

The Resistance of Succedaneous Teeth to Periapical Infection: A Series of Seven Cases

Abstract

Pediatric dental procedures are carried out largely to prevent the adverse effects of primary teeth infection on succedaneous teeth (ST). The existing literature on how and when periapical infection (PI) from primary teeth affect ST is conflicted. A series of seven case reports on PI (abscesses and radicular cysts) from primary molars, until the eruption of the premolars, have been illustrated. The resistance of ST to PI based on their developmental stages is also discussed.

Keywords: Abscess, ameloblast, follicle, gubernacular canal, primary molar, radicular cyst

Introduction

Pediatric dental procedures such as restorations, pulp therapy, or extractions are usually undertaken in order to maintain the function and esthetics of primary teeth. However, they are also carried out to prevent the adverse effects of primary teeth infection on succedaneous teeth (ST). The effects of periapical infection (PI) on ST have been reported by various authors on the basis of the structures they have affected such as follicle,^[1-7] reduced enamel epithelium,^[1,3-6,8,9] ameloblasts,^[1,9,10] gubernacular canal,^[1,3-6,8,9,11] enamel,^[1,3-10,12-17] dentin,^[9,13] and the root.^[7] Its effects on the eruption of ST such as tilting,^[18] accelerated eruption,^[11,18] and ankylosis^[19] have also been reported. However, this article highlights a series of seven cases, wherein ST were not affected despite the presence of large periapical lesions in their vicinity that had resulted from their corresponding primary teeth.

Case Reports

Case report 1 (periapical abscess)

A 5-year-old male patient had reported with a large gum swelling in the right lower posterior region [Figure 1a]. His parent had mentioned that the caries had been present for 6 months, although the gum swelling had developed 3 days before. On examination, 84 was found to have grade three mobility, tenderness to percussion,

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and caries on its distal side [Figure 1b]. On compression of the gingival swelling, purulent discharge was observed at the margins. An orthopantomograph (OPG) revealed distoproximal caries in 84 that had resulted in a periapical lesion [Figure 1c]. A diagnosis of periapical abscess was made for 84 and its extraction was carried out [Figure 1d and e]. A band and loop space maintainer was inserted 2 days later for space maintenance [Figure 1f]. At 11 years of age, all premolars and canines had erupted in the lower arch, and 44 (succedaneous to 84) showed no enamel defect [Figure 1g].

Case report 2 (periapical abscess)

An 8-year-old female patient had reported with pain in the lower right posterior tooth. She had mentioned that caries had been present in that tooth since the last 2 years. On examination, 85 was found to have a large caries lesion with gross damage of crown structure. A radiograph showed destruction of mesial root structure, furcation involvement, and periapical radiolucency in relation to 85 [Figure 1h]. Extraction of 85 was carried out and a band and loop space maintainer was inserted [Figure 1i]. At 11 years of age, all premolars and canines had erupted in the lower arch, and 45 (succedaneous to 85) showed no enamel defect [Figure 1j].

Case report 3 (periapical abscess)

A 9-year-old female patient reported with pain in the lower posterior teeth.

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On examination, stainless steel crowns were found on 74, 75, 84, and 85, which had been placed 2 years before. An OPG and radiographs revealed minimal root structure and periapical radiolucencies in relation to 74 and 85 [Figure 2a-c]. A purulent discharge was observed upon deroofing the pulp chambers of 74 and

85 [Figure 2d]. Infected pulp tissue was excavated and an intracanal medicament (Metapex) was placed in these teeth [Figure 2e and f]. The coronal openings were then restored with glass ionomer cement [Figure 2g]. At 11 years of age, the ST of 74 and 85 (34 and 45) had erupted with no enamel defects [Figure 2h].



Figure 1: (a) Right lateral view; (b) occlusal view (lower right side); (c) orthopantomograph (lower right quadrant); (d) right lateral view; (e-g) occlusal view (lower right side); (h) intraoral radiograph; (i and j) occlusal view (lower right side)

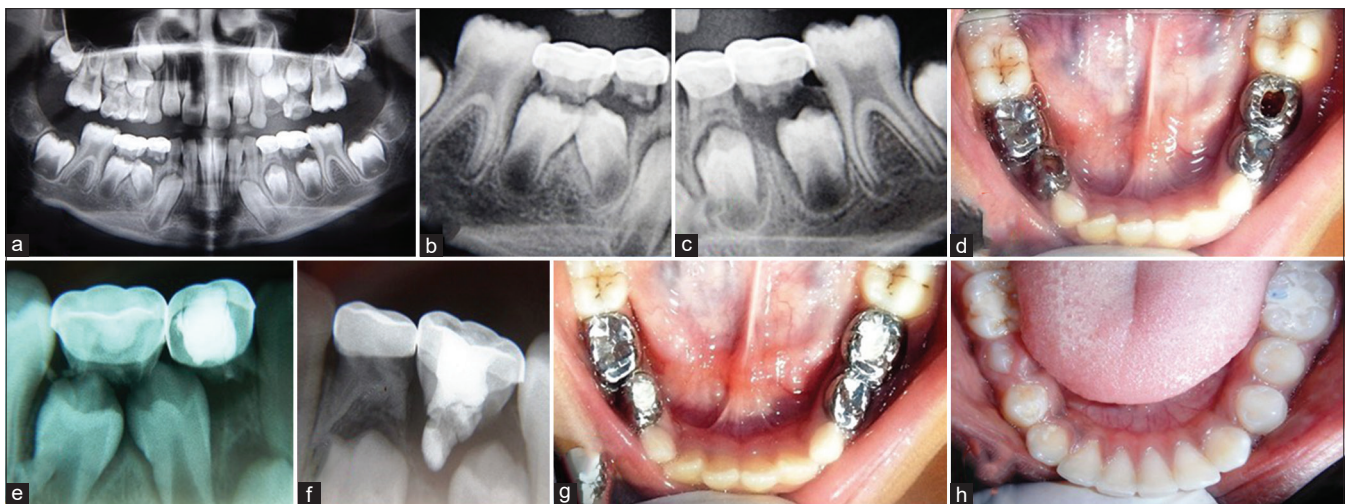


Figure 2: (a) Orthopantomograph; (b) magnified view of orthopantomograph (lower right side); (c) magnified view of orthopantomograph (lower left side); (d) lower occlusal view; (e) posttreatment radiograph (right side); (f) posttreatment radiograph (left side); (g) posttreatment lower occlusal view; (h) lower occlusal view after eruption of premolars

Case report 4 (radicular cyst)

A 9-year-old male patient had reported with pain in relation to the lower left posterior teeth. He had given a history of caries having been present on those teeth for the last 3 years. On examination, 74 and 75 were found to have large caries lesions and showed grade three mobility [Figure 3a]. A radiograph revealed a cystic lesion in relation to 74 and 75 with well-defined margins [Figure 3b]. A diagnosis of radicular cyst was made, following which 74 and 75 were extracted. Following extraction, the crowns of 34 and 35 were partially visible in the extraction sockets [Figure 3c and d]. Six months following extraction, 33, 34, and 35 had erupted with no enamel defects [Figure 3e].

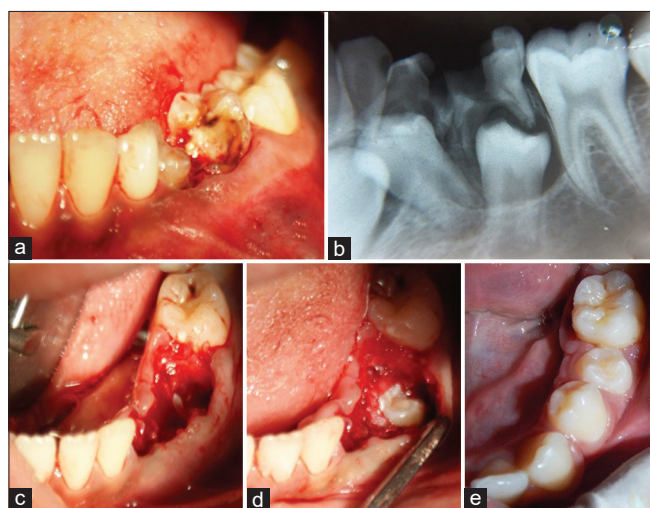


Figure 3: (a) Left lateral view of lower arch; (b) radiograph (lower left side); (c and d) lower left occlusal view postextraction; (e) lower left occlusal view after canine and premolar eruption

Case report 5 (radicular cyst)

A 12-year-old male patient had reported with pain in the lower right posterior region that had resulted from caries that was present for the last 4 years. Examination revealed the presence of the roots of 85. An OPG revealed the presence of a radicular cyst in relation to 85 with well-defined margins that had probably resulted in pressure-induced horizontal displacement of 45 [Figure 4a]. The patient was called the next day for extraction of 85. However, the patient returned after 3 months, and a radiograph taken revealed partial up righting of 45 [Figure 4b]. Extraction of 85 was carried out [Figure 4c] followed by the placement of a band and loop space maintainer [Figure 4d]. A radiograph taken 3 months later showed further uprighting of 45 [Figure 4e] until its eruption [Figure 4f]. The space maintainer was removed after eruption and no enamel defects were observed [Figure 4g].

Case report 6 (radicular cyst)

A 9-year-old female patient reported with pain in lower posterior teeth, bilaterally. She had given a history of caries being present on her lower teeth for the last 2 years. On examination, dental caries was found in all lower primary molars and grade three mobility was present in all except 84. An OPG revealed the presence of a large radicular cyst with well-defined margins in relation to 74 and 75 [Figure 5a]. However, computerized tomography (CT) scan images revealed the presence of a radicular cyst in relation to 85, in addition to the larger cyst in relation to 74 and 75 [Figure 5b-e]. Extraction of 74, 75, and 85 were carried out and a lingual arch was placed to preserve space [Figure 5f]. Glass ionomer cement restoration and stainless-steel crown placement was done for

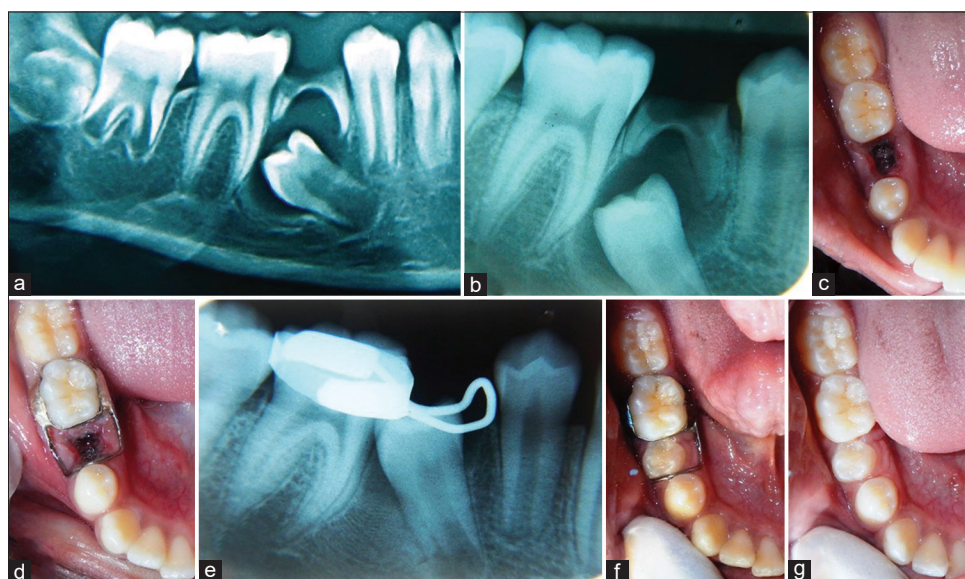


Figure 4: (a) Orthopantomograph (lower right quadrant); (b) pretreatment radiograph (lower right side); (c) postextraction occlusal view (lower right quadrant); (d) posttreatment occlusal view (lower right quadrant); (e) posttreatment radiograph (lower right side); (f and g) occlusal view (lower right quadrant)

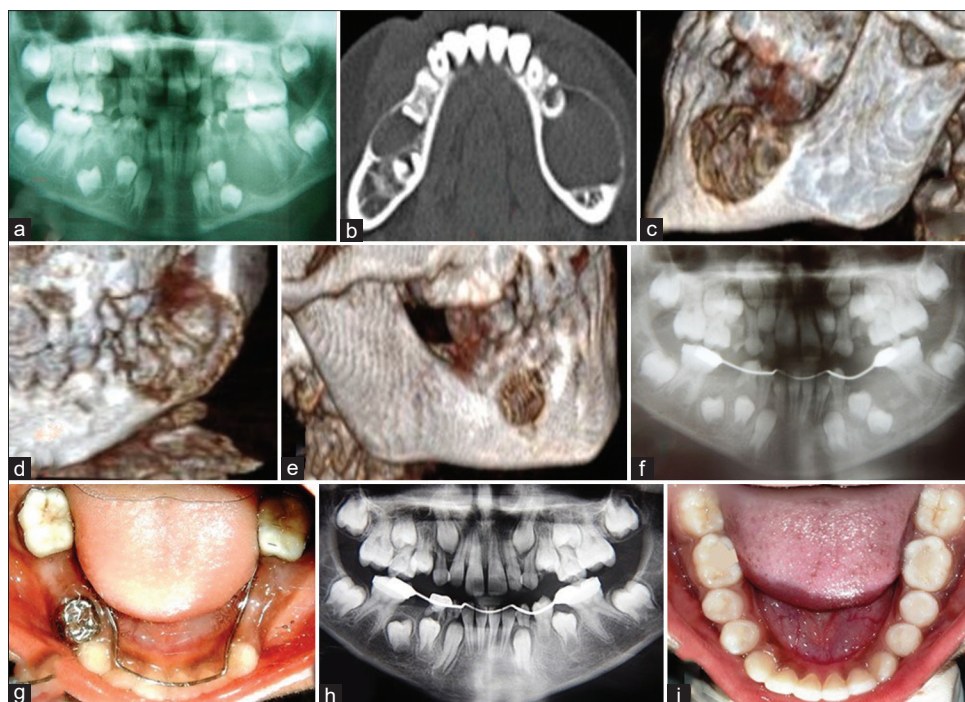


Figure 5: (a) Orthopantomograph; (b) computerized tomography scan (occlusal view); (c) computerized tomography scan (lower left side); (d) computerized tomography scan (lower left anterior view); (e) computerized tomography scan (lower right side); (f) orthopantomograph; (g) lower occlusal view; (h) orthopantomograph; (i) lower occlusal view

84 [Figure 5g]. After 1 year of treatment, an OPG revealed absence of the cystic spaces and the presence of normal alveolar bone [Figure 5h]. The lingual arch was removed after the eruption of the premolars and no enamel defects were observed [Figure 5i].

Case report 7 (radicular cyst)

A 9-year-old female patient reported with dull continuous pain in her lower right posterior tooth. On examination, caries was found in 84 and 85 [Figure 6a]. She had mentioned that caries had been present for the last 2 years. However, tenderness to percussion was found only in 85. An OPG revealed a large well-defined cystic lesion in relation to 85 [Figure 6b]. CT scan images revealed perforation of the buccal bone caused by the expanding cyst [Figure 6c-g]. Restoration of 75 and 84 and extraction of 85 was carried out. No treatment was carried out for 74 (root stumps), since it was asymptomatic and there were no associated radiographic findings. A lingual arch was placed for space maintenance [Figure 6h]. At 11 years of age, all premolars had erupted and there was no enamel defect on 45 [succedaneous to 85; Figure 6i].

Discussion

It has been observed that the severity of the effects of PI on ST depends on its stage of formation.^[10,12] Hypocalcific defects (qualitative) are most likely to occur during Nolla's 2 and Nolla's 3 stages (beginning of crown mineralization), while hypoplastic defects (quantitative)

are most likely to occur during cap or bell stages of tooth formation (ameloblast secretory stages; enamel matrix formation).^[14,20] In all our cases with PI (abscesses and cysts), premolars eventually erupted without any enamel defects. This is because crown formation and calcification had been completed (Nolla's stage 6) in these teeth before they got subjected to PI. Thus, our findings are in partial agreement with those of previous authors.^[10,12,14,20]

Various authors had reported enamel defects in newly erupted premolars after being exposed to PI from their corresponding primary molars.^[2,14,16] However, these had most likely occurred because the premolars had got exposed to PI before they had completed crown formation, which usually occurs between 5 and 6 years in the first premolar and between 6 and 7 years in the second premolar.^[16] Therefore, it can be justified that although PI from primary teeth could affect the follicle, reduced enamel epithelium, ameloblasts, gubernacular canal, enamel, dentin, root, or eruption of ST, it is ineffective once crown formation has been completed (Nolla's stage 6) in the ST. Moreover, none of the premolars from our cases exhibited any torsion, rotation, deflection, premature eruption, demarcated opacities, sequestration, or dilaceration.

In a study by Broadbent *et al.*, the occurrence of demarcated opacities in ST was found to be 2.2–2.3 times greater, if there was caries in the primary teeth. However, if there was history of extraction of primary teeth due to caries or periapical abscess, the chances of finding demarcated

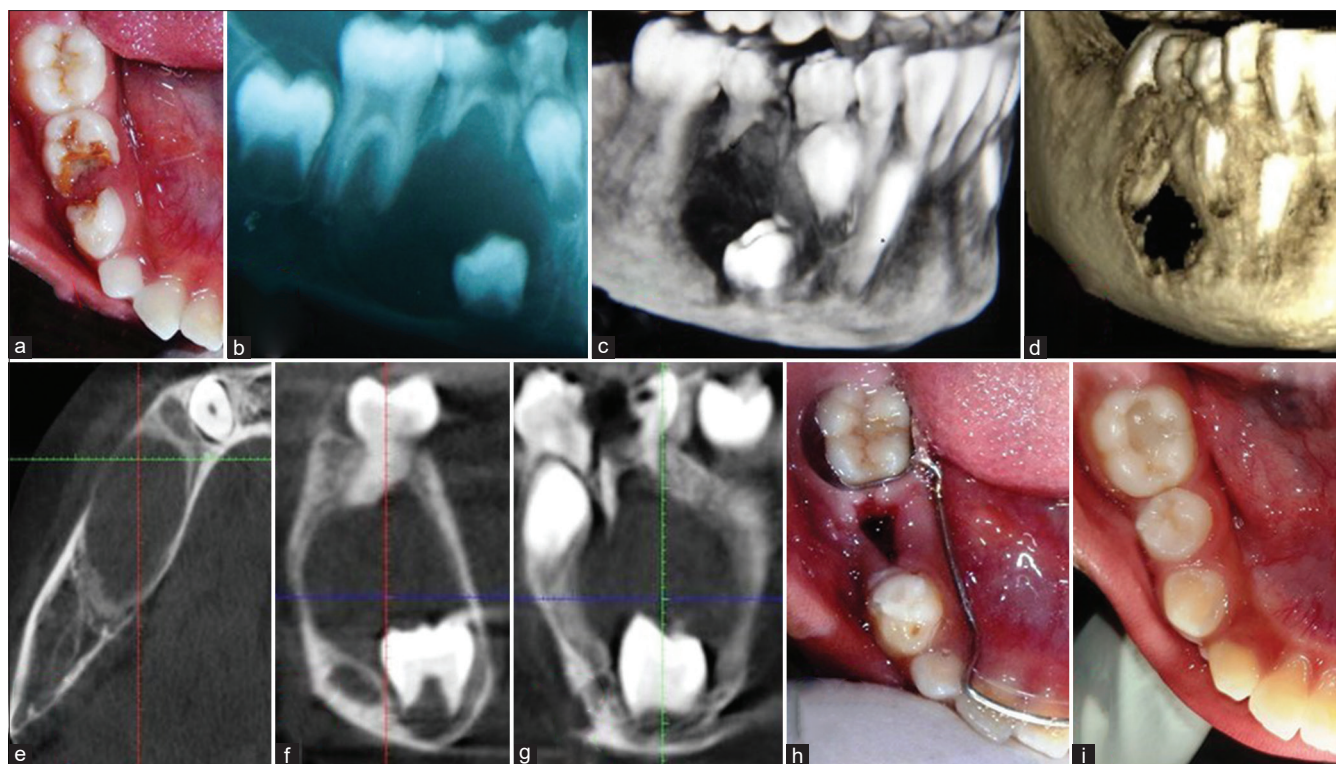


Figure 6: (a) Lower right occlusal view; (b) orthopantomograph (lower right side); (c) computerized tomography scan (lower right side); (d) computerized tomography scan (lower right anterior view); (e) computerized tomography scan (lower right occlusal view); (f and g) computerized tomography scan cross-sectional view; (h and i) lower right occlusal view

opacities in their ST were five times greater.^[15] PI or extraction of primary teeth can injure the gubernacular canal, which, in turn, can affect ST.^[1,3-6,8,9,11] Although all the primary molars with PI in our case series were extracted to prevent the spread of the lesions, none of the premolars were affected.

A defense mechanism in the dental follicle that could prevent the entrance of PI from primary teeth was observed in dogs.^[8,13] The presence of a fibrous wall barrier that separates PI from the reduced enamel epithelium of the ST for up to 6 weeks has also been reported.^[18] However, the contribution of these defending factors cannot be ascertained from our cases. In case reports 1, 5, and 7, OPG were advised since we suspected large lesions that might extend till the base of the mandible, since these patients had complained of tenderness when the mandible was palpated. In case reports 3 and 6, OPG were advised since the signs and symptoms were present bilaterally on multiple teeth. CT scans were taken for case reports 6 and 7 to assess the amount of mandibular destruction that had occurred due to the large cystic lesions.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not

be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conclusion

Unerupted ST with completed crowns (Nolla's stage 6) are unaffected by PI (abscesses or cysts) from their corresponding primary molars or from the extraction of such teeth.

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Conflicts of interest

There are no conflicts of interest.

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