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COMPREHENSIVE TREATMENT OF HYPODONTIA IN 6 YEARS OLD PATIENT (A Case Report)

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Abstract

Agenesis described as a certain developmental disorder that is a lacking in the number of teeth present intraorally. Hypodontia is an agenesis with the absence of one or several teeth. In most of the population, the prevalence is 3,5 – 6,5%, with 0,3-0,4% for a severe hypodontia (an absence of 6 teeth or more clinically). Agenesis affects permanent dentition more often than primary dentition, and the incidence of agenesis is greater in female than male patients. Agenesis might be a result of environmental and genetic factors. It is necessary to have a comprehensive treatment for a case of hypodontia, which involves restorative, orthodontic, a prosthetic treatment based on the children's growth and development. In the present case, a patient of 6 years and 5 months old girl was diagnosed with severe hypodontia. The treatment of choice included a removable orthodontic appliance for the upper jaw and a removable space maintainer for the lower jaw. The removable orthodontic appliance served as an interceptive orthodontic treatment to correct anterior crossbites, and the child will be refered to the orthodontist to treat a Class III skeletal malocclusion. The space maintainer was to be used until the patient's condition become favorable for a permanent fixed bridge or steel removable partial denture.

Key words: Hypodontia, comprehensive treatment, 6 years old patient

Introduction

Agenesis which affects one or more teeth is one of a common developmental disorder.[1,2] Agenesis described as a certain disorder, that is a lacking in the number of teeth present intraorally. Some terms are used in some literatures to describe the disorders which affect the number of the teeth including hypodontia (an absence of one or several teeth), oligodontia (an absence of multiple or most of the dentition) which could be a result of syndromes and systemic disorders, and anodontia (a complete absence of the dentition).[1,3]

Hypodontia's classification was described by Dhanrajani (cit. Stephen, 2003) based on the severity. Mild to moderate hypodontia refers to agenesis which affects 2 to 5 teeth, whilst an absence of 6 teeth or more can be classified as severe hypodontia. If a multiple absence of teeth in the oral cavity presents, the term oligodontia is used.[4]

A pediatric dentist is often being the first person to diagnose this disorder, so he has to familiarize himself with the etiology, treatment planning, and the follow up of this particular case.[5] The etiology of agenesis is thought to be multifactorial (i.e. genetic and environmental factors).[6] The pattern of

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inheritance in most of the cases is autosomal dominant with partial penetration and various expressions.[1,3,7,8,9] Agenesis might be a result of environmental factors such as systemic disorders, an obstructed or altered dental lamina, dental arch size discrepancies (especially third molars), infections (e.g rubella), certain medications (e.g thalidomide), and neonatal trauma.[3,7,8,10,11]

Hypodontia affects permanent dentition more often than primary dentition.[1,2] Agenesis might present unilaterally and/ or bilaterally. In most of the population, the prevalence is 3,5 – 6,5%, with 0,3-0,4% for a severe hypodontia (an absence of 6 teeth or more clinically). The incidence of agenesis is greater in female than male patients with the ratio of 3:2.[1,7,12] A formation failure of one or more third molars is happened to 20% of the population. The incidence of agenesis in other teeth (aside from third molars) is ranging from 1,6 to 9,6%.[2] Mandibular second premolars, maxillary lateral incisors, maxillary second premolars, and mandibular central incisors are most affected respectively.[13,14]

Hypodontia may result in teeth malposition, periodontal destruction, altered vertical growth of maxillary and mandibular bones, and may also have some significant psychological, esthetic and functional consequences. Primary dentition with no permanent successor will tend to be ankylosed (or having an infraclussion), and having a delayed root resorptions compared to the normal ones.[5,13,15,16]

It is necessary to have a comprehensive treatment for a case of hypodontia, which involves restorative, orthodontic, a prosthetic treatment based on the children's growth and development. If the disorder is found earlier, it tends to give a better result in function, esthetic, and stability.[5] Orthodontic treatment is performed preceding the incoming prosthetic treatment in a multiple agenesis cases.[10,15,17,18]

This paper is describing a case of hypodontia in a 6 years and 5 months old girl and the treatments performed.

Case

A 6 years and 5 months old girl came to the dental clinic of Pediatric Dentistry Department University of Indonesia, with painful lower left teeth as the chief complaints. The pain was first occurred around a week ago, and the region was swollen three months previously. The patient and her parent had no visit to dental clinic for any medication. She was only rinsing her mouth with salt water to relieve the pain. At the initial visit, the pain had resolved.

The patient was health with the height 105 cm and weght 16 kg, normal, and being able to show a fully cooperative behavior. Her medical history contained no serious illness prior to the visit. She had an experience with a dentist for a teeth extraction (upper anterior and lower posterior) about six previous months.

An extra oral examination , revealed no disorder. Intra oral examination revealed fistula at the region 75 and gingival recession at the regions 74 and 84. There were some edentulous at regions 85 and 61. A status of occlusion had not determined, since there was a missing 85, and 16 had not erupted yet. There were anterior crossbites of 51 toward 81, 52 toward 82 and 83, 62 toward 72 and 73; and there was also a posterior crossbite of 55 toward 46. Patient's plaque score was 14 and her plaque index was 2,4.

There were dentinal caries at the teeth 55, 54, 53, 52, 51, 62, 63, 64, 65, 73, 72, 71, 81, 82, 83. The tooth 75 had pulpal caries, non vital, negative percussion and palpation, second degree mobility. The tooth 74 had pulpal caries, non vital, negative percussion and palpation, third degree mobility. The tooth 84 had pulpal caries, non vital, positive percussion and palpation, and third degree mobility (Fig 1).

Figure 1. Intraoral condition before treatment

The panoramic radiographic imaging revealed pulpal caries at 75, with a radiolucency at the furcation, the mesial root was resorbed to the cervical third area, and the distal root was resorbed to the apical third area; pulpal caries at 74, with a radiolucency at the furcation, the mesial root was resorbed to the middle third area, and the distal root was resorbed to the middle third area; pulpal caries at 84, with a radiolucency at the furcation, the mesial root was resorbed to the middle third area, and the distal root was resorbed to the cervical third area. There were no follicles of 15, 14, 12, 22, 24, 25, 35, 34, 42, 44 dan 45 (Fig 2).

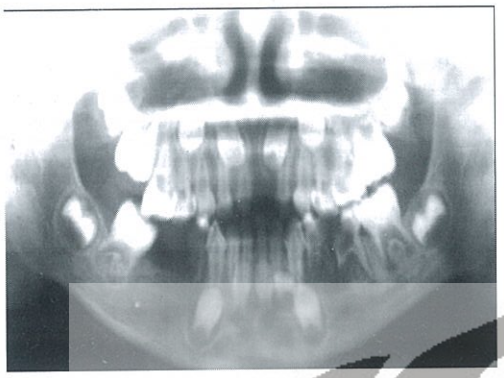

Figure 2. Panoramic radiographic imaging

Case Management

In order to reveal a history of hereditary agenesis, anamnesis and clinical examination were performed toward both parents and her siblings. There were several agenesis of 15, 12, 22, 25, 35, and 45 of her mother. Her father and one of her sibling had no agenesis, but microdontia of 12 and 22 were found on her sister.

Based on cephalometry radiographic analysis (Fig 3 and Table 1), it was concluded that facial and skeletal growth was in a straight downward as a result of smaller NSAr, greater SArGo. Anteroposterior and vertical growth was within normal limit. She had class III mandibular-maxillary relationship, concave facial profile as a result of retruded maxilla toward cranial base, normal vertical growth, retrusive upper and lower incisors (bimaxillary retrusion), and normal positions of upper and lower lips.

Based on clinical and radiographic examination, the patient was diagnosed as having a hypodontia due to the agenesis of 15, 14, 12, 22, 24, 25, 35, 34, 42, 44 and 45. The patient was presented with poor oral hygiene. Chronic dento alveolar abscess at region 75 due to a non vital tooth, with second degree pathologic mobility. Chronic dento alveolar abscess at region 74 due to a non vital tooth, with third degree pathologic mobility. Chronic dento alveolar abscess at region 84 due to a non vital tooth, with third degree pathologic mobility. The teeth 55, 54, 53, 52, 51, 62, 63, 64, 65, 73, 72, 71, 81, 82, 83, 75 were having dentinal caries. The teeth 85 and 61 were prematurely lost. She had Class III skeletal malocclusion with mesial step relationship (primary upper and lower molar relationship) with anterior and posterior crossbites.

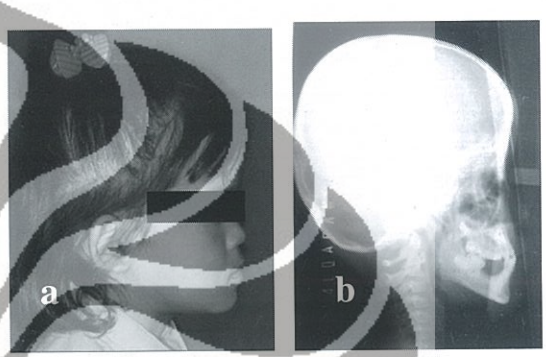

Figure 3. (a) Lateral photograph, (b) Cephalometry radiographic

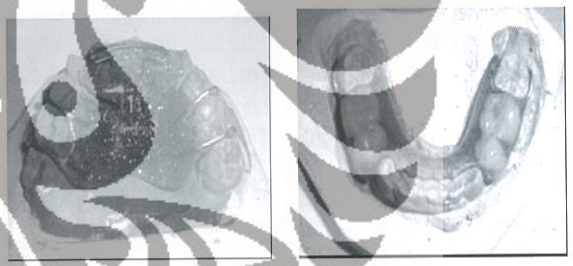

Figure 4. Removable orthodontic appliance (maxillary) and unctional removable space maintainer (mandibular)

Table 1. Cephalometry radiographic imaging's analysis (Bjork modification - Retno Hayati 2000)

SKELETAL	Bjork	Mean *9-11th (N=67)	Patient	Information
< NSAr	123 ± 5	123 ± 5	103	Saddle angle<
< SArGo	143 ± 6	143 ± 5	164	Articular angle >
< ArGoMe	130 ± 7	126 ± 5	130	Normal Gonial angle
Sum	396	395.5 ± 5	397	Clockwise facial growth direction
SN	71 ± 3	68 ± 3	60	Anterior cranial base length <
SAr	32 ± 3	34 ± 4	37	Normal posterior cranial base length
< ArGoN	52-55	52 ± 4	54	Normal anteroposterior growth
< NGoMe	70-75	76 ± 4	76	Normal vertical growth
ArGo	44 ± 5	42 ± 3	21,5	Ramus height <
GoMe	71 ± 5	68 ± 4	52	Body length <
GoMe/SN	1	1	0,867	<, inproportional growth
< SNA	80	82 ± 3	78	Maxillary relation to cranial base <
< SNB	78	79 ± 3	79	Normal mandibular relation to cranial base
< ANB	2	3.3 ± 1.2	-1	Maxilla and mandibular relation < (prognatism)
< GoGnSN		33 ± 5	33	Normal mandibular base inclined to cranial base
NGo		112 ± 5	89	Facial depth <
SGn		120 ± 5	98	Fasial length <
Y axis		60 ± 3	58	Normal mandibular vertical growth direction
SGo		73 ± 5	58	Posterior facial height <
NMe			92	Anterior facial height <
SGo/ NMe		63%	63,04 %	Normal
< SNPg		79 ± 3	79	Normal craniofacial angle
< NAPg		7 ± 3	0	angle of facial convexity < (convex)
DENTAL				
< OPMP		14 ± 3	8	Angular relation of occlusal base to mandibular plane <
< Interinsisal		120 ± 7		Angular relation of anteroposterior > (retrusive)
< UISN	102 ± 2	108 ± 5	96	Angular relation of maxillary incisor to cranial base < (retrusive)
< UINA		25 ± 4	17	Angular relation of maxillary incisor to maxillary denture base <
UI-NA		6 ± 1.6	3	Maxillary Incisor position to maxillary denture base <
< LINB		30 ± 4	24	Angular relation of mandibular incisor to mandibular base <
LI-NB		6 ± 2	4,5	Normal mandibular incisor position to mandibular base
IMPA (<LIGoMe)	90 ± 3	97 ± 6	90	Angular relation mandibular incisor to mandibular plane <
Soft Tissue				
LL-E line	-1 - -4	3 ± 3	1,5	Normal lower lip position to esthetic line
UL-E line	0 - +2	2 ± 2	2	Normal upper lip position to esthetic line

*: based on Retno Hayati studies

The treatment planning for 74, 75 and 84 was extraction, whilst other teeth were planned to receive functional removable space maintainer treatment (mandibular) and removable orthodontic appliance (maxillary) as a preceding treatment prior to performing fixed orthodontic treatment to correct skeletal malocclusion and permanent prosthodontic treatment. A restorative treatment with GIC was performed on 73, 72, 71, 81, 82 and 83 on the first visit following thorough oral examination, dental health education, and oral prophylaxis. On the second visit, a restorative treatment with GIC was performed on 55, 54, 53, 63, 64, and 65. On the third visit, 74 and 75 were extracted. On the fourth visit, 84 was extracted. On the fifth visit, an impression was made toward both jaws and topical fluoride application. On the sixth visit, a removable orthodontic appliance and functional removable space maintainer were inserted in upper and lower jaws respectively (Fig 4). A week after inserting theappliance, the patient was subjected to have a regular evaluation visits.

Discussion

The abnormalities in number, size, or morphology of the teeth need some special considerations in pediatric dentistry.[4] Thorough odontogenesis knowledge is required to comprehend the growth and developmental disorder of the tooth.[5] Agenesis can affect any dentition in oral cavity.[10] In

present case, agenesis was accidentally found when the dentist was trying to afford radiographic imaging for a caries evaluation.[5,19] This patient had agenesis which affected 11 teeth, those were 15, 14, 12, 22, 24, 25, 35, 34, 42, 44 and 45. This condition was classified as a severe hypodontia based on a classification of hypodontia by Dhanrajani (cit. Stephen, 2003).

Agenesis could be present as both symmetrical and asymmetrical cases.[1] In this case, the pedigree tracing revealed agenesis of 15, 12, 22, 25, 35, and 45 on the mother. The father and one of her sibling had no agenesis, but a microdontia of 12 and 22 were found on her sister (Fig 5). It was assumed that this case had a hereditary background, which an autosomal dominant inherited with partial penetration and various expressions as cited by Grahnen (cit. Vastradis, 2000). The various expressions were expressed as the difference in affected teeth of the patient and her mother.[1, 3, 7, 14]

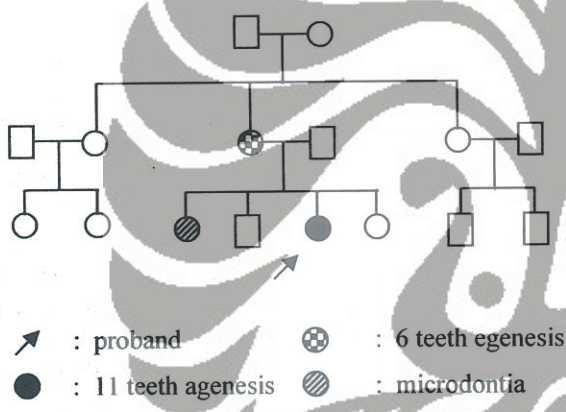

Figure 5. Proband pedigree

The other hypodontia related to the tooth abnormalities are microdontia, permanent canine impaction, first maxillary premolars or canines transpositions, and taurodontia.[7,8,11,14,17] There is a relationship between hypodontia and microdontia. Hypodontia and macrodontia occur more often in female patients, whilst supranumerary teeth and megadontia are more affecting male patients. This showed that there is a genetic relationship of the tooth anomaly. Microdontia is inherited as an autosomal dominant with partial penetration and various expression.[7,11,17]

Hypodontia could be related to some certain systemic disorders such as Down syndrome, incontinentia pigmenti, recessive X-linked syndrome, ectodermal dysplasia, Monilethrix syndrome, lip-pit syndrome, lacrimo-auriculo-dento-digital syndrome, Marshall syndrome, Reiger syndrome, cleft lips and cleft palates.[7,8,11,13,14,17] In present case we found none of those disorders.

Patient with hypodontia generally has a smaller maxilla in a more retrognathic position, and tend to have Class III skeletal pattern. This tendency is significant with the severity of hypodontia, particularly when multiple teeth are involved.[7] The patient with hypodontia has a smaller mandibular plane angle (GoGnSN angle), smaller gonion angle (ArGoMe angle) and more prognathic mandible (SNPg angle).[20] Based on cephalomtric analysis, the patient has a within normal limit mandibular plane angle (GoGnSN angle), a within normal limit gonion angle (ArGoMe angle), a within normal limit gonion angle (SNPg angle), and a retruded maxilla which led to Class III skeletal pattern (ANB angle).

In this case, there was an anterior crossbite of 51 toward 81, 52 toward 82 and 83, and 62 toward 72 and 73; and there was also a posterior crossbite of 55 toward 46 which required a maxillary removable orthodontic appliance with an extension at region 61 to maintain a space with an expansion screw and double mershon spring at the regions of 52, 52, and 62 to push those teeth. A mesial and distal ball clasps were used as retention clasps. The treatment also involved a posterior bite raiser attached on the mandibular functional removable space maintainer. A removable orthodontic appliance was an interceptive orthodontic treatment to correct anterior crossbite and to prevent any further malocclusion. The patient would be referred to an orthodontist to correct her Class III skeletal malocclusion.

In a certain condition where first and second primary molars can not be restored and have to be extracted despite of a very young age, the remaining space should be maintained with a space maintainer.[21] In this case, the teeth 75, 74 and 84 could not be restored so it required a functional removable space maintainer. The space maintainer was placed to prevent a mesial drifting of permanent first molar and to prevent canine's migration due to the loss of 75, 74, 84, and 85.

In this case, a functional removable space maintainer was chosen as a treatment due to the loss of two teeth on each quadrant.[21,22] The basic principles of placing a space maintainer is similar to a removable partial denture. A removable partial denture comes to a favor as a definitive approach in multiple teeth loss. This appliance has proven to be useful in developing children since it has a reversible property, and in the cases where the adjacent teeth do not met the fixed appliance requirements, or there are only a few alveolar bones present for implant therapy.[23,24]

The space maintainer consisted of a base, clasps, and tooth elements. Circumferential clasps served as the retentive clasps on 36 and 46. The tooth elements were 74, 75, 84, and 85. Those additional tooth elements served as teeth replacement, to rehabilitate the function of mastication, and to prevent the antagonistic teeth extrusion.[23,25] The ideal requirements for this appliance were its ability to rehabilitate the function of mastication, esthetic and supportive toward facial appearance, should not interfere to the normal growth of jaws and speech activity, easily applied and cleaned by the patient, repairable, adjustable, and no need abutment teeth preparations.[23]

Beside of the removable partial denture, other prosthetic treatment for a severe hypodontia cases are placed such as an overdenture, implant, or an autotransplantation.[5, 6, 12, 24] The treatment of choice depends on several factors, such as the number of teeth to be replaced, the condition, position and periodontal health of the adjacent teeth, patient's motivation, and medical factors.[24]

Evaluation should be performed 24 hours after initial insertion. The items to be evaluated included occlusal adjustment, oral and dental examination to reveal any signs of inflammation, and the cleanliness of the appliance. The next visit should be held 1 month later with the same procedures. If no complaints exist, the periodic evaluation can be held every 6 month (at this point, a radiographic evaluation should be carried along with topical fluoride application and the same procedures as above).[26] In this case, the evaluation was held a week after an initial insertion of the appliances and every six months.

In this case, the functional removable space maintainer served as a temporary treatment due to the patient's age, where the clinical lengths and pulpal widths of the teeth could not meet the requirements of a definitive prosthesis. The space maintainer was to be used until the patient's condition become favorable for a permanent fixed bridge or steel removable partial denture.[24,26]

It could be concluded that in most cases, agenesis of the teeth was accidentally revealed by radiographic evaluation. It is necessary to have a comprehensive treatment for a case of hypodontia, which involves restorative, orthodontic and a prosthetic treatment based on the children's growth and development. In this case, a 6 years and 5 months old patient was diagnosed as severe hypodontia. The treatment of choice included a removable orthodontic appliance and removable space maintainer on upper and lower jaws respectively. The removable orthodontic appliance served as an interceptive orthodontic treatment to correct anterior and posterior crossbites and to treat a Class III skeletal malocclusion. The space maintainer was to be used until the patient's condition become favorable for a permanent fixed bridge or steel removable partial denture. The treatment of space maintainer in this case had proven to be satisfying.

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