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Mini Review

Blunt Images of Smooth Curvatures on Intraoral Periapical Radiography

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Abstract: Intraoral periapical (IOPA) radiography is an essential diagnostic tool in dental practice, yet its two-dimensional nature can occasionally produce misleading interpretations. This communication reports a case in which a mandibular third molar appeared to exhibit a blunted distal root apex on an IOPA image. Careful evaluation of the lamina dura and periodontal ligament (PDL) space indicated that the apparent bluntness was not a true anatomical alteration but an artifact caused by a pronounced buccal curvature of the apical one-third of the root, superimposed over the middle third. Recognition of such projection artifacts is crucial for accurate diagnosis and treatment planning. Continuous lamina dura and PDL outlines can help distinguish real structural changes from optical illusions caused by root curvature. Understanding the interplay between root anatomy and radiographic projection enhances interpretation accuracy and prevents misdiagnosis during endodontic and surgical procedures.

Keywords: Intraoral periapical radiograph, Mandibular third molar, Root curvature, Radiographic interpretation, Projection artifact.

Introduction

Intraoral periapical (IOPA) radiography is one of the most frequently employed diagnostic techniques in clinical dentistry because it provides fine detail of root and periapical anatomy. However, as a two-dimensional imaging method, it is prone to geometric distortion and overlap of anatomical structures, which can occasionally produce misleading appearances. The present report describes a case in which the distal root of a mandibular third molar appeared to have a blunted apex on an IOPA image, although further careful evaluation revealed that the finding was an optical artifact created by the projection of a curved root [1,2].

A patient presented with a carious mandibular third molar on the right side. An IOPA radiograph was taken for evaluation before extraction of the tooth. On the image, the distal root seemed to terminate in a blunt apex, raising initial suspicion of apical resorption, arrested root development, or changes associated with chronic periapical inflammation. Careful inspection of the lamina dura and the periodontal ligament (PDL) space, however, provided critical clues. The lamina dura appeared intact and continuous around the apex, and the PDL space could be traced clearly without any interruption or widening [3,4]. These characteristics suggested that the root morphology was likely showed dilaceration, and the blunted appearance resulted from radiographic superimposition rather than a true structural alteration [3,5].

A detailed interpretation indicated that the distal root showed a marked buccal/lingual curvature in its apical one-third. With the conventional angulation used during IOPA imaging, the curved portion at the apex was projected over the middle third of the same root, obscuring the actual apex and giving the impression of a shortened or blunted root end. Because the lamina dura and PDL space remained continuous, the diagnosis of a projection artifact was supported.

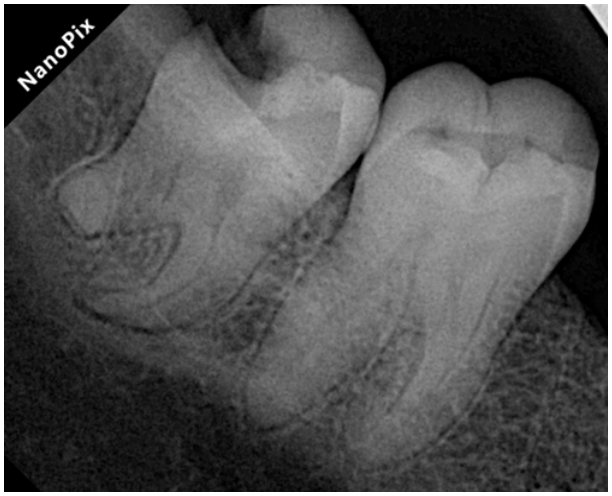

Figure: IOPA with apparent blunt root apex of distal root of tooth no. 32.

This observation reinforces an important principle in radiographic interpretation: not every apparent variation on an IOPA film represents a genuine anatomical or pathological change. The mandibular third molar often displays complex and variable root morphology, including significant curvatures in buccolingual and mesiodistal directions. When such three-dimensional structures are projected onto a two-dimensional surface, superimposition can mimic apical resorption, incomplete root formation, or abnormal root morphology. Misinterpretation of these appearances can influence endodontic and surgical decisions, especially in procedures where accurate assessment of root length and curvature is essential.

When evaluating root morphology, clinicians should pay particular attention to the lamina dura and PDL space. Discontinuity or destruction of these structures generally indicates true pathology, whereas their preservation favours a radiographic artifact. In cases where the radiographic finding remains uncertain, obtaining an additional periapical image with a different horizontal or vertical angulation may help clarify the morphology. Cone-beam computed tomography (CBCT) can also be considered for three-dimensional assessment when clinically justified and available.

Conclusion

In conclusion, an apparently blunted distal root apex of a mandibular third molar on an intraoral periapical radiograph may be the result of a pronounced buccal curvature in the apical third, which is superimposed over the middle third of the root in the image. Careful evaluation of radiographic landmarks such as the lamina dura and PDL space can help differentiate between true anatomical variations and projection artifacts, ensuring more accurate diagnosis and better-informed clinical decision-making when 3D methods like CBCT are not available.

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