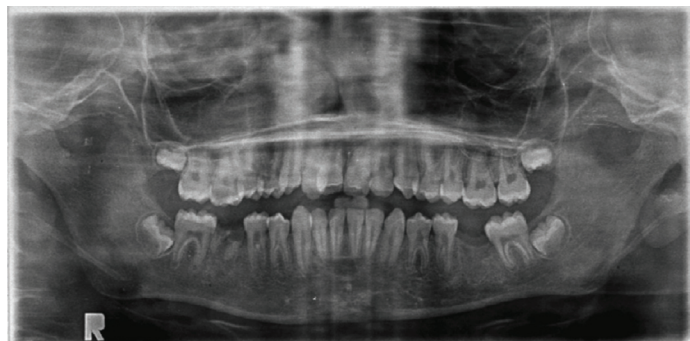


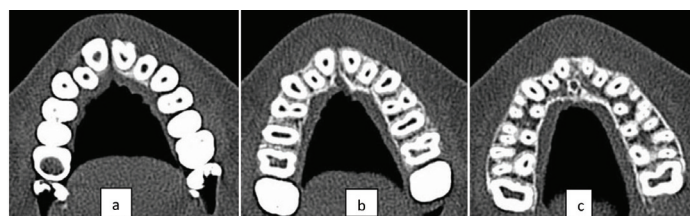
All Premolars with Three Roots Confirmed with Cone Beam Computed Tomography: A Rare Anatomical Variation

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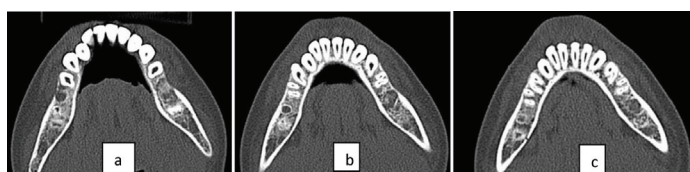
A 13-year-old boy with a non contributory medical history reported with a chief complaint of pain in relation to his lower right jaw region. Clinical examination showed a grossly carious tooth with evidence of intraoral swelling and sinus tract formation. The Orthopantomograph (OPG) revealed root stumps in relation to 46 which were advised for extraction. While examining the OPG the adjacent premolars showed two roots. Being an unusual finding and also the patient was being considered for early placement of implants in 36 and 46 region was sent for Cone Beam Computed Tomography (CBCT). The OPG showed all eight premolars with two roots and the lower left first premolar appeared to have three roots [Table/Fig-1]. The CBCT showed three roots in all the premolars [Table/Fig-2,3], c-shaped canal in the mandibular right and left first premolar [Table/Fig-3].



[Table/Fig-1]: Preoperative OPG showing root stumps (46) and three roots in all premolars.



[Table/Fig-2]: CBCT axial view of maxilla showing: (a) coronal third section showing pulp chamber; (b) middle third section showing two roots and two canals; (c) apical third section showing three rooted bilateral maxillary first and second premolars.



[Table/Fig-3]: CBCT axial view of mandible showing: (a) coronal third section showing pulp chamber; (b) middle third section showing two roots and two canals; (c) apical third section showing three rooted bilateral mandibular first and second premolars.

DISCUSSION

While travelling, road maps are helpful to reach our destination; similarly a map can be created in the mind with the help of the CBCT for predictable and successful endodontic treatment, which will lead to less endodontic failures to missed and untreated canal spaces [1].

The bifurcation of mandibular first premolar appearing bilaterally is 59.6% and maxillary first premolar with trifurcation appearing bilaterally is 4% [2]. Therefore, if a particular anomaly is rare like the three rooted premolars, there is 90% chance that the anomaly would be bilateral [2]. This fact stands true in our case report.

The presence of three roots is rare [Table/Fig-4] [3-6]. It is a remarkable finding that in our study all the premolars have three roots [Table/Fig-5].

The exact reason for presence of three roots is not known but it could be related to the epithelium diaphragm of the hertwigs root sheath. The differential growth of the epithelial diaphragm causes the division of the root trunk into two or three roots. When the enamel organ is grown if three tongue like extensions are developed from the horizontal epithelial diaphragm, three roots are formed [7].

S. No.	Tooth type	Author	Type of study	Inference
1.	Maxillary first premolar	Gupta S et al., [3]	In vitro study (clearing technique) in North Indian population	Prevalence of three roots is 0.4%
2.	Maxillary second premolar	Khreisat ASA et al., [4]	Case report	Three roots
3.	Mandibular first premolar	Cleghorn BN et al., [5]	Case report showing 3D microcomputed tomography of extracted first premolar for orthodontic purposes.	Three rooted tooth with three canals
4.	Mandibular first premolar	Parekh V et al., [6]	Clearing technique	Type 1 (50%) according to vertucci classification was most common and type 6 (2.5%) vertucci was least common. Type 6 and type 8 were not seen
5.	Mandibular second premolar	Parekh V et al., [6]	Clearing technique	Type 1 (80%) according to vertucci classification was most common and type 4 (2.5%) vertucci was least common. Type 2, 3, 6, 7, 8 were not seen
6.	Mandibular second premolar	Cleghorn BM et al., [5]	Case report showing 3D microcomputed tomography of extracted first premolar for orthodontic purposes	C shaped canal

[Table/Fig-4]: Shows various case reports and studies done on premolars with three roots [3-6].

Tooth number	No of roots	No of root canals	Vertuccis classification
14	3	3	Buccal- type V Palatal- type I
15	3	3	Buccal-type V Palatal- type V
24	3	3	Mesiobuccal- type I Distobuccal- type I Palatal- type I
25	3	3	buccal- type V Palatal- type I
34	3	3, c- shaped canal in distal root	Mesiobuccal- type I Distobuccal- type I Palatal- type I
35	3	3	mesial- type I distal- type I
44	3	3, c- shaped canal in distal root	mesial- type I distal- type I
45	3	3	mesial- type I distal- type V

[Table/Fig-5]: Shows variations in root canal morphology in the premolars of our case reports.

CBCT can be a useful adjunct but the disadvantage of using CBCT in paediatric patients, uncooperative patients, and those who have neuromuscular disorders often cannot remain stable throughout the scanning procedure [8] and therefore, the images obtained are not

clear, as seen in our case report. This was also a limitation of our case report.

CONCLUSION

Variations of this grade as seen in our case is extremely rare but is possible, so it is necessary that before starting any endodontic treatment, the clinician should take into consideration the variability of the root canal morphology and CBCT can be of great help to the clinician to achieve the same.

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