



## Endodontic Treatment of Infected Lower Primary Second Molar with Agnesis of Permanent Second Premolar-A Case Series

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### Abstract

Hypodontia is defined as the absence of one or a couple of teeth. It has been regarded as the most frequent dental developmental anomalies among humans. Agnesis of mandibular second premolar is the most common anomaly. In the congenital absence of permanent second premolar the management of retained primary second molar (PSM) could be challenging. The present case series report contains the endodontic treatment of two infected mandibular PSM that has developed a peri-apical lesion. Owing to the agnesis of the permanent successor tooth, during endodontic preparation the tooth was disinfected and also in the subsequent session the root canal system was filled with gutta-percha point followed by crown placement. 12 months of follow-up revealed that the tooth was symptomless as well as brought back to function, also lamina dura re-establishment and inter-radicular bone lesions healing was seen, indicating successful treatment.

**Keywords:** Endodontic; Second Molar; Agnesis

### Introduction

Congenitally missing teeth (CMT)/tooth agnesis are most prevalent dentofacial malformation condition [1]. CMT is referred to the tooth germ that does not develop sufficiently to permit the dental tissues differentiation [2]. Congenitally missing teeth fails to erupt into the oral cavity and cannot be seen on radiographs [3,4]. CMT can be further classified as hypodontia, anadontia and oligodontia. Hypodontia referred to missing of just 1 or a couple of teeth. Anadontia and oligodontia are more severe forms of CMT, missing of more than six teeth and the entire dentition [5].

The prevalence of hypodontia, which may be increasing with time, ranges from 1.6% to 36.5% [1]. Hypodontia is found more frequently in females than males [6]. Most frequently missing teeth are mandibular second premolar excluding third molars they could be most frequently bilaterally missing also, followed by maxillary lateral incisors and maxillary second premolars [7,8]. In Dravidian population, prevalence of agnesis of permanent second premolar teeth was reported as 1.02% [9]. Its etiology could be as result of functional abnormalities in the dental epithelium, space deficiency, effect of dental lamina disruption or a physical obstruction, gene-

tic with autosomal dominant inheritance mode, or due to failure of initiation of the underlying mesenchyme, also chemotherapy or radiotherapy, medicines or infections such as osteomyelitis and rubella, can affect the proliferation of the tooth bud cells [10-12].

The choice of treatment for agenesis of permanent teeth requires careful consideration. Factors that need to be considered while planning treatment includes- missing teeth's position and number, over-retained primary teeth's condition- ie. the condition of the crown and root, space requirements, facial profile, the patient's chronologic and dental age, occlusion and skeletal relationship, patient's attitude towards treatment, the patient's antero- posterior skeletal and dental relationships, and bone of the deciduous second molar, its vertical position relative to the occlusion, and dental crowding [13,14].

A deciduous tooth without a permanent successor is often retained beyond the time of normal exfoliation, meaning an extended life for that tooth. Regressive changes can be seen uniformly with this extended life and commonly include compromised circulation, reduction in pulp size, abnormal odontoblastic pattern, radicular resorption, accelerated secondary dentin formation, hypercementosis, and ankylosis [15]. For management of infected primary molars with missing permanent successor, selection of a beneficial treatment plan with the best results over the long time is required.

Various treatment modalities are available for managing congenitally missing second premolars and retained primary second molars. This includes- conserving primary second molar in jaw [16,17] extracting the primary second molar before the eruption of first permanent molar thereby providing spontaneous space closure [18,19] hemisection and controlled slicing of the PSM for closing space [20] orthodontic space closure after extraction of the PSM [21] autotransplantation [22] implant placement [23] conventional fixed prosthesis [24] and resin-bonded prosthesis [25].

The deciduous tooth is usually retained beyond the time of normal exfoliation, providing an extended life for that tooth, conserving the primary teeth act as space maintainers, prevention of the alveolar bone resorption, until adulthood it may function as a temporary solution, and help in delaying the requirement for prosthetic replacement.

The non-resorbable root canal filling material usage helps to conserve the infected primary molar for longer period of time without root resorption for preserving adequate bone width, which is of pivotal importance during implant placement in adults. Obturation of retained primary teeth using sealer and a gutta-percha lateral condensing technique has been reported by several authors [26,27].

The following case report series demonstrates the one-year successful treatment outcome of a retained infected PSM without permanent successor that had developed an endodontic abscess in the inter-radicular area. The root canals were sealed/filled with gutta-percha as the obturating material. In this cases, the above technique the root canal system acquired a biocompatible seal. For obturation of deciduous teeth that will exfoliate within 6 month, it is not recommended.

### Case Report 1

A 6-year-old boy came to a private dental hospital complaining of pain and discomfort in the left mandibular area. His parents did not mention any contributory medical issue. Upon clinical examination, a localized swelling in the PSM area was detected that was tender on palpation. The PSM had a large cavity exposing pulp. On radiographic evaluation, there was missing permanent second premolar. Inter-radicular lucency extending to the periradicular area was indicative of the chronic peri apical infection.

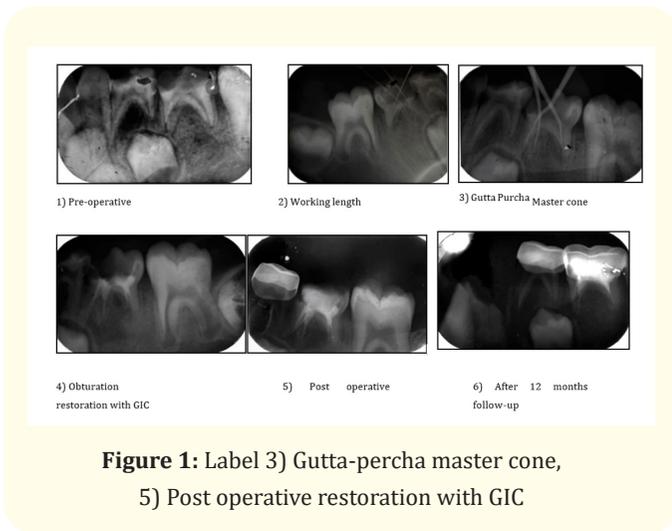
Tooth extraction carried the risk of mesial drifting of the permanent first molar. The situation was discussed with patient's parents and the final decision was made. Treatment plan included endodontic treatment of the necrotic tooth.

After administration of local anesthesia through INAB technique of lidocaine with 1:80000 epinephrine, on the left side of mandible, the caries was removed with a high-speed handpiece using round bur. Access was modified with straight fissure bur to reveal the orifices of four canals. The size 15 sterile K-file kept 2 mm short of the radiographic apex was used for estimating a working length. Working length was confirmed by using a radiograph (remove Both). Intra- canal tissue was extirpated and the canals were filed using step back technique with Protaper Universal files (Dentsply Maillefer-21mm) until a master file size of F3 was reached. Irrigation of canal in between instruments was done with 2mL of 1% sodium

hypochlorite (NaOCl) followed by final irrigation of 5mL of sterile saline. Pre-measured paper points (Dia Dent- MMPP) were used for drying canals that were kept up to 2 mm from the root apex. Root canal treatment was completed in the subsequent session. Gutta-percha points were used for completely filling canals using a Size 30 master cone (Dia Dent- Dia-ProISO.06 plus) and size 25, 20 and 15 accessory cones applied with finger spreaders (Dentsply) sizes 25 and 20 and calcium hydroxide sealer. Obturation was done using cold lateral condensation technique. Glass ionomer cement was used for final post operative restoration followed by restoration with stainless steel crown in the same visit.

Radiographic and clinical follow-up examinations were carried out by two calibrated pediatric dentists after 12 months. A marked reduction in the size of radiolucency was seen in 12-month follow-up radiograph. The patient was also asymptomatic, and all clinical findings were within normal limits at that time

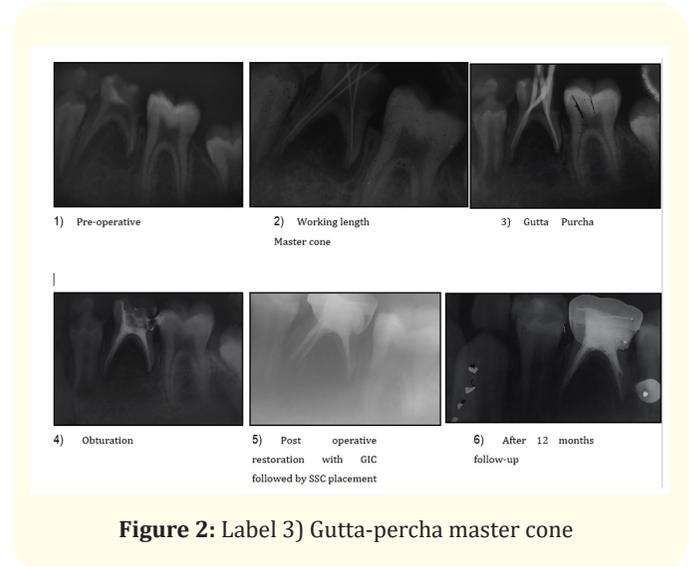
Similar endodontic procedure as mentioned above was performed. Radiographic and clinical follow-up examinations were carried out by two calibrated pediatric dentists at 12 months. A 12- month follow-up radiograph showed a marked reduction in the size of radiolucency. The patient was also asymptomatic, and all clinical findings were within normal limits at that time.



**Figure 1:** Label 3) Gutta-percha master cone, 5) Post operative restoration with GIC

### Case Report 2

A 10-year-old boy came to a private dental hospital complaining of pain and discomfort in the right mandibular area. His parents did not mention any contributory medical issue. Upon clinical examination, a large cavity was seen exposing pulp. On radiographic evaluation, there was missing permanent second premolar. Tooth extraction carried the risk of mesial drifting of the permanent first molar. The situation was discussed with patient’s parents and the final decision was made. Treatment plan included endodontic treatment of the necrotic tooth.



**Figure 2:** Label 3) Gutta-percha master cone

### Discussion

This case series discussed the successful endodontic treatment of a necrotic PSM associated with an apical abscess by sealing/filling the root canals with gutta-percha points. After one year, the teeth were functional and the inter-radicular bone lesion had healed.

Treatment strategy for congenitally missing mandibular second premolar, the PSM may be left in the oral cavity or extracted. Surgical removal of the contralateral premolar and the maxillary premolars followed by spontaneous space closure or closure with orthodontic appliances has also been planned in certain cases. Long-term follow-ups after extraction of the PSM showed that the space was either closed by distal drift accompanied by tipping of the first premolar as well as mesial tipping and drifting of the first permanent molar, leaving a mean residual space of 2mm [28]. However, in absence of crowding in arch, with hypodivergent vertical skeletal pattern and a pronounced deep bite, or with mandibular retrusion or generalized spacing of teeth, extraction of the PSM is contraindicated because of the difficulty in space closure without

detrimental effects on facial profile. In these situations, maintaining the PSM would be a viable option [29]. A tooth-supported bridge and pontic or implant-supported prosthetic replacement can also be regarded as other treatment modalities [14].

In the presented case, the perfect sealing/filling of the root canal walls by was gutta-percha points a leading factor in healing of the endodontic lesion. Conventionally resorbable pastes such as zinc oxide-eugenol, iodoform and calcium hydroxide has been used for primary teeth pulpectomies. In the case of primary teeth with absence permanent successors, pulpectomy treatment is performed in the same manner as with permanent teeth [30]. As a root-canal filling material in pulpectomies of permanent teeth, use of Mineral tri-oxide aggregate (MTA) has been recommended [31]. It has also been used for endodontics treatment of PSM with missing permanent successor. MTA is an aggregate of fine hydrophilic particles that hardens on contact with water [32]. It is comprised of 75% Portland cement, 20% bismuth oxide and 5% gypsum by weight, and while the initial compound was grey in color, recently a white mineral trioxide aggregate (WMTA) is also available. MTA was recommended as a root-apex filling material [33]. It has also been used in vital pulp therapy [34] and as an apical barrier in the treatment of immature teeth with non-vital pulp and open apices [19].

Since many years, gutta-percha (GP) has been most extensively used and accepted itself as a gold standard [35] Also, it has been efficiently used with different techniques of obturation. But more complex root canal morphology is seen in deciduous teeth than that of permanent teeth, and hence complete extirpation of infected tissue, root canal preparation and obturation could be difficult. In addition, as the time progresses, the secondary dentin deposition also bring about variations in the number as well as the size of primary molar root canals [36].

Thereby the pulp tissue removal from these accessory canals cannot be achieved completely, as there is always a risk of remaining pulp tissue and microorganisms in primary molars. Considering the above factors, sealing ability and anti-bacterial effectiveness may significantly affect treatment prognosis. Tissue fluids can invade the canal and provide supplemental nutrition to the remaining bacteria, if a hermetic seal cannot be maintained. When the root canal filling inhibit the remaining bacteria, they may die to lack of nourishment after a period of time. Placement of stainless-steel crown over the endodontically treated teeth produces

also help in achieving hermetic seal and thereby prevent bacterial contamination and failure of endodontic treatment.

## Conclusion

In many cases with missing of the permanent teeth, the necrotic primary tooth can be saved by endodontic management to play its normal functional role. Gutta-percha has proven sealing, anti-bacterial, compactable, inert, dimensional stability, tissue tolerant, radiopaque, easily removed and readily sterilizable properties that make it a suitable biomaterial for root canal filling of the infected primary teeth with missing permanent successor. Although, long-term clinical studies are still required.

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## Conflict of Interest

None.

## Bibliography

1. Matalova J., *et al.* "Tooth agenesis: from molecular genetics to molecular dentistry". *Journal of Dental Research* 87.7 (2008): 617-623.
2. Moyers RE and Riolo ML. "Early treatment. In: Moyers RE, editor. *Handbook of Orthodontics*. 4<sup>th</sup> edition". Chicago: Yearbook Medical Publishers (1988): 348-553.
3. Jorgenson RJ. "Clinician's view of hypodontia". *Journal of the American Dental Association* 101 (1980): 283-286.
4. Pemberton TJ., *et al.* "Hypodontia: Genetics and future perspective". *The Brazilian Journal of Oral Sciences* 4 (2005): 695-706.
5. Al-Ani AH., *et al.* "Hypodontia: an update on its etiology, classification, and clinical management". *BioMed Research International* (2017): 9378325.
6. Rakshan V. "Meta analysis and systematic review of factors biasing the observed prevalence of congenitally missing teeth in permanent dentition excluding third molars". *Progress in Orthodontics* 14 (2013): 33.

7. Goya HA, et al. "An orthopantomographic study of hypodontia in permanent teeth of Japanese pediatric patients". *Journal of Oral Science* 50 (2008): 143-150.
8. Garib DG, et al. "Increased occurrence of dental anomalies associated with second-premolar agenesis". *The Angle Orthodontist* 79 (2009): 436-441.
9. Lakshmanan L and Gurunathan D. "Prevalence of congenitally missing second premolar teeth in the Dravidian population". *Journal of Forensic Dental Sciences* 11 (2019): 103-106.
10. Larmour CJ, et al. "Hypodontia--a retrospective review of prevalence and etiology. Part I". *Quintessence International* 36.4 (2005): 263-270.
11. Polder BJ, et al. "A meta-analysis of the prevalence of dental agenesis of permanent teeth". *Community Dentistry and Oral Epidemiology* 32.3 (2004): 217-226.
12. Nunn JH, et al. "The interdisciplinary management of hypodontia: background and role of paediatric dentistry". *British Dental Journal* 194 (2003): 245-251.
13. Rune B and Sarnas KV. "Root resorption and submergence in retained deciduous second molars". *European Journal of Orthodontics* 6 (1984): 123-131.
14. Hvaring CL, et al. "The prognosis of retained primary molars without successors: infraocclusion, root resorption and restorations in 111 patients". *European Journal of Orthodontics* 36.1 (2014): 26-30.
15. Saad AY. "Regressive changes of the dental pulp complex in retained primary molars with congenitally missing successor teeth". *The Journal of Clinical Pediatric Dentistry* 22 (1997): 63-67.
16. Kenworthy CR and Larson BE. "Incorporating retained deciduous teeth in orthodontic therapy". *American Journal of Orthodontics and Dentofacial Orthopedics* 119 (2001): 202-210.
17. Sletten DW, et al. "Retained deciduous mandibular molars in adults: a radiographic study of long-term changes". *American Journal of Orthodontics and Dentofacial Orthopedics* 124 (2003): 625-630.
18. Northway W. "Hemisection: one large step toward management of congenitally missing lower second premolars". *The Angle Orthodontist* 74 (2004): 792-799.
19. Northway WM. "The nuts and bolts of hemisection treatment: managing congenitally missing mandibular second premolars". *American Journal of Orthodontics and Dentofacial Orthopedics* 127 (2005): 606-610.
20. Valencia R, et al. "Controlled slicing in the management of congenitally missing second premolars". *American Journal of Orthodontics and Dentofacial Orthopedics* 125 (2004): 537-543.
21. Medio M, et al. "Management of mandibular second premolar agenesis". *Journal of Dentofacial Anomalies and Orthodontics* 18 (2015): 105.
22. Josefsson E, et al. "Treatment of lower second premolar agenesis by autotransplantation: four-year evaluation of eighty patients". *Acta Odontologica Scandinavica* 57.2 (1999): 111-115.
23. Eckert SE and Wollan PC. "Retrospective review of 1170 endosseous implants placed in partially edentulous jaws". *Journal of Prosthetic Dentistry* 79 (1998): 415-421.
24. Näpänkangas R, et al. "Longevity of fixed metal ceramic bridge prostheses: a clinical follow-up study". *Journal of Oral Rehabilitation* 29.2 (2002): 140-145.
25. Durey KA, et al. "Resin bonded bridges: techniques for success". *British Dental Journal* 211 (2011): 113-118.
26. Weine FS. "Endodontic therapy. 5<sup>th</sup> edition". St. Louis: Mosby (1996): 359-361.
27. Cohen S and Burns RC. "Pathways of the pulp. 7<sup>th</sup> edition". St. Louis: Mosby (1994): 659-661.
28. Mamopoulou A, et al. "Agenesis of mandibular second premolars. Spontaneous space closure after extraction therapy: a 4-year follow-up". *European Journal of Orthodontics* 18.6 (1996): 589-600.
29. Bjerklin K, et al. "Agenesis of mandibular second premolars with retained primary molars: a longitudinal radiographic study of 99 subjects from 12 years of age to adulthood". *European Journal of Orthodontics* 30.3 (2008): 254-261.

30. Camp JH., *et al.* "Pediatric endodontics: endodontic treatment for the primary and young permanent dentition". In: Cohen S, Burns RC, eds. *Pathways of the Pulp*. St. Louis: Mosby (2002): 797-844.
31. Holland R., *et al.* "Reaction of dogs' teeth to root canal filling with mineral trioxide aggregate or a glass ionomer sealer". *Journal of Endodontics* 25 (1999): 728-730.
32. Camilleri J., *et al.* "The constitution of mineral trioxide aggregate". *Dental Materials* 21 (2005): 297-303.
33. Torabinejad M., *et al.* "Sealing ability of a mineral trioxide aggregate when used as a root end filling material". *Journal of Endodontics* 19 (1993): 591-595.
34. Aeinehchi M., *et al.* "Randomized controlled trial of mineral trioxide aggregate and formocresol for pulpotomy in primary molar teeth". *International Endodontic Journal* 40 (2007): 261-267.
35. Vishwanath V and Rao HM. "Gutta-percha in endodontics- A comprehensive review of material science". *JCD* 22.3 (2019): 216.
36. Ansari G and Mirkarimi M. "Gutta percha root filling in 2 ed primary molar teeth with missing successor: a challenging approach". *Research Journal of Medical Sciences* 2 (2008): 251-254.