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Maxillary lateral incisor agenesis: A review of literature

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Abstract

Introduction: Tooth agenesis is defined as congenital absence of one or more teeth in primary or permanent dentition and is a common oral variation that affects a large population group. Among the missing one's, maxillary lateral incisor is more frequent causing esthetic and functional impairments in the affected individual. It might be associated with systemic problems, syndromic conditions or other oral anomalies. Management of missing lateral incisors involves a multi-disciplinary approach for rehabilitation of impaired esthetics and function. The current literature review is offered to highlight the important characteristics of this anomaly for better management of such patients.

Material and Methods: Several electronic databases were searched. Hand searching was done to short list the relevant articles. A total of 63 studies were retrieved out of which 48 most relevant studies were selected for the review.

Results: maxillary lateral incisor agenesis is a common dental anomaly and has been reported to affect a wide group of populations. It can be unilateral or bilateral and females are more prone to be affected than the males.

Conclusions: agenesis of maxillary lateral incisors is a common oral variation of either genetic or environmental origin. A comprehensive evaluation of the anomaly would be helpful to develop significant clinical management of the affected patients.

Keywords: Tooth agenesis; hypodontia; maxillary lateral incisor; congenitally missing teeth

Introduction

Dental agenesis is defined as congenital absence of one or more teeth in primary or permanent dentition.[1]It is also known as hypodontia and is one of the most frequently encountered of all oral variation that affects a large population.[2,3] Epidemiological studies reveal make that one of the most common congenitally missing tooth is lateral incisor in maxilla causing esthetic and functional impairments in the affected individual.[4,5] It might be associated with Non-syndromic systemic problems, syndromic conditions or other oral anmolaies.[6] Management of missing lateral incisors is a challenging procedure that involves a multi-disciplinary approach for rehabilitation of impaired esthetics and function.[7] The most common treatment approaches advocated by the clinicians include regaining of the space of missing tooth followed by prosthetic replacement, auto transplantation of developing premolar and space closure with substitution of canine.[8,9] The aim of current review of literature was to appraise the data related to prevalence, etiology and management options for congenitally missing maxillary lateral incisors.

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Material and Methods

The present review of literature was done based on the guidelines given in Pakistan Orthodontic Journal. Internationally published research literature, review articles and relevant citations were included. After the electronic literature search, a hand search of key orthodontic journals was undertaken to identify recent articles. The review was restricted to articles dealing with dental agenesis and particularly agenesis of maxillary lateral incisors. Exclusion criteria included articles that did not follow the objective of this review.

Results

A broad search of published articles (The Angle Orthodontist, American Journal of Orthodontics and Dentofacial Orthopedics, British Dental Journal, European Journal of Orthodontics, Journal of clinical pediatrics, Journal of Oral Pathology) was done using both the electronic database and hand searching. A total of 63 studies were retrieved initially. 48 studies having close relevance to the current study objective were used to convey the review of literature for the agenesis of maxillary lateral incisors.

Discussion

Agenesis of teeth can be due to genetic or environmental factors.[10] In non syndromic agenesis, gene mutations are said to be the cause. The mutations in genes responsible for tooth development are marked as PAX9, MSX1, and AXIN2.[11] Among these, MSX1 is usually related to congenitally missing third molars, second premolars, maxillary first premolar and incisors.[12]

The syndromic type dental agenesis is commonly exhibited in ectodermal dysplasia and various orofacial clefting syndromes.[13-15] Several orthodontists claim that susceptibility of its agenesis increases since lateral incisor is located in areas of fusion of facial processes.[16]

Among the environmental factors, the close related ones are trauma, infections, chemical agents and radiations.[17-19]

The review of literature demonstrates that if more than one or two teeth are misaiming, the most frequent one is lateral incisor.[20] The prevalence of maxillary lateral incisor agenesis in the permanent dentition shows great variation among different population groups and ranges between 1-3%.[21] In Caucasian population it prevails up to 20%.[22,23] Among various ethnic groups, the agenesis of maxillary lateral incisor is most frequent in Iranian and Brazilian population,[24,25] second most frequent is Indian, Jordanian and Danish,[26-28] and third most affected are Norwegian and Kenyan population.[29,30] In primary dentition, the incidence for missing maxillary lateral incisor in Caucasian population is 50%.[31,32]

Females are more affected than males[20,33,34] and bilateral absence is more frequent than unilateral.[13,35] In cleft patients, the most frequent missing tooth reported is maxillary lateral incisor.[36]

Accurate diagnosis of a missing tooth requires clinical and radiographic examinations and sometimes dental casts to distinguish whether the tooth is extracted impacted or congenitally absent.[37,38]

A variety of esthetic problems are associated with maxillary lateral incisor agenesis. This includes median diastema, spacing between permanent incisor and canine, mesial migration of canines, midline shift in case of unilateral missing tooth.[39] Over-retention of maxillary deciduous lateral incisor and canine, ectopically erupted canines, absence of canine eminence, asymmetric loss of primary teeth, dental asymmetries are significant apparent factors that are useful for diagnosing the entity.[40]

Confirmed diagnosis of a missing tooth requires radiograph like periapical view or an OPG. Among them, tomography is the most reliable method for diagnosing congenitally missing teeth.[41]

Management of missing maxillary lateral incisors is challenging process for re-establishment of esthetics and function of the affected individuals. The most appropriate approaches as reported in the literature namingly are i) Regaining of space by orthodontic therapy ii) Autotransplantaion of premolars iii) Orthodontic space closure.

1) Regaining of space by orthodontic therapy: this approach is aimed to provide adequate space for replacement of missing tooth. Space opening can be achieved by closing the midline diastema and retracting the ectopically erupted canines.[41,42] The amount of space required can be determined by application of

golden proportions, measuring the Bolton discrepancy and the missing lateral incisor is then replaced to the best of its esthetic and functional demand using a variety of alternatives as per patients choice and socioeconomic status. These include removable denture, fixed cantilever bridge, fiber reinforced composite fixed partial dentures, resin bonded fixtures, or by implant supported restoration.[43]

2) Autotransplantaion of premolars: Autotransplantaion of premolars at maxillary lateral incisor position is suggested when 2/3rd root of premolar roots have developed so that autotransplanted teeth can achieve functional adjustment. The success rates of autotransplantaion range from 79-90% as reported in the literature.[44] After three months of successful autotransplantaion, the crown of premolar is modified to bear a resemblance with the maxillary lateral incisor both esthetically and functionally.[45]
3) Orthodontic space closure: It is best indicated for patients presenting a class II malocclusion with noncrowded lower arch, class I malocclusion with sever crowded upper lower arches where extractions are required and in cases where upper anterior teeth are proclined.[46] This approach involves orthodontics space closure by moving the canines to missing lateral incisor place and making contact with central incisors. After orthodontic space closure, the crowns of canine and premolars are modified to take esthetic and functional semblance of lateral incisor. This approach also has an advantage that normal gingival and alveolar bone architecture can be maintained by mesial movement of teeth into the available space, prosthetic replacement can be avoided and possibility of third molar impaction is also decreased.[47] However, following this method would result in anterior group functioning during lateral excursions instead of canine guided occlusion. This occlusal scheme is also acceptable and considered stable by several school of thoughts.[48]

Conclusions

Maxillary lateral incisor is among one of the most common congenitally missing teeth that occurs either due to genetic or environmental disturbances. Management of missing lateral incisors is a challenging and complex process that involves a multidisciplinary approach in order to restore the esthetics and function.

A high quality perspective of this entity might be helpful in developing meaningful clinical management of affected patients.

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