cause debonding and gap formation along the periphery of the root filling.[27] On the other hand some other sealers namely those based on calcium hydroxide or calcium oxide or mineral trioxide aggregate MTA present yet better biological properties.[28,29,30] Glass-ionomer cements and resin-modified glass-ionomer cements bond to root dentin.[31,32]

This case report is one such case wherein we encountered an endodontically challenging funnel shaped canal initially but ended up with a successful treatment outcome. In such uncertain cases, a radiograph cannot be considered to be foolproof because of its inherent limitations. This paper highlights the role of a CBCT as an objective analytical tool to ascertain the root canal morphology.[33]

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Case Report

Gardner's Syndrome with Significant Maxillofacial Cosmetic Deformity: A Rare Case Report

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Abstract

Gardners Syndrome, a common variant of familial adenomatosis polyposis affects one in approximately 8000 births. This syndrome is identified due to a distinctive triad of familial intestinal polyposis, surface tumours of hard tissue particularly osteomas in the skull and surface tumours of the soft tissue. The intestinal polyps have a 100% risk of undergoing malignant transformation. Hence, early detection of the disease is critical. This article discusses the surgical management of an unesthetic orbital osteoma in a particularly undiagnosed case of Gardners Syndrome.

Keywords: Gardners syndrome: Autosomal dominant; Polyposis; Osteomas; Soft tissue tumours.

Introduction

Gardner's syndrome (GS), also known as 'familial colorectal polyposis,[1] is an autosomal dominant disorder localised to a small region on the long arm of chromosome 5(5q21-22).[2] It is characterised by adenomatous polyps of the gastrointestinal tract, desmoid tumors, osteomas (largely confined to skull bones), epidermoid cysts, lipomas, periampullary carcinoma and dental abnormalities. Less common features include hypertrophy of the pigment layer of retina, thyroid tumors and liver tumors.

Menzel first described adenomatosis of colon in 1721, and in 1863, Cripps discovered the heredity of colon polyposis and termed it familial adenomatosis.[3] Devic and Bussy first described GS in 1912 as a triad of intestinal polyposis, various soft tissue tumors such as fibromas, lipomas, neurofibromas, and epidermoid cysts, and multiple osteomas especially of the skull.[4] In 1951, Gardner reported the association between surface tumors and colonic polyps that are prone to malignant degeneration. In 1952, Gardner and Plenk described the dominant hereditary pattern of multiple osteomas associated with colonic polyposis. In 1953, the report by Gardner and Richards described the association of the multiple cutaneous and subcutaneous polyposis and osteomatosis. This completed the description of the clinical syndrome that has come to bear Gardner's name. In 1962 Gardner discovered the dental abnormalities and skeletal alterations in these patients.[5]

Dental annomalies include impacted or unerupted teeth, congenitally missing teeth, hypercementosis, dentigerous cysts, fused roots of the first and second molars, long tapered roots of posterior teeth, and multiple caries.[6] Osteomas are pathognomic of GS. The significance of this disease to the dentist is that the colonic polyps usually undergo malignant change by the fourth decade and the extra intestinal lesions may appear long before the bowel lesions. Thus, early detection of multiple jaw osteomas and/or multiple sebaceous cysts (particularly on scalp) may aid

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