



Research Article

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Hypodontia



Sogol Poursamad^{1*}, Nailya Drobysheva², Ramiz Mokhamed El_khalaf³, Soroush Poursamad⁴ and Polina Artiukh⁵

¹Residency student, Department of Orthodontics, Russian University of Medicine (ROSUNIMED), Iran

²Associate Professor, Department of Orthodontics, Russian University of Medicine (ROSUNIMED), Russia

³PHD student, Department of Orthodontics, Russian University of Medicine (ROSUNIMED), Russia

⁴Dentistry Student, Russian University of Medicine (ROSUNIMED), Iran

⁵Residency Student, Department of Orthodontics, Russian University of Medicine (ROSUNIMED) Russia

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***Corresponding author:** Sogol Poursamad, Residency student, Department of Orthodontics, Russian University of Medicine (ROSUNIMED), Iran

Abstract

Introduction: Tooth agenesis is a dental condition that can affect a young patient's aesthetics and functions and presents a significant challenge to dentists. Several treatment options are available, including mesial retraction of posterior teeth followed by tooth transformation or space opening with preservation followed by implant placement. This paper provides a review of the current literature regarding functional and aesthetic treatment outcomes. We discuss the indications, clinical limitations, and important factors that contribute to achieving optimal results for each technique. It is difficult to definitively determine which approach is the best due to the limited amount of available literature. However, a multidisciplinary approach to diagnosis and treatment planning is necessary to determine the best course of action for individual patients to achieve the optimal results.

Goal: To study the literature to provide a review of available treatment methods for patients with hypodontia.

Materials and Methods: Electronic resources.

Conclusions: There is a lack of long-term studies comparing existing treatment options for patients with hypodontia. These studies are necessary to obtain a more detailed understanding of the diagnostic and treatment methods for these patients.

Keywords: Dentists; Electronic resources; Clinicians; Environmental factors; Tooth anatomy

Introduction

Hypodontia is a term used to describe the developmental absence of one or more primary or permanent teeth, excluding third molars Al-Ani AH, Antoun JS, Thomson WM, Merriman TR, Farella M [1]. Hypodontia is the most common maxillofacial malformation in human beings Khalaf K [2]. The phenotypic manifestation of this pathology varies in terms of severity and, therefore, different terms have been used to describe it. These terms include "congenitally-missing teeth," "dental agenesis," "hypodontia," "oligodontia," and "anodontia." The term "congenitally-missing teeth" is quite incorrect, since dental development is completed only after birth. So, the presence of most tooth buds can only be proven in childhood P Nieminen [3], Eshgian [4], T. Nikopensius, T. Annilo, T. Jagomagi [5]. Tooth agenesis, on the other hand, directly refers to a disorder of tooth development. Other terms, such as hypodontia, are more suitable for classifying the type of tooth agenesis present and are used in the context of developmental disorders of 6 or fewer teeth Persin

L.S [6], Persin L.S [7]. Oligodontia and anodontia are used to describe more severe forms of dental agenesis, usually the absence of more than six teeth and the entire dentition, respectively Al-Ani AH, Antoun JS, Thomson WM, Merriman TR, Farella M [1].

If there are gaps in the dental arch because of missing teeth, particularly the lateral incisors in the upper jaw, should these spaces be left untreated to accommodate prosthetic restorations or the canines be moved mesially to close the gaps? Clinicians facing this decision must be prepared to work with people who have high expectations. The need for orthodontic treatment in these patients increased because the condition has a major impact on dental and facial aesthetics. Since a significant number of these orthodontic patients are teenagers, the anxiety and uncertainty usually exist. Often, both patients and parents want a quick and easy solution, which may not be possible. These patients are often more interested in the aesthetics of their smile than in having optimal occlusion Rosa M, Zachrisson BU [8], Rosa M [9].

Materials and Methods

Search Strategy

Foreign publications published between 2013 to 2024 were analyzed to determine and study the effectiveness of using different approaches to the treatment of patients with maxillary lateral incisor agenesis (MLIA). They included the results of using methods of closing or opening the gap in the treatment of this category of patients. Analysis of foreign literature data, scientific publications, electronic resources in the PubMed electronic database, Google system, and reference lists of relevant studies and reviews:

Search criteria

Publications, papers, and clinical cases, which met the following selection criteria, were included:

- i. Period from 2011 to 2024.
- ii. A study of the effectiveness of treatment of patients with MLIA using closing gap technique and canine mesialization.
- iii. A study of the effectiveness of treatment of patients by opening the space for the future.

Discussion

The outbreak of hypodontia can vary depending on the population being studied, ranging from 1.6% to 36.5% Khalaf K [10], Persin L.S [6], Persin L.S [7]. Most individuals with this condition (approximately 80%) lack one or two teeth [Persin L.S [6], Persin L.S. [7] Eshgian N [4]. A meta-analysis of the outbreak of non-syndromic dental agenesis found a higher outbreak in Europe and Australia compared to the North America. The outbreak of hypodontia was reported to be 5.5% in Europe while it was 6.3% in Australia B. J. Polder, M. A. Van't Hof, F. P. G. M. Van Der Linden, and A. M. Kuijpers-Jagtman [11]. The outbreak of hypodontia in women and men in European populations is reported to be 6.3% and 4.6%, respectively B. J. Polder, M. A. Van't Hof, F. P. G. M. Van Der Linden, and A. M. Kuijpers-Jagtman [11]. The incidence of congenital absence of maxillary lateral incisors (MLIAs) is approximately 1% Swarnalatha C [12], and bilateral absence is more common than unilateral one B. J. Polder, M. A. Van't Hof, F. P. G. M. Van Der Linden, and A. M. Kuijpers-Jagtman [11]. A study was conducted to assess the outbreak of congenital absence of the maxillary lateral incisors in 8,000 schoolchildren aged 12 to 15 years, from the Syrian population, with an equal number of male and female ones. The study found that isolated agenesis of the maxillary lateral incisor was even more prevalent, accounting for 1.15% of the population Kabbani T, Abdullah NM, Rshadat Y, Abu Hassan MI [13].

The overall range of missing teeth in the study group was between 2% and 16.3%, with variability in results among different populations. This variation may be explained by genetic and/or environmental factors that influence the tooth formation during

the developmental stages. It is also suggested that variability in the results of different studies may be attributed to genetic factors and environmental influences on tooth development. Several authors have investigated the outbreak of hypodontia in the Russian literature Srivathsa SH [14].

The study of the incidence of primary tooth agenesis at dental clinics in Volgograd State Medical University and State Autonomous Institution No. 9 Dental Clinic revealed an incidence of 8% and 4.67%, respectively. The research found that the lack of second premolars is the most common occurrence (94.74%), followed by the absence of first premolars (36.84%), lateral incisors (31.56%), and second molars (26.32%). Central incisors, canines, and first molars are also affected at a lower rate (21.05% and 15.79%, respectively) Bavlakova V.V., Borisova M.A [15]. Notably, the outbreak of dental agenesis has been reported to have increased over the past few decades. However, there is no empirical evidence to support whether this apparent increase is due to more advanced screening and diagnosis or other factors Mohamad I. S., Vodolatsky V. M [16].

The most common reason for patient visits related to missing teeth is MLIA because the absence is associated with an unbalanced smile, dental asymmetry, and facial disharmony, which are the complex problems requiring multiple treatment options and there is no quick fix to them Naum S [17]. Inadequate treatment planning and poor communication between professionals involved in dealing with such problems can cause increased levels of frustration among patients and their families. It is the responsibility of the orthodontist to ensure the functional and healthy occlusion while improving esthetics within the limitations of each case. Thus, a diagnostic protocol, which provides a thorough and consistent method to assess the patients with MLIA, can facilitate the treatment planning and communication between specialists, patients, and their families. Opening or closing the remaining anterior spaces is a diagnostic decision and any choice must consider some compromises. The question that needs to be answered is: What trade-off represents the best benefit for the patient, both functionally and aesthetically? To do this, consider a diagnostic protocol listing the variables that need to be analyzed before deciding whether to open prosthetic spaces or close them by repositioning the canines and central incisors in patients with MLIA Abu-Hussein M [18], Josefsson E, Lindsten R [19], Seehra J [20].

Achieving adequate esthetics with space closure in patients with unilateral missing maxillary lateral incisors is a clinical challenge. Careful comparison of the shape, color, and size of the canine on the side of the missing lateral incisor and on the contralateral incisor will determine whether the space closure will result in a significant esthetic compromise that may contraindicate its performance or not. With unilateral absence of teeth, the best aesthetic results are observed when opening a place for prosthetics or when removing an existing lateral incisor Krassnig M., Fickl S [21].

The canines typically have a wide and long root while the lateral incisor region is often represented by a narrow area of alveolar bone, reflecting the normal shape of the tooth root. The combination of a wide canine root and a narrow alveolar process in the area of the lateral incisors may indicate insufficient bone tissue to ensure the adequate movement of the canine.

The ideal anterior gingival architecture suggests that the gingival margin of the central incisor and the canine margins are at the same level, while the contour of the lateral incisor is approximately 1 mm lower. Therefore, the gap closure may result in unsightly anterior gingival anatomy, especially when combined with a gummy smile. The clinician should be aware of such potential problems before deciding on the most appropriate treatment approach. Canine extrusion and first premolar intrusion can be used to achieve ideal gingival esthetics in cases where the space closure is used. Canine teeth will require coronal grinding, which should be done to imitate the shape of the lateral incisors. When a premolar is first introduced, composite build-up may be required to ensure the proper canine insertion as these teeth will function in the canine position Rosa M [9].

Some canines have such a unique appearance that even an experienced prosthodontist would have difficulty molding them into acceptable lateral incisor anatomy. They have different shapes, from conical to trapezoidal, and changes in contour can only be carried out within certain limits. When canine shape imposes severe restrictions on reshaping, the esthetic outcome can be quite unpleasant for the patient, leading the clinician to consider opening a space for esthetic improvement Calheiros-Lobo MJ, Calheiros-Lobo M, Pinho T [22].

Proponents of lateral incisor prosthetics believe that it is ideal to preserve the canine insertion for long-term healthy occlusion. These authors also reported difficulties in obtaining adequate esthetics when canines replace a lateral incisor due to differences in root color, shape or volume Pinho T, Bellot-Arcís C, Montiel-Company JM, Neves M [23].

There are two main treatment options for patients with an MLIA, namely closing the space and replacing the missing lateral incisor with a canine or opening a space and filling it with a prosthetic implant. However, the prosthetic option may not be the best solution and cannot be considered as a permanent treatment in the anterior segment. Indeed, although single implants have a relatively long service shelf-life, they can lead to biological complications, such as an increase in the rate of progression of infraocclusion Zitzmann NU [24], Jamilian A, Perillo L, Rosa M [25], blue staining of the marginal gingiva in the implant area Totou D [26] abutment exposure, and distal papilla recession in the long term Totou D [26]. Consequently, the space closure is the preferred option for many dentists.

However, this solution does create some problems. Problems may arise in terms of correct alignment of the gingival margin, as well as achieving the correct degree of inclination of the crowns

Rosa M, Olimpo A, Fastuca R, Caprioglio A [27]. With the ideal location of the gingival margin on the upper jaw, the gingival margin of the central incisors and canines should be at the same level Correa BD, Bittencourt MAV, Machado AW [28], Kolte AP, Kolte RA, Ahuja C [29], while the gingival margin on the lateral incisors is approximately 1 mm below the drawn line between them. Thus, it is necessary to extrude the canine and at the same time to intrude the first premolar to prevent this aesthetic defect of the gingival zenith. In practice, it means that either the first, second, and third order bends will need to be applied to the arch wire or the braces themselves will have to change the position several times.

Conclusions

The optimal approach to addressing missing upper teeth remains a matter of debate in both academic and clinical fields, despite decades of research. This controversy stems from the choice between utilizing dental implants and addressing gaps through orthodontic intervention followed by alteration of the underlying tooth anatomy.

References

1. Al-Ani AH, Antoun JS, Thomson WM, Merriman TR, Farella M (2017) Hypodontia: An Update on Its Etiology, Classification, and Clinical Management. *BioMed Research International* 2017: 9378325.
2. Khalaf K (2014) Prevalence of hypodontia and associated factors: a systematic review and meta-analysis. *Journal of orthodontics* 41(4): 299-316.
3. Nieminen P (2009) Genetic basis of tooth agenesis. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution* 312(4): 320-342.
4. Eshgian N (2021) Prevalence of hyperdontia, hypodontia, and concomitant hypo-hyperdontia. *Journal of Dental Sciences* 16(2): 713-717.
5. Nikopentis T (2013) Non-syndromic tooth agenesis associated with a nonsense mutation in ectodysplasin-A (EDA). *Journal of dental research* 92(6): 507-511.
6. Персин Л. С. и др. Стоматология детского возраста. – Общество с ограниченной ответственностью Издательская группа ГЭОТАР-Медиа, 2016. – С. 240-240.
7. Янушевич О. О., Персин Л. С., Слабковская А. Б. Ортодонтия. – 2016.
8. Rosa M, Zachrisson BU (2014) Missing maxillary lateral incisors: new procedures and indications for optimal space closure. *Esthetics and biomechanics in orthodontics*. 2nd ed. St Louis: Elsevier Saunders pp. 528-559.
9. Rosa M (2016) Congenitally missing maxillary lateral incisors: Long-term periodontal and functional evaluation after orthodontic space closure with first premolar intrusion and canine extrusion. *American Journal of Orthodontics and Dentofacial Orthopedics* 149(3): 339-348.
10. Персин, Л.С. Современные методы диагностики аномалий зубных рядов и окклюзии : учебное пособие по ортодонтии / Л.С. Персин, А.Б. Слабковская, Е.А. Картон, Н.С. Дробышева, И.В. Попова. – Москва : ГЭОТАР-Медиа, 2017. – 160 с.
11. Polder BJ (2004) A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community dentistry and oral epidemiology* 32(3): 217-226.

12. Swarnalatha C (2020) Prevalence of congenitally missing upper lateral incisors in an orthodontic adolescent population. *Journal of Orthodontic Science* 9: 15.
13. Kabbani T, Abdullah NM, Rsheadat Y, Abu Hassan MI (2017) Prevalence of isolated maxillary lateral incisor agenesis in Syrian adolescents. *J Orofac Orthop* 78(1): 62–69.
14. Srivathsa SH (2018) Congenitally missing maxillary central incisor or, solitary median maxillary central incisor? *Int J Orofac Res* 3: 17–19.
15. Бавлакова ВВ, Борисова МА (2020) Анализ частоты встречаемости первичной адентии по данным ортопантомограмм пациентов г. Волгограда и Волгоградской области. *Colloquium-journal. – Голопристанський міськрайонний центр зайнятості* 13(65): 50–54.
16. Mohamad IS, Vodolatsky VM (2020) Prevalence of dentoalveolar anomalies and deformities in children and adolescents. *Bulletin of New Medical Technologies* 1: 7–11.
17. Naoum S (2021) Trends in orthodontic management strategies for patients with congenitally missing lateral incisors and premolars. *The Angle Orthodontist* 91(4): 477–483.
18. Abu-Hussein M (2015) Modern treatment for congenitally missing teeth: a multidisciplinary approach. *Planning* 6(7): 8.
19. Josefsson E, Lindsten R (2019) Treatment of missing maxillary lateral incisors: a clinical and aesthetic evaluation. *European journal of orthodontics* 41(3): 273–278.
20. Seehra J (2020) Space closure versus space opening for bilateral absent upper lateral incisors: what is the duration of orthodontic treatment? *European journal of orthodontics* 42(4): 460–465.
21. Krassnig M, Fickl S (2011) Congenitally missing lateral incisors—a comparison between restorative, implant, and orthodontic approaches. *Dental Clinics* 55(2): 283–299.
22. Calheiros-Lobo MJ, Calheiros-Lobo M, Pinho T (2023) Esthetic perception of different clinical situations of maxillary lateral incisor agenesis according to populations with dental and non-dental backgrounds: a systematic review and meta-analysis. *Dentistry Journal* 11(4): 105.
23. Pinho T (2015) Esthetic assessment of the effect of gingival exposure in the smile of patients with unilateral and bilateral maxillary incisor agenesis. *Journal of prosthodontics* 24(5): 366–372.
24. Zitzmann NU (2015) Treatment strategies for infraoccluded dental implants. *The Journal of prosthetic dentistry* 113(3): 169–174.
25. Jamilian A, Perillo L, Rosa M (2015) Missing upper incisors: a retrospective study of orthodontic space closure versus implant. *Progress in orthodontics* 16: 1–6.
26. Totou D (2021) Esthetic, mechanical, and biological outcomes of various implant abutments for single-tooth replacement in the anterior region: a systematic review of the literature. *International journal of implant dentistry* 7(1): 85.
27. Rosa M, Olimpo A, Fastuca R, Caprioglio A (2013) Perceptions of dental professionals and laypeople to altered dental esthetics in cases with congenitally missing maxillary lateral incisors. *Prog Orthod* 14: 34.
28. Correa BD, Bittencourt MAV, Machado AW (2014) Influence of maxillary canine gingival margin asymmetries on the perception of smile esthetics among orthodontists and laypersons. *American Journal of Orthodontics and Dentofacial Orthopedics* 145(1): 55–63.
29. Kolte AP, Kolte RA, Ahuja C (2018) Assessment of gingival zenith position and its level relative to age and gender in maxillary anterior teeth. *Quintessence International* 49(9): 791–768.



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