

Multidisciplinary Management of Oligodontia

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Introduction

Agnesis of one or more teeth is one of the most common of human developmental anomalies. The term oligodontia refers to congenital absence of many but not all teeth whereas the term hypodontia implies the absence of only a few teeth. In the permanent dentition, hypodontia has a prevalence of 1.6% to 9.6%, excluding agnesis of the third molars. Oligodontia has a population prevalence of 0.3% in the permanent dentition. It occurs more frequently in girls at a ratio of 3:2. Agnesis of only the third molars has prevalence between 9% and 37%. In the deciduous dentition, hypodontia occurs less often (0.1%-0.9%) and has no significant sex distribution [1]. The mandibular second premolar is the most frequently absent tooth after the third molar, followed by the maxillary lateral incisor and the maxillary second premolar. Agnesis of maxillary central incisors, canines, or first permanent molars seems to be rather exceptional.

Case Report

A 35 years old female reported for seeking treatment for unpleasant smile and replacement of missing teeth. Medical history was non-contributory. Queries revealed that missing teeth were not extracted, were absent since childhood and her sister had similar dental pattern. The missing teeth were maxillary lateral incisors, maxillary first molars, mandibular central incisors, mandibular right lateral incisor and all third molars with unilateral cross bite in the region of canine and premolars on left side (Fig. 1). Diagnostic records included orthopantomogram (OPG), lateral cephalogram and study models. OPG showed missing maxillary lateral incisors, maxillary first molars, mandibular central incisors, mandibular right lateral incisors and all third molars (Fig. 2). OPG revealed a rounded structure of approximately 5 mm diameter with tooth like radiopacity lying in close proximity to the root of maxillary right molar. It could have been an artifact or a rudimentary tooth. It was asymptomatic and was not likely to interfere with orthodontic tooth movement hence was left

unattended. Lateral cephalogram showed orthognathic maxilla and mandible and class I skeletal pattern with normal growth pattern. (Fig. 3). Problem list consisted of multiple missing teeth, unilateral cross bite, flattening of upper lip and deep mentolabial sulcus. The case was discussed in association with prosthodontist. Treatment plan consisted of two phases. Phase I consisted of orthodontic treatment with objectives to consolidate the spaces, correction of cross bite and improving incisor relation and lip support. Phase II consisted of prosthetic rehabilitation for improving aesthetics and function. Mandibular deciduous incisors were not to be retained due to poor and unfavourable crown to root ratio. A six unit porcelain fused to metal (PFM) in the anterior segments and replacement of maxillary molars in the removable retention plates followed by suitable fixed partial dentures (FPD) was planned.

Phase I therapy was initiated after extraction of retained deciduous teeth and oral prophylaxis. Preadjusted edgewise appliance (0.022" Roth Prescription) was placed. Initial alignment was done with 0.016" HANT arch wire which also corrected the cross bite. Lower bite plate was used until the correction of cross bite took place. Spaces consolidated on 0.017"x 0.025" SS arch wire with the help of open coil springs and elastic chains (Fig. 4). Then rigid 0.019"x 0.025" SS arch wire was used for retaining the orthodontically achieved results. Mid treatment, OPG was taken to ascertain the parallelism of the roots and position of the tooth like structure.. Tooth like structure was present but was asymptomatic and had not hindered orthodontic tooth movement. Lateral cephalogram showed improved relation of dentition to cranial base and to its basal bones (Fig. 5). The interincisal angle improved because of the uprighting of the maxillary central incisors and existing mandibular lateral incisor. Lip position also showed improved results. After retaining the achieved results for three months, Phase II of treatment plan was initiated.

Phase II therapy consisted of replacement of missing anterior teeth with fixed partial dentures (FPDs) to improve aesthetics and function. Maxillary canines and central incisors were prepared as abutments for FPD. In mandibular arch

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canines and left lateral incisor were prepared as abutments for FPD. Six units Porcelain fused to metal FPDs extending from canine to canine were made for the maxillary and mandibular arches (Fig.6). The cervical margins of teeth nos. 13,11,43,32 and 33 showed some metal, indicative of shortcoming in lab fabrication work.

Discussion

Majority of oligodontia patients, seek orthodontic care because of unaesthetic malocclusion. Tooth agenesis occurs more frequently amongst a few specific teeth and clinically this is often considered a normal variant. A disturbance in the fusion of the embryonic facial processes may result in the incomplete expression of a primary cleft, which is manifested as the absence of the maxillary lateral incisors.

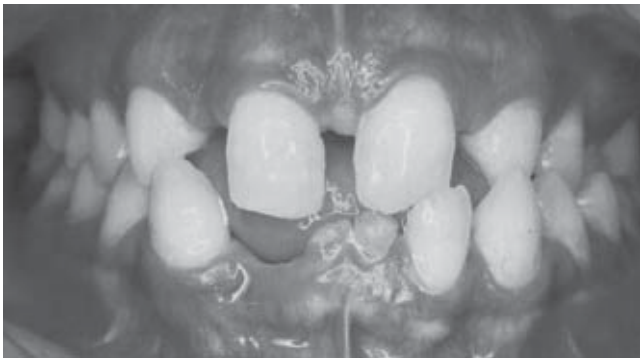


Fig. 1 : Missing teeth

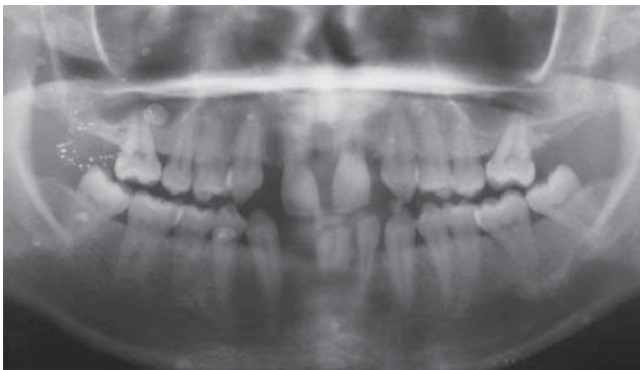


Fig. 2 : Orthopantomogram of the case



Fig. 3 : Lateral cephalogram before treatment

The biologic basis for the congenital absence of permanent teeth is partially explained by the failure of the lingual or distal proliferation of the tooth bud cells from the dental lamina. The causes of hypodontia are attributed to environmental factors such as irradiation, tumours, trauma, hormonal influences, rubella, and thalidomide or to hereditary genetic dominant factors, or to both. Familial tooth agenesis is transmitted as an autosomal dominant, recessive, or X-linked condition. Affected members within a family often exhibit significant variability with regard to the location, symmetry and number of teeth involved. Residual teeth can vary in their size, shape or rate of development and the permanent dentition is more affected than the primary dentition [2]. Several studies have shown that *MSX1* and *PAX9* play a role in early tooth development. *PAX9*



Fig. 4 : Preadjusted edge wise appliance



Fig. 5 : Lateral cephalogram after treatment



Fig. 6 : Fixed partial dentures in place

is a paired domain transcription factor that plays a critical role in odontogenesis. All mutations of *PAX9* identified to date have been associated with nonsyndromic form of tooth agenesis [3-5]. The homeobox gene *MSX1* has previously been associated with agenesis of the second premolars and third molars in a single family. The involvement of *MSX1* has however been excluded in other forms of hypodontia involving both second premolars and lateral incisors or lateral incisors and canines.

The orthodontic treatment of patients with congenitally missing laterals is controversial as to whether to close the spaces left by the missing lateral incisors orthodontically or to open or maintain spaces for prosthodontic (FPD) replacement or implants. Lack of lab support and concern for periodontal health has resulted in recommendation for orthodontic space closure. Poor aesthetic appearance of canine eminence and color incompatibility between maxillary canine and central incisors also needs to be considered while closing spaces. Reasonably stable and well accepted results not impairing TMJ function or periodontal health with orthodontic space closure have been reported [6].

Advocates of opening or maintaining the space for prosthodontic (FPD) replacement or implant suggest that a better occlusion and less flattening of the facial profile will result if the canines are in a Class I relationship. If the large diastema between the centrals is closed by moving them mesially, they leave papilla behind. Overtime the tissue will be keratinized but the location of the papilla will not change. This can be an aesthetic dilemma for the periodontist and restorative dentist [7].

The success of implants has rapidly made them a preferred way to replace missing teeth. Before placement of the implant sufficient space must be gained by uprighting and paralleling the adjacent teeth. The orthodontic treatment has to be completed with good stability followed by retention of orthodontically moved teeth. Even small movement after implant placement may cause complications e.g. tipping of the central incisor may result in tooth implant contact with marginal bone loss. Shorter the distance between the implant and the adjacent teeth, the larger the reduction of marginal bone level. Buccal bone plate in the lateral incisor area is often thin resulting in discoloured soft tissue, buccally to the implant-supported crown [8].

Major concerns when implants are to be placed, are adequate bone in the edentulous area to support the implant and for single tooth implants adequate space between the roots as well as the crowns of the adjacent teeth. If there is no tooth to erupt into an area of the dental arch, little or no alveolar bone ever forms. Positioning adjacent teeth for a single tooth implant can

be tricky especially in replacement of missing maxillary lateral incisors because of the small area for replacement. In older patients with missing teeth and large alveolar defect, bone grafts in the area of future implants will be required. Usually it is advantageous to go ahead with the placement of grafts in areas that will receive implants, while orthodontic treatment is being carried out in other areas of the mouth. If the orthodontic treatment is completed before the graft matures and implant placed, a temporary resin bonded bridge can be used as a retainer. Prosthetic replacements, whether implants or bridges, are an essential part of the orthodontic retention [9]. Placement of permanent prosthesis is delayed due to time required for osseointegration and graft maturation in cases where bone grafting and implant is planned.

Considering the quality of bone in the edentulous area, delay involved in bone grafting and implant and esthetic and functional considerations of closing spaces orthodontically, a six unit, Fixed Partial Denture (FPD) from canine to canine was preferred in this case. A multidisciplinary approach is essential to achieve better aesthetics and function in such cases.

Conflicts of Interest

None identified

References

1. Dermaut LR, Goeffers KR, De Smit AA. Tooth agenesis correlated with jaw relationship and crowding. *Am J Orthod Dentofac Orthop* 1986; 90: 204-10.
2. Mostowska A, Kobiela A, Trzeciak WH. Molecular basis of non-syndromic tooth agenesis: Mutations of *MSX1* and *PAX9* reflect their role in patterning human dentition. *Eur J Oral Sci* 2003; 111: 365.
3. Mostowska A, Biedziak B, Trzeciak WH. A novel mutation in *PAX9* causes familial form of molar oligodontia. *European Journal of Human Genetics* 2006 ; 14: 173-9. Epub 2006 Feb.
4. Lammi L, Halonen K, Pirinen S, Thesleff I, Arte S, Nieminen P. A missense mutation in *PAX9* in a family with distinct phenotype of oligodontia. *European J of Hum Genet* 2003; 11:866-71.
5. Lammi L, Arte S, Somer M, Järvinen H, Lahermo P, Thesleff I, Pirinen S, Nieminen P. Mutations in *AXIN2* Cause Familial Tooth Agenesis and Predispose to Colorectal Cancer. *Am J Hum. Genet* 2004; 74:1043-50.
6. Robertsson S, Mohlin B. The congenitally missing upper lateral incisor. A retrospective study of orthodontic space closure versus restorative treatment. *EJO* 2000; 22: 697-710.
7. Vincent O, Kokich. Congenitally missing teeth: Orthodontic management in adolescent patient. *Am J Orthod Dentofac Orthop* 2002; 121: 594-5.
8. Thilander B, Odman J, Kekholm U. Orthodontic aspects of the use of oral implants in adolescents: A 10 year follow up study. *EJO* 2001; 23: 715-31.
9. Proffit WR, Fields Jr HW. *Contemporary Orthodontics*, Third Edition, 2000; 658-66.