

Treatment of Non Syndromic Hypodontia Associated with Generalized Microdontia with Fiber Reinforced Resin Composite Bridges

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Abstract

Genetic and environmental factors are the causes of dental anomalies during tooth morphogenesis. Microdontia may appear as three types: single tooth, multiple teeth in both jaws, and true generalized microdontia (TGM), in which all teeth are smaller. Congenitally missing teeth is referred as hypodontia. This condition might be combined with specific syndromes. This paper proposes that generalized microdontia, without any apparent systemic association, can be treated by direct composite restorations.

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Introduction

The phenomenon of microdontia is described as an abnormal state of small teeth [1]. Boyle et al. characterized this phenomenon as 'small dental size, normal short crowns, commonly missing teeth's contact areas' [2]. Levy, Hine, and Shafer [3] classified microdontia as 1) Microdontia including only one tooth; 2) Relative generalized microdontia because of huge jaws, and 3) True generalized microdontia which all teeth are affected. True generalized microdontia is a rare condition and is often related to other syndromes, such as Rieger anomaly, orofaciobuccal syndrome (type 3), oculo-mandibulo-facial syndrome, and pituitary dwarfism [4]. It has also been reported in radiation or chemotherapeutic treatment during the developmental stage of the teeth [5].

Hypodontia is defined as the absence of 1 to 5 teeth excluding the 3rd molars [4]. Hypodontia might be present separately or as a part of genetic or chromosomal faults like Down syndrome or Hereditary Ectodermal Dysplasia (HED) [6-8]. Hypodontia, like anodontia, is often associated with general

disorders, but there are rare cases of non-syndromic hypodontia in clinically healthy patients. Factors that cause hypodontia are not fully understood, but some authors showed that there are some environmental factors that may favor this disorder [9]. The overall prevalence of hypodontia is found to be 6.4% [10].

Hypodontia usually requires complex treatments, associated with lifelong maintenance. The treatment depends on the pattern of tooth absence, the amount of remaining spaces, the presence of malocclusion and patient habits. Minimal invasion, esthetics, and cost are some of the important factors that can affect the treatment plan. A conventional porcelain-fused metal bridge is the most invasive treatment in terms of the tooth reduction. The resin-bonded fixed partial denture (FPD) is a valid treatment option in selected cases. Traditionally, metal alloy has been used as the material for the framework, but fiber-reinforced composite (FRC) is advocated today for their favorable elastic modulus as compared to metals and better adhesion of the composite luting agent to the framework. The FRC bridges are adhesive,

minimally invasive, and economic restorations that can be used for single visit replacement of a missing tooth. A review of the dental literature suggests that the FRC prostheses have good longevity, especially those which are made by the direct technique [11]. Fiber-reinforced technology was initially used as a splint material for periodontally involved teeth and to stabilize avulsed teeth. Nowadays, it is used to replace anterior or posterior teeth [12]. There are some conditions that need to be checked before the FRC composite treatment. Some of these are listed below:

Medical situations that can affect oral health such as uncontrolled diabetes [13], the length of edentulous space, loading on the pontic and the technique which was used [14]. There are two types of techniques for this treatment, direct and indirect. The direct technique excludes the need of laborator and can be done in one session [15]. The indirect technique success is related to the skills of the technician and cost more [16]. To give the fiber better properties, they create meshes with multiple fiber orientations several times. This can be achieved in one of two

ways: either by placing unidirectional fibers in multiple directions or by using a braided or woven fabric [12].

Authors, in this case report deliberate treatment of a rare case of generalized microdontia with hypodontia not associated with systemic conditions or syndromes with a fiber re-inforced composite bridge.

Narrative

A 22-year-old female patient was referred to the restorative dentistry department of Tehran University of Medical Sciences, complaining of small teeth and spaces between them. During the registration of patient history, her brother showed the same abnormality, where the small teeth had been noted by the parent during permanent tooth eruption without any other abnormalities. Therefore, the heredity possibility was considered. No gross abnormality was noted in the physical examination. The patient's medical history was unremarkable. After checking the patient's medical records; alkaline phosphatase, phosphorous, serum calcium, and her hormonal levels including growth hormone, thyroxin, and cortisol revealed normal values. Intraoral examination revealed normal soft tissues, while abnormal shape and size of the teeth and missing teeth number 12, 14, 15, 22, 24, 25, 34, 35, 44, and 45 was recorded. In contrast retained deciduous teeth number 52, 54, 55, 63, 64, 65, 73, and 83 was seen in mouth.

Total residual teeth were found less in size than normal permanent teeth, and other clinical findings were: Abnormal occlusion with excessive interdental spaces (Class III Angle classification of occlusion), proclined upper anterior segment with spacing, decreased overbite (anterior open bite) and class III molar relation on the right and left side (mandibular prognathism). The first steps of the author's management were diagnosis and treatment plan through making and evaluating the diagnostic casts. The posterior and anterior teeth were short and had small clinical crowns. Mesiodistal dimension of teeth was measured from the diagnostic casts for the erupted teeth (Table 1). The patient's photographs and radiography are shown in Figure 1.

Regarding the data collected earlier with a systematic assessment that revealed a lack of significant abnormalities, the final diagnosis was Non-syndromic occurrence of hypodontia and true generalized microdontia.

The consultations from orthodontic, periodontic and prosthodontic departments were taken. Because of patient's age and number of involved teeth, the preparation for crowns or overlays seemed to be invasive and would cost a fortune. Also patient couldn't afford the orthodontic treatment and demanded a

treatment with shorter period of time. After it was decided to reconstruct the patients teeth with composite veneers and fiber re-inforced resin composite bridges.

The first step was to register occlusal records of patient and mounting dental casts in an articulator as it is shown in Figure 2.

After mounting, diagnostic wax up was done by inlay wax and a clear mold was fabricated to ease the procedure of composite reconstruction (Figure 3).

Solafill M90 universal A1 4g Trent Dent Products Ltd, London, United Kingdom, Meta P& Bond 5g Meta Biomedical Republic of Korea Bonding Agent and Ribbond® ribbon United States was used for the reconstruction (Table 2).

In the upper right segment, the tooth number 55 was heavily decayed, so it was extracted. FRC bridge was fabricated to replace tooth 55 with abutments of teeth 16 and 54. Teeth number 11, 13 and 52 were prepared for composite veneer. Teeth dimensions were corrected to become more esthetic.

In the upper left segment, tooth number 22 was missed and the deciduous tooth number 63 was present. The deciduous canine was reshaped by composite veneer to lateral and teeth number 21, 64 and 65 were treated by composite veneer to have better width to height relations (which was 0.8).

In the lower right segment, teeth number 34 and 35 were missing and the deciduous canine tooth (tooth number 73) was present. For the replacement of premolars, fiber reinforced composite bridge was utilized. The bridge benefits from abutment teeth number 33 and 36.

In the lower left segment, teeth number 44 and 45 were missing and the deciduous canine tooth (number 83) was present in mouth. For the replacement of premolars, a fiber re-inforced composite bridge was used. The teeth number 43 and 56 were abutments. These treatments are shown graphically in Table 3.

The post treatment photographs is illustrated in Figure 4.

A 1mm width and depth box was prepared on each abutment teeth. Then teeth were prepared for bonding and a thin layer of composite was placed on tooth. After that the Ribbond has been wet with the bonding agent and was placed from one abutment to the other. Then a thin layer of composite was placed lingual to the Ribbond. After placing the second layer of Ribbond, it was covered with composite and cured.

The occlusal relationships were adjusted so that the resin bridge pontics had light contact in centric relation and were out of contact in lateral and protrusive movements.

Discussion

development [17]. Microdontia is a dental disorder in the form of teeth that are smaller than normal teeth [18]. Microdontia is present in three forms, (1) Microdontia includes only one tooth; (2) Relative generalized microdontia because of small teeth related to huge jaws and (3) True generalized microdontia when there are total abnormal small teeth (3). Although it can affect primary and permanent teeth, microdontia is more common in permanent teeth and can cause abnormal spacing. Microdontia can cause a diastema between the involved tooth and the adjacent tooth so that it has the potential to become an area for trapped food debris or food impaction that has the potential to cause caries and periodontal disease [19].

Hypodontia can be represented as, with the exception of the third molar, a state of developmentally missing single or more dental primary or secondary teeth [4]. Hypodontia, like anodontia, is often associated with general disorders, but there are rare cases of non-syndromic hypodontia in clinically healthy patients. Factors that cause hypodontia are not fully understood, but some authors showed that there are some environmental factors that may favor this disorder [9]. Treatment of these conditions is aimed at addressing the aesthetics issue of the patient and this can present a number of challenges which may require a multidisciplinary approach in its management [20]. Treatment options for the comprehensive management of microdontia, which may also include hypodontia, vary but broadly include the following:

1. Orthodontic treatment – to idealise tooth position of the microdont tooth or teeth
2. Restorative treatment – using direct and indirect techniques on the microdont tooth or teeth
3. Joint orthodontics and restorative treatment
4. Extraction of the microdont tooth or teeth and orthodontics and tooth replacement if required
5. Extraction and tooth replacement
6. No treatment – which is unlikely to be acceptable [20].

Composite based restorations can be used as a reversible material to build-up the morphology of the microdont tooth or teeth [21]. Direct composite has been shown to be aesthetic, non-invasive, well-tolerated by pulpal tissue, minimally abrasive to opposing teeth and easy to repair, however, it is prone to staining/discolouration, accelerated wear rate of material in comparison to metal and ceramic based material, bulk fractures,

complexity and technique sensitive [22]. Direct composite veneers can provide adequate aesthetics and studies have shown that direct composite can be just as aesthetic as porcelain [23]. Fiber-reinforced composite resin (FRC) bridges are a conservative alternative method for the replacement of missing teeth. The abutment teeth can be conserved with a minimally invasive preparation, thereby ensuring that the technique is reversible, and FRC bridge treatment can be performed in a single visit [24].

The treatment plan, in this case, was to substitute the missing teeth and interdental space closure with resin composite material to promote the aesthetics look, the mastication efficacy, and the pronunciation of the words to restore the patient's esthetics and functions. Regarding the unpleasantness of the patient's smile and the inadequacy of her esthetic, these reasons made her unhappy with her appearance. Different treatment methods are suggested for partial hypodontia; however, the treatment plans should be adjusted, rendering the severity of the anomaly in a way that makes the maximum pleasing outcome. Follow ups within 3,6 and 12 months were done and the evaluation of the restorations and periodontal health was examined each time. Follow ups showed pleasant results.

Conclusion

In this case, dental findings are rarely seen and with negative hereditary history. Different clinical appearance of syndromic and non-syndromic incidence of dental anomalies is arguing, and more investigations are needed. This study supports that different modulations in treatment plans can be altered and performed to ascertain esthetics and dental functions in the future and reduce the difficulties associated with hypodontia and microdontia.

References

1. Laundau S. International dictionary of medicine and biology. 1. New York: John Wiley & Sons; 1986. p. 1717.
2. Boyle PE. Kronfeld's Histopathology of the Teeth and their Surrounding Structures. 3. Philadelphia: Lea & Febiger; 1955. p. 14.
3. Shafer WG, Hine MK, Levy BM. A Textbook of Oral Pathology. 1. Philadelphia: W. B. Saunders Co; 1958. p. 26.
4. Chen, Yuan et al. "Non-syndromic occurrence of true generalized microdontia with hypodontia: A case report." *Medicine* vol. 98,26 (2019): e16283. doi:10.1097/MD.00000000000016283
5. Van der waal I, Van der kwast WAM. *Oral pathology*. Chicago: Quintessence Publishing Co. Inc; 1988. Developmental anomalies and eruption disturbances and some acquired disorders of the teeth; p. 114.
6. Vastardis H. The genetics of human tooth agenesis: new discoveries for understanding dental anomalies. *Am J Orthod Dentofacial Orthop*, 2000, 117(6):650-656.
7. de Moraes ME, de Moraes LC, Dotto GN, Dotto PP, dos Santos LR. Dental anomalies in patients with Down syndrome. *Braz Dent J*, 2007, 18(4):346-350.
8. Zarrinnia K, Bassiouny MA. Combined aplasia of maxillary first molars and lateral incisors: a case report and mana Herman NG, Moss SJ. Anodontia of the permanent dentition:
9. Mărgărit, Ruxandra et al. "Non-syndromic familial hypodontia: rare case reports and literature review." *Romanian journal of morphology and embryology = Revue roumaine de morphologie et embryologie* vol. 60,4 (2019): 1355-1360.
10. K. Khalaf, J. Miskelly, E. Voge, and T. V. Macfarlane, "Prevalence of hypodontia and associated factors: a systematic review and meta-analysis," *Journal of Orthodontics*, vol. 41, no. 4, pp. 299-316, 2020.
11. Muhamad, Abu-Hussein & Abdulgani, Azaldeen & Mai, Abdulgani. (2017). Ortho-Prosthodontic Management of Hypodontia Using Fibre-Reinforced Composite Resin Bridge: An Interdisciplinary Approach. 10.9790/0853-1606100810.
12. Escobedo Martínez MF, Rodríguez López S, Valdés Fontela J, Olay García S, Mauvezin Quevedo M. A New Technique for Direct Fabrication of Fiber-Reinforced Composite Bridge: A Long-Term Clinical Observation. *Dentistry Journal*. 2020; 8(2):48. <https://doi.org/10.3390/dj8020048>
13. Isola, G.; Matarese, G.; Ramaglia, L.; Pedullà, E.; Rapisarda, E.; Iorio-Siciliano, V. Association between periodontitis and glycosylated haemoglobin before diabetes onset: A cross-sectional study. *Clin. Oral Investig*. 2019, 1-10.
14. Goguta, L.M.; Candea, A.; Lungeanu, D.; Frandes, M.; Jivanescu, A. Direct Fiber-Reinforced Interim Fixed Partial Dentures: Six-Year Survival Study. *J. Prosthodont. Off. J. Am. Coll. Prosthodont*. 2019, 28, 604-608.
15. Singh, K.; Gupta, N.; Unnikrishnan, N.; Kapoor, V.; Arora, D.; Khinnavar, P.K. A Conservative Treatment Approach to Replacing a Missing Anterior Tooth. *Case Rep. Dent*. 2014, 14, 10-12.
16. Benito, P.P.; Trushkowsky, R.D.; Magid, K.S.; David, S.B. Fiber-reinforced framework in conjunction with porcelain veneers for the esthetic replacement of a congenitally missing maxillary lateral incisor: A case study. *Oper. Dent*. 2012, 37, 576-583.
17. W.R. Proffit The development of orthodontic problems W.R. Proffit (Ed.), Contemporary orthodontics (2nd ed.), Mosby, St Louis (1997), p. 110
18. Malleshi S, Basappa S, Negi S, Irshad A, Nair S. The Unusual Peg Shaped Mandibular Central Incisor – Report of Two Cases. *J Res Pract Dent*. 2014;2014:1-6.
19. Rahmah KA, Riyanti E, Yohana W. Prevalence of Microdontia in People with Down Syndrome: A Rapid Review. *Journal of International Dental & Medical Research*. 2022 Jul 1;15(3).
20. Laverty DP, Thomas MB. The restorative management of microdontia. *British dental journal*. 2016 Aug;221(4):160-6.
21. Asher C, Lewis D H . The integration of orthodontic and restorative procedures in cases with missing maxillary incisors. *Br Dent J* 1986; 160: 241-245.
22. Mehta S, Banerji S, Millar B, Suarez-Feito J . Current concepts on the management of tooth wear: Part 4. An overview of the restorative techniques and dental materials commonly applied for the management of tooth wear. *Br Dent J* 2012; 212: 169-171.
23. Nalbandian S, Millar B J . The effect of veneers on cosmetic improvement. *Br Dent J* 2009; 207: E3; discussion 72-73.
24. Heo G, Lee EH, Kim JW, Cho KM, Park SH. Fiber-reinforced composite resin bridges: an alternative method to treat root-fractured teeth. *Restorative Dentistry & Endodontics*. 2019 Nov 4;45(1).

10.



11.

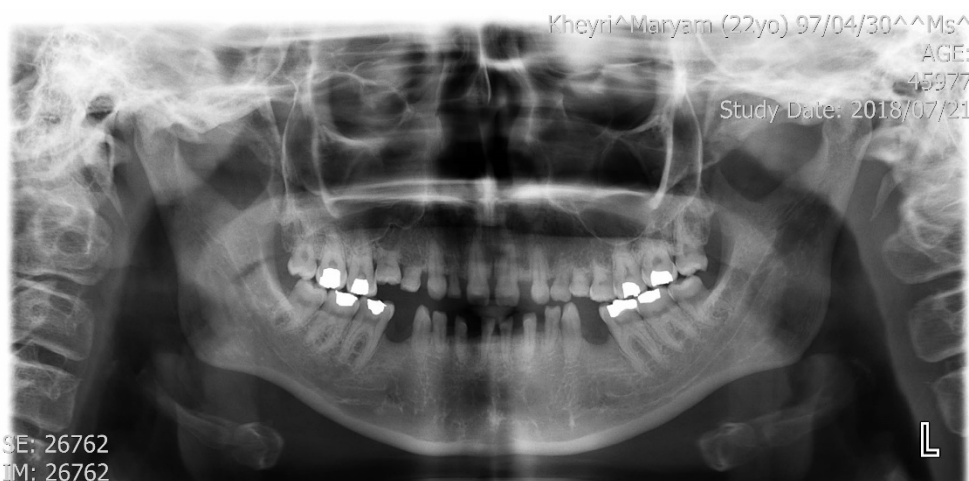
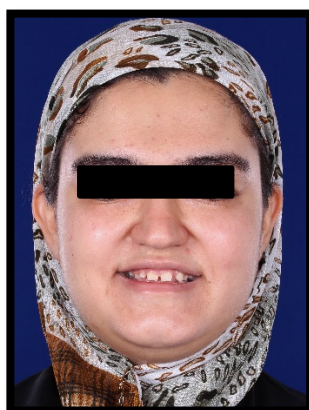


Figure 1. Patient's pre-treatment photographs and radiography.

Table 1. Measurements of the erupted teeth dimensions mesio-distally and bucco-lingually/labio-lingually and the values of anatomic averages for the permanent teeth in the maxilla and mandible (measures in millimeters).

	Central (MD/LL)	incisorLateral (MD/LL)	incisorCanine (MD/LL)	1 st (MD/BL)	premolar2 nd (MD/BL)	premolar1 st (MD/BL)	molar2 nd (MD/BL)	molar
Maxillary								
* Average	8.6/7.1	7.0/6.4	7.9/8.2	7.2/9.5	6.7/9.3	10.1/11.3	9.6/11.4	
Right	6.8/3.6	Missing	6.4/Nm	5.9/Nm	6.5/Nm	7.3/8.3	7.9/Nm	
Left	7.0/3.9	Missing	6.6/Nm	6/Nm	5.4/Nm	7.6/8.5	8.7/Nm	
Mandible								
* Average	5.4/5.8	6.1/6.3	7.0/7.1	7.1/7.1	7.1/8.4	11.2/10.6	10.7/10.5	
Right	4.0/3.5	4.6/3.5	5.7/Nm	6.2/Nm	6.4/Nm	8.1/7.1	7.9/Nm	
Left	4.3/3.6	4.4/3.5	5.5/Nm	5.9/Nm	6.3/Nm	7.9/7.7	8.6/Nm	

*Values taken from Xin, P. Textbook of dental anatomy and physiology, ed. 7, Beijing, 2012, People’s Medical Publishing House, pp. 46-47
 NM=not measured. BL = buccolingual, LL = labiolingual, MD =mesiodistal



Figure 2. Register occlusal records of patient and mounting dental casts in an articalutor.



Figure 3. Diagnostic by inlay wax and fabrication a clear mold to ease the procedure of composite reconstruction.

Table 2. Materials used in the case.

Material	Composition
Meta P&Bond 5g	Bis-GMA, PMGDM, 2-Hydroxyethylmethacrylate, Ethyl alcohols
Solafil M90 A1 4g	1,4-Butandioldimethacrylate Urethandimethacrylate Bis-GMA
Ribbond®	Ultra-high molecular weight polyethylene fibers

Table 3. Treatment graphic.

		FRC bridge abutment	Extraction (decay)	FRC bridge abutment	Composite veneer	Composite veneer	Composite veneer	Composite veneer	Reshapse to lateral		Composite veneer	Composite veneer			
18	17	16	55	54	13	52	11	21	63	23	64	65	26	27	28
48	47	46	missing	43	83	42	41	31	32	73	33	missing	36	37	38
		FRC bridge abutment	pontic	FRC bridge abutment	Composite veneer	Composite veneer	Composite veneer	Composite veneer	Composite veneer		FRC bridge abutment	pontic	FRC bridge abutment		

16.



Figure 4. Post treatment photographs.