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The Roles of Multidisciplinary Team in Tooth Agenesis: Clinical Review

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REVIEW

ABSTRACT

Tooth agenesis, dental agenesis and congenitally missing tooth or hypodontia are terms used commonly when describing failure of tooth development. More specific terms hypodontia (one to five teeth absent, excluding third molars), oligodontia (six or more teeth absent, excluding third molars) and anodontia (complete absence of teeth) are in common use according to the severity of phenomenon. Treatment must be planned on a longitudinal basis to give optimised outcomes over a lifetime, and often requires phases both of active treatment and long - term clinical maintenance. The clinical team must therefore possess sufficient skills to plan treatment with a perspective on current and future needs. A multidisciplinary approach to the management of hypodontia may be costly in terms of resources but it has many benefits. It ensures that there is an integrated and unified treatment plan, which has been agreed in advance by all specialties involved in the care pathway. This paper describes the roles of multidisciplinary treatment plan for tooth agenesis involving medical team ,orthodontics, implantology and prosthodontic specialties.

KEYWORDS

Tooth agenesis, Hypodontia, Genetic, Multidisciplinary team, Dental implants

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INTRODUCTION

The congenital absence of teeth can seriously affect a young person, both physically and emotionally, especially when the missing tooth is located in the anterior region of the mouth. Hypodontia is the congenital absence of teeth and refers to the condition where there is an absence of one or a few teeth21. In addition, hypodontia of permanent teeth is fairly common in contemporary populations11 and is the most common human malformation.[1] It occurs without any other signs or symptoms of developmental disorders. Both genetic and environmental components are involved in the etiology of hypodontia3, and several genetic and syndromic conditions are currently known to increase the risk of hypodontia19; nonetheless, congenitally missing teeth are commonly found in healthy people.While the most frequently missing tooth is third molar, except third molars the prevalence of tooth agenesis varies according to population. [1,2] [Figure 1]

In many studies on the prevalence of tooth agenesis, differences were observed between populations, continents and countries. Ethnic differences in the prevalence of tooth agenesis is outstanding.[3] The prevalance of permanent tooth agenesis were found to be between studies in Asia continent % 1.4- % 9.4,4 in European studies % 4.5- % 11.3, in the United States studies % 3.5- % 3.8 studies in the Middle East % 0.3- % 6. In Europe, the United States, Asia and Middle East studies, the most frequently missing teeth were found maxillary lateral incisors and mandibular second premolars.[4]

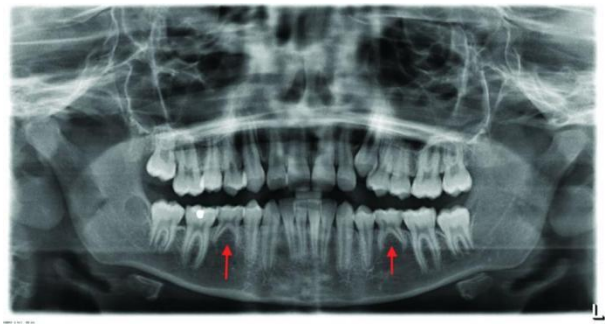

Figure 1: Panoramic radiography of mandibular agenesis teeth.

The most common dental anomalies in Turkish population is said to be hypodontia.[5] In Turkey, studies showed that the frequency of hypodontia were found between % 1.77- % 21.[6] The prevalence of oligodontia were found to be between % 0.13 %.[7,8] The most commonly missing teeth were found to be maxillary lateral incisors and followed by mandibular second premolars.[4] The prevalence of missing maxillary lateral incisors were found between % 1.74- % 46.[4] and the prevalence of missing mandibular second premolars were found between % 0.57- % 38.[8] The prevalence of bilateral missing maxillary lateral incisors were found between % 72 % 84.[9] The prevalence of tooth agenesis in females were more common than males and the prevalence in females were found to be between % 0.50- % 8., in males have shown to be between % 0.17- % 6. [10-13] [Figures 2,3]

Figure 2: Pre-op occlusal view of maxilla.

Figure 3: Pre-op occlusal view of mandible.

The frequency of absent teeth in descending order was

- Mandibular second premolar (3.0 %)
- Maxillary lateral incisor (1.7 %)
- Maxillary second premolar (1.5 %)
- Mandibular central incisor (0.3 %)
- Mandibular lateral incisor and maxillary fi rst premolar (0.2 %)
- Mandibular fi rst premolar (0.15 %)
- Mandibular second molar and maxillary canine (0.1 %)
- Maxillary second molar (0.05 %)
- Maxillary first molar (0.03 %)
- Mandibular canine (0.02 %)
- Mandibular first molar (0.01 %)
- Maxillary central incisor (0.005 %)

This supports one of the widely accepted sequences of missing teeth as

- Mandibular second premolar
- Maxillary lateral incisor
- Maxillary second premolar
- Mandibular incisors

This paper describes the roles of multidisciplinary treatment plan for tooth agenesis involving medical team ,orthodontics, implantology and prosthodontic specialties.

Aetiology of tooth agenesis

The long time span and complexity of human dental development means that abnormalities may arise from multiple genetic and environmental factors which may affect the teeth at different stages of development.[1,2]

The important role of genetics as a cause of tooth agenesis stems from the facts that tooth agenesis is usually observed without any obvious environmental cause and it is more common in monozygotic than in dizygotic twins and among relatives than in the general population. Many gene mutations have been discovered to cause isolated and syndromic tooth agenesis. However, both twin and family studies indicate that the relationship of the genotype and phenotype is not straightforward but shows variation presumably caused by genetic background, that is to say additional genetic factors, as well as epigenetic and external factors. Thus, family members affected by the same mutation typically show variation in the phenotype, and even monozygotic twins often do not have identical phenotypes [14]].

Genetic causes of tooth agenesis

Both case reports and systematic studies of cohorts of patients and their families indicate that genetic factors cause tooth agenesis by different modes of inheritance. Thus autosomal dominant, autosomal recessive and X-linked modes of inheritance as well as suggested complex inheritance have been reported in families with oligodontia.[15-18] In his pioneering study of hypodontia, Grahnen studied Swedish families and observed hypodontia in at least one of the parents of 43 of the 55 cases (78 %), suggesting predominantly dominant inheritance [19]. Underlying genes have been identified in all common syndromes featuring tooth agenesis and a significant part of nonsyndromic oligodontia [29,21]. Identified human mutations, complemented by experimental mutations in mice, show that disturbances in any of the important signaling pathways (WNT, Hedgehog, FGF and TGFβ/BMP) or their intracellular effectors affect normal tooth development. Furthermore, mutation identification in hypohidrotic (also named anhidrotic) ectodermal dysplasia (HED, EDA), the most common ectodermal dysplasia syndrome, led to a discovery of a whole new signaling pathway, EDA signaling. In this pathway, an identical disease can be caused by inactivating mutations in the genes coding for the extracellular signal protein, its cell surface receptor or an intracellular mediator of signaling (EDA, EDAR and EDARADD, respectively). Similarly, identified causative mutations in other signaling pathways may affect the extracellular signals or their receptors or intracellular mediators or effectors. Several genes for transcription factors critical for BMP, FGF and WNT signaling and cell fate decisions are mutated in isolated or syndromic forms of tooth agenesis. In addition, tooth agenesis may be caused by mutations in molecules mediating cell adhesion and/or even by defects in extracellular matrix molecules [21].

The first identified causative genes for isolated tooth agenesis were MSX1 and PAX9, which code for transcription factor proteins critical for tooth development [22,23]. Heterozygous mutations segregate with severe tooth agenesis in multi- generation families. In the family segregating an MSX1 missense mutation in the homeobox, all affected family members lacked second premolars and third molars and to variable extent other teeth like first molars, first premolars and some incisors [23], whereas a frameshift mutation in PAX9 affected predominantly all molars, second premolars and some incisors [13]. Numerous other mutations, each unique, have since been identified, and phenotypes of the patients largely conform to the patterns described above [20]. Data from patient cohorts suggests that less than 10 % of families with oligodontia have a mutation in MSX1 or PAX9; however, due to the dominant inheritance, an overall contribution of each of these genes to oligodontia is larger [20,24].

MSX1 and PAX9 are expressed in the mesenchymal tissue during early tooth development and mediate effects of epithelial-mesenchymal signalling especially by BMPs and FGFs. Selective tooth agenesis as a consequence of a heterozygous inactivating mutation indicates a haploinsufficiency of these genes in human tooth development, presumably by defective mesenchymal condensation and signalling. Haploinsufficiency, i.e. insufficiency of a single normal copy, as a cause of tooth agenesis is a more general mechanism present in numerous syndromes and isolated tooth agenesis with dominant inheritance.[25-29]

The important role of WNT signalling in human tooth development is emphasised by unravelling the role of WNT10A in tooth agenesis. Recessive mutations affecting this extracellular signal protein were first identified in an ectodermal dysplasia syndrome, odonto-onycho-dermal dysplasia. Subsequently they have been identified in a spectrum of patients with ectodermal defects, from an allelic Schöpf- Schulz- Passarge syndrome (additional symptoms eyelid cysts and telangiectasias) to ectodermal dysplasia with hypo- or hyperhidrosis to tooth agenesis with minor or no other

ectodermal defects. Mutations in WNT10A are by far the most common known cause of isolated tooth agenesis: in different samples, biallelic or heterozygous genotypes have been found in 26–56 % of the non-syndromic oligodontia patients. [20,24,29]

According to the verifiable data, despite strong effects on permanent dentition, WNT10A, AXIN2 or LRP6 mutations very seldom affect deciduous teeth [28] implying that abnormalities of WNT signalling tend to affect mechanisms involved in development of successional teeth. Unlike mutations in MSX1 and PAX9, mutations in WNT10A or LRP6 show variable phenotypes sometimes affecting mostly anterior and sometimes posterior teeth. This extensive variation may depend on other mutations that affect WNT10A expression or are located in other genes. Indeed, examples of codetection of WNT10A and EDA signalling mutations have been presented [29,30].

The mutations described above have been mainly identified in oligodontia. However, many heterozygous carriers of WNT10A or EDAR mutations, that is, family members of oligodontia patients, present with hypodontia, lacking one or a few permanent teeth. These variants behave as dominant mutations but with reduced penetrance and variable expression, presumably explained by genetic background and other factors affecting the developmental outcome. It is probable that similar variants in other genes will be discovered in hypodontia.[28-30] [Table 1]

defects.

Stage of tooth development	Protein factors involved in signaling from epithelium	Protein factors involved in signaling from mesenchyme
Initiation Stage	Fgfs, Bmps, Shh, Pitx2 and Wnts	Pax9, Ptc, Msx1, Msx2, Bmp4, Lhx6, Lhx7, Lef1, Dlx1, Dlx2,Gli1,Gli2, Gli3 and Barx1
Bud Stage	Bmp, Fgf, Wnts, Shh, Pdgf, p21, Msx2, Lef1 and Tgf-β	Pax9, Bmp, Dlx1, Dlx2, Lhx6, Lhx7, Msx1, Lef1, Gli1,Gli2, Gli3, Barx1 and Fgfs
Cap Stage	Bmp, Fgf, Wnts, Shh, Pdgf, p21, Msx2, Lef1 and Tgf-β	Pax9, Bmp, Dlx1, Dlx2, Lhx6, Lhx7, Msx1, Lef1, Gli1,Gli2, Gli3, Barx1, Bmp4, Msx2 and Fgfs
Bell Stage		

Table 1: Genetic basis of dental agenesis.

Environmental causes of tooth agenesis

The most dramatic known external effect on tooth development is caused by treatment of cancer during early childhood. The effects include tooth agenesis, extreme microdontia and hypoplasia of tooth roots. The effect is especially strong after radiological treatments but also chemotherapy can cause microdontia and agenesis [1,2,15].

Tooth germs may sometimes be destroyed by external trauma. It has been suggested that agenesis of mandibular third molars may be related to application of local anaesthetics during childhood dental care [1,2,16].

Tooth agenesis has been described in children whose mothers' have suffered rubella infection during pregnancy [1,2,17]. Both experimental animal and population studies have shown that certain pollutants, especially dioxins, are harmful for normal tooth development. As shown by nimal studies, dioxins affect both tooth morphogenesis and cell differentiation, and predisposition to dioxins after an industrial accident in Seveso, Italy, was associated with increased prevalence of tooth agenesis [18]. Confirmed environmental causes of tooth agenesis are rare and do not have a significant contribution to tooth agenesis at a population level. However, factors that affect the size of tooth germs may also play a role in determining the outcome of genetic predisposition.[1,2,15-18,28-30]

Diagnosis

Dental agenesis is categorized according to the number of missing teeth, less than three and six missing teeth are defined as mild and moderate, respectively. Clinical evaluation, radiographic and dental cast examinations are required for proper diagnosis. The third molar germ calcification

initiates at the age of about 7.5 and in very few people, it starts at the age 9.5. Thus, by including patients younger than 9, researchers might overestimate the missing of the third molars. This might explain the high occurrence of agenesis in third molars which has been reported by some studies.[31-35]

Age is an important factor in determining the treatment modalities available at any given time, reflecting both age-related effects on a patient's attitudes to dental problems and their management and their stage of dental development and the remaining degree of facial growth. Comprehensive orthodontic treatment is often not considered until all developing successional teeth have erupted, or until the completion of facial growth in people with skeletal discrepancies that require orthognathic surgery. Dental development is often delayed in individuals affected by hypodontia, which can delay the start of orthodontic treatment compared to their peers. As well as orthognathic treatment, dental implant therapy is rarely undertaken until completion of vertical facial growth so as to limit the risk of infra occlusion of the restored unit(s) which have no eruptive mechanism.[33-35]

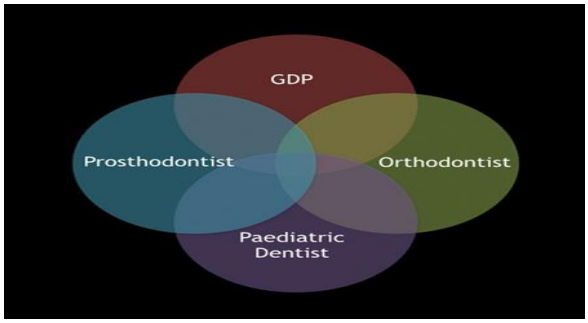

Table 2: Dentral team of dental agenesis.

In patients with hypodontia the situation is complicated, as often they have retained primary teeth. It is clear that primary teeth wear less favourably than permanent teeth, although this has not been quantified. Primary teeth are usually lost through root resorption , but if retained for a long time they can eventually be lost through tooth wear. Occlusal discrepancies can occur when permanent teeth oppose primary teeth, which are slowly worn away with time.[32-34]

Treatment plan

Treatment needs an interdisciplinary approach including operative dentistry, paediatric dentistry, orthodontics and prosthodontics. [35] Early extraction of primary canines might guide the eruption of the permanent canine into the proper position in cases with missing maxillary lateral and impaction of upper canine. [36] The amount of crowding, type of malocclusion, facial profile, age of the patient, periodontal conditions, bone volume in alveolar process, vertical or horizontal growth pattern, craniofacial morphology and the number of missing teeth should be considered in treatment plan. There are two treatment plans that include space reopening or space closing. Space can be reopened for implant insertion, auto transplantation and prosthetic restoration. Another treatment plan is space closing which can be done by fixed orthodontics. [37-41] [Table 2]

It is important that the dentition as a whole is examined and any primary disease managed at an early stage. The initial role of the team is to assess the patient fully in order to determine the extent of the hypodontia, the quality of the dentition, and the prognosis for the retention of primary teeth without successors. The use of a standard clinical assessment pro forma is recommended to ensure that the clinical assessment follows a consistent format.[38-41]

Figure 4: Congenital bilateral missing maxillary.

Treatment planning should be provided on an interdisciplinary basis with an integrated structure. The team should agree with the patient on a tentative long- term objective. This could, for example, be to provide an apparently complete natural dentition using fixed restorations. The plan might involve the optimised positioning of the permanent teeth and restoration of any spaces with implant stabilised restorations. Establishing lon-term objectives can help to define priorities but it should not be at the expense of meeting short-term goals. Depending on the patient' s age, complaints and state of dental development, a treatment plan may be developed for immediate application or may be in a predictive format with short , medium and longer term objectives. A sound principle is to begin active treatment only when there are good clinical indications for doing so, or when it is requested by the patient .[42,43] [Figure 4]

A major advantage of a hypodontia team is the availability of specialist opinions from different dental specialties. Various treatment modalities can be discussed and their feasibility ascertained. For example, in some circumstances it may not be possible to upright the roots of teeth adjacent to a potential implant site, thus precluding the use of such devices to replace missing teeth. If this is recognised and discussed with the patient at an early stage, it avoids giving unrealistic expectations about the treatment outcome. A restorative specialist is also ideally placed to assess if canines can be disguised as lateral incisors, which may impact on the complexity and length of orthodontic treatment.[28-32]

Roles of a hypodontia team

In general, the roles of the team may encompass the following main areas

- Diagnosis and interdisciplinary treatment planning
- Patient and parent/carer counselling.
- Provision of specifi c treatment plans for outreach provision of care.
- Provision of treatment by team members.
- Education for students in training (including senior undergraduates, specialist trainees from associated specialties and development of successional staff), education of purchasers (including insurers and government agencies).
- Data collection for local audit and clinic management.
- Local and collaborative research at a national or international level.
- Collaboration with national patient support groups.

Composition of the ideal hypodontia clinic team

They recommend that particular specialties, as listed below, should either be represented directly on the hypodontia clinic, or should be available nearby:

- General dental practitioners
- Dental nurses
- Orthodontists
- Paediatric dentists
- Prosthodontists
- Oral and maxillofacial surgeons
- Specialist laboratory technicians
- Clinical psychologists
- Clinical geneticists
- Dermatologists
- Speech and language therapists

Dental nurses

The dental nurse is usually the first team member that the patients and their families meet on arrival at the hypodontia clinic. They are the initial point of contact when arranging the appointment. This named contact will, throughout the patient' s time, remain attached to the clinic, giving opportunities to raise any concerns. [36]

The large number of team members in an interdisciplinary hypodontia clinic can be intimidating for patients, but if the dental nurse prepares the family before they enter the clinic, by explaining who will be present and their roles, this can be of great comfort and benefit. Frequently, the patient or parents may raise issues and concerns with the dental nurse outside the clinic either before or after consultation, which they do not wish to bring up in discussion with the team. This gives the dental nurse a valuable role of patient advocate, and such concerns can be brought to the attention of the team.[36,37]

The dental nurse also has the responsibility of ensuring that the clinic runs smoothly, by appropriate appointment scheduling, chairside support and carrying out equipment decontamination processes. With larger clinics, where multiple dental chairs are used simultaneously, a team of dental nurses may be more appropriate than a single nurse. This is particularly useful if it enables one dental nurse to carry out the initial meeting with the family outside the clinical environment, while the remainder provide chair - side support. In some teams, this role may be filled by a designated clinic coordinator. [28,29,36,37]

The general dental practitioner

The dental practitioners are rarely present on the hypodontia team, they form a vital component of the care pathway and need to be aware of the condition because they are responsible for the initial identification of the problem and subsequent referral to the clinic. The patient' s standard of oral health, including caries control and oral hygiene status, will have been under the care of the practitioner, often over an extended .[42] The concept of shared care will require this to continue alongside any specialist treatment delivered through the hypodontia clinic team. [43-45]

The orthodontic phase of treatment the practitioner may be asked to carry out any necessary primary or permanent (less frequently) tooth extractions. He or she may also be willing to carry out any necessary restorative treatment, including interim replacement of teeth with resin- b onded bridges or removable prostheses, together with re-contouring of microdont teeth with composite resin additions or veneers.[45]

The clinical psychologist

Patients with severe hypodontia may suffer from associated psychosocial problems and may benefit from a meeting with a clinical psychologist. Issues such as low self- esteem, social withdrawal and coping strategies may be explored through discussions or group therapy.[46] In addition, the patient ' s parents sometimes benefit from discussing issues with the clinical psychologist, dissociating their own perceived problems from those of their child, and focusing on the developmental benefit to the child. This may lessen the risk of providing early treatment for a child with little or no personal concerns relating to their hypodontia, to allay what are actually parental concerns. [36,37,45,46]

The clinical geneticist

Therefore the clinical geneticist may be involved both in the genetic testing of severe hypodontia patients and their parents and with their counselling. This may be especially useful where the hypodontia is associated with a familial genetic syndrome, and where parents are seeking advice about the risks for future planned pregnancies .Similarly, patients with genetic syndromes may wish to discuss their own future family planning. [36,37,47]

The dermatologist

Patients and families of patients with hypodontia- related syndromes with skin involvement, including the ectodermal dysplasias, may benefit from time with a dermatologist. They may discuss management strategies for hypohidrosis and subsequent skin dryness. Other syndromes (such as incontinentia pigmenti) cause patches of skin hyperpigmentation that may benefit from advice or treatment from a dermatologist. [28,29,30,34]

The speech and language therapist

Young children with severe hypodontia may present with speech defects associated with large spaces. These defects may respond to speech and language therapy, and the integration of therapy both before and after treatment of the hypodontia can maximise the improvement in speech. The provision of extensive removable prostheses, or early implant therapy, in very young children to attempt to improve aesthetics, psychosocial development, and speech patterns is controversial of speech processes through speech and language therapy may be less invasive, and more acceptable to the patient. [36,37,48]

The paediatric dentist

The paediatric dentist' s role in the management of child and adolescent patients with hypodontiamay include behavioural management to encourage nervous children so that they accept dental care (both preventive and therapeutic forms). [46] Treatment may involve restorative care of permanent and primary teeth to maximise their longevity, primary tooth extractions as required, dentoalveolar surgery for severely infra-occluded primary teeth, or the exposure and bonding of attachments to ectopic permanent teeth. In the intermediate restorative phase of treatment, the paediatric dentist may be asked to build up microdont permanent teeth with resin to improve aesthetics. Resin-retained bridges or removable prostheses may be required for more severe hypodontia. [36,47,48] Patients with severe hypodontia and microdontia associated with ectodermal dysplasia may require more extensive over dentures at a very young age to improve self esteem relating to dental and facial aesthetics, and function. [36,37,42,43]

The orthodontist

The orthodontist' s role is to provide knowledge of normal growth and development, and to assess any deviations from the normal associated with hypodontia .[49] In addition, he or she may advise on any interceptive primary tooth extractions to guide the developing occlusion and provide appliance therapy to treat the malocclusion, including repositioning of ectopic permanent teeth and root paralleling of abutments. [36,50] Where feasible, orthodontics should seek to close spaces completely, or reduce them to a more easily manageable size .[37,50,51] If it is not possible to close the spaces, then the ultimate abutment sites and saddle lengths should be agreed with the prosthodontist before the orthodontist moves teeth to the agreed positions.[39, 52] The use of dental implants in the treatment of hypodontia is increasing and can often be optimised, or even made feasible, by jointly planned tooth movement. In this way, the surgical envelope in implant sites can be improved, the size of spaces in the arch can be optimised, and potential occlusal issues can be managed. [38-40,53] [Figure 5, Table 3]

Figure 5: Orthodontics treatment in hypodontia.

The oral and maxillofacial surgeon

Figure 6: Dental implants maxillary and mandibular.

The surgeon may be involved in dentoalveolar surgery on patients of all ages. It may include extractions, surgical removal of severely infra occluded primary teeth, surgical exposure of ectopic permanent teeth, and the autotransplantation of permanent teeth from one site to. Patients requiring dental implants for the definitive restorative phase may need bone grafting or sinus floor lifts to increase available bone in the implant sites, using bone substitutes or bone harvested from the patient [54-60]. In some teams the surgeon may place dental implants, while in others this is something the prosthodontist carries out. In addition, patients with severe skeletal deformities may require orthognathic surgery to improve facial aesthetics and normalise jaw relationships prior to prosthodontic treatment. [32-40,60]

Specialist laboratory technicians

The complex nature of the treatment provided for patients with hypodontia requires high - quality laboratory support. Ideally the laboratory should be on site to enable the laboratory and clinical staff to discuss complex issues face-to-face and where necessary at the chaiside. However, where this is not feasible then an off - site service is acceptable, although this necessitates good communication. The laboratory service is necessary to support the orthodontic phase of treatment, where fixed or removable auxiliary appliances may be required, and for the provision of orthodontic retainers. These often differ from routine retainers in that they include prosthetic teeth, which maintain spaces created during the active orthodontics and improve aesthetics during the retention phase. The prosthodontic phases of treatment require high - quality fixed or removable prostheses and indirect restorations or veneers to be manufactured in the laboratory, to the clinician ' s prescription. The microdont or conical morphology of the teeth in many hypodontia patients may complicate such work and challenge the skills of the technician.[39] Where dental implants are to be used, laboratory support is required for the manufacture of the positioning jigs or stents needed for accurate placement and the coronal superstructure. It goes without saying that high- quality clinical treatment can only be provided where supported by high- quality laboratory work. [32,33,39,40]

The prosthodontist

The prosthodontist' s role is to plan and, where appropriate, agree with the orthodontist the ultimate sites and sizes of edentulous spaces, and the intended functional occlusion. Following orthodontic treatment the prosthodontist will provide a range of restorative treatment options, including fi xed or removable prostheses, in order to restore aesthetics and function . Dental implants have become more widely used to restore single units or as supports for more extensive fixed prostheses . The potential use of implants requires that the roots of adjacent teeth are not converging into the intended implant zone, and root paralleling (or preferably root divergence) should have been agreed as an objective of the initial interdisciplinary treatment plan between the prosthodontist and orthodontist, [39,40,60]

DISCUSSION

The multidisciplinary approach associated with early diagnosis in individuals with hypodontia of permanent teeth is related to treatment success. [32,33] However, definitive treatment of the missing teeth is often performed only after eruption of all permanent teeth or completion of orthodontic

treatment. The oral patient's hygiene status and socioeconomic conditions as well as the maintenance therapy should also be considered.[38,39] [Table 3]

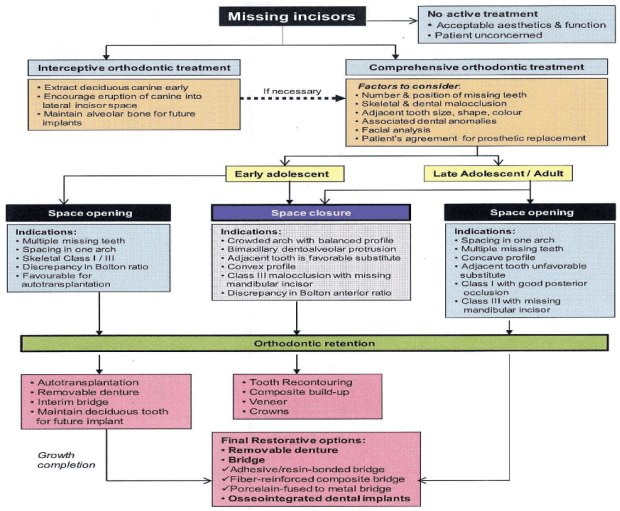

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Table 3: Algorithm of "Orthodontic management of developmentally missing incisors".

Multidisciplinary treatment is usually initiated upon the diagnosis of hypodontia, often by the pediatric dentist or general practitioner. The main contribution of these professionals is the prevention of carious lesions and maintenance of the primary teeth in the oral cavity for space maintenance and preservation of alveolar bone for future implant therapy. [38-40] Orthodontic treatment allows for the creation or redistribution of spaces for later rehabilitation . If the primary teeth had not been maintained in the present case, the final prosthetic spaces would not have been large enough for the placement of crowns with the dimensions of mandibular second premolars. The greatest challenge in the treatment of hypodontia is related to treatment planning, which usually depends on the severity of the hypodontia6. The treatment options available for these cases are the maintenance of the primary teeth; orthodontic space closure; space maintenance; restoration with adhesive or fixed dentures, tooth transplantation or dental implants; or orthodontic space redistribution to facilitate the prosthetic treatment. [38-40]

The treatment with dental implants may be the best option for patients with hypodontia because this procedure is predictable, stable and provides excellent esthetic results.[39] Other treatment options, such as conventional partial fixed dentures, may cause biological damage due to the need to reduce the intact tooth structure; in young patients, the risk of pulp damage is high due to the large volume of the pulp chamber.[35] When treatment with dental implants is indicated, the possible postpubertal vertical growth of the facial skeleton should be considered, and consecutive cephalometric analyses should be performed to establish the period of growth. These analyses revealed completion of physical growth of our patient; thus, restoration of the prosthetic space with implants was the treatment of choice.[37,39-41,58] The implant therapy in individuals with hypodontia may be complex due to the limitations caused by the reduced bone thickness ,impairing the ideal positioning of implants or requiring the use of implants with a small platform.[39,60] For this reason, bone grafting is often indicated to compensate for this deficiency. Implants with a small platform prevent the achievement of an adequate emergence profile for wide teeth, such as the posterior teeth. In this case, the maintenance of the primary teeth during orthodontic treatment favors the maintenance of the bone architecture, allowing for the placement of implants with a regular platform. [38,39,58,59]

Figure 7: Pre-operative view.

Figure 8: Post-operative view.

Another treatment method is auto transplantation. Referring prosthetic, transplantation is thought to be a better choice than the implant; osseointegrated implants placing to the growing alveolar bone is not correct.[60] [Successful auto transplantation of teeth, depending on the physiological stimulation of the periodontal ligament provides stability of alveolar bone volume. It is stated that children should be delayed until completion of adolescence implant treatment.[60,63,64] [Figures 7,8].

Autotransplantation of premolars may be recommended in patients with multiple agenesis of maxillary incisors. In growing children transplated teeth can induce alveolar ridge growth and development and also it may be a permanent solution for agenesis of teeth.[39,66] In studies the long-term success of autotransplantation of premolars were reported to be between 70-98 %. [39,60]

The management of such patients will require multidisciplinary care which is very close for health care providers especially in those with severe hypodontia and this study revealed the essential role of resin bonded bridges (RBB) in managing patients with hypodontia.[39] The conservative design of resin-bonded bridges enables young adults to step into fixed prostheses rather than waiting for a cessation of development before the eventual procurement of crowns covered by dental implants . It is therefore important to have an up to date knowledge of the prevalence of this condition in order to plan and prioritize funding of healthcare provision, including with those hypodontia for further progress, identifying pathways of human genome and compare with different population with early interventions which would be great support and for rehabilitation. [61,67-70]

CONCLUSION & RESULTS

The early diagnosis prevents or reduces complications which may cause ethestic and functional disorder which decrease quality of life.Treatment for patients with hypodontia aims to provide them with a functional occlusion withgood aesthetics. Occlusal relationships can be considerably improved with orthodontics, however as the severity of hypodontia increases so the need for restorative treatment also increases. It is desirable to provide an ideal occlusion with canine guidance and posterior support in most circumstances. When complete dentures or overdentures are required it may be that a bilaterally balanced occlusion provides most comfort for the patient. In many circumstances, some element of compromise has to be accepted, although survival of the teeth or restorations will not be ideal if this is the case. An ideal occlusion for a treated hypodontia patient should provide the following:

- Class I incisal relationship
- Canine guidance
- Posterior stability
- No spacing and tight interproximal contacts
- Good tooth and gingival aesthetics
- Suffi cient interocclusal space for appropriate thickness of restorative materials

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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