Journal of the
Bahrain Medical Society

Faraj and Vijayalakshmi, J Bahrain Med Soc. 2020;32(1):41-46

CASE REPORT

Case Reports Illustrating Different Orthodontic Treatment Modalities in Hypodontia

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Received date: July 1, 2019; **Accepted date:** December 12, 2019; **Published date:** March 31, 2020

Abstract

Hypodontia or tooth agenesis is a developmental anomaly characterized by missing teeth (excluding all third molars), which can range from single tooth to anodontia (complete absence of teeth). Hypodontia is the most common developmental anomaly in humans, affecting primary teeth (rarely) or permanent teeth, and may occur as part of a genetic syndrome or can be non-syndromic.

This report is aimed to demonstrate alternative treatment modalities for hypodontia considering various factors. We present two clinical cases of congenital missing upper permanent lateral incisor that created an aesthetic problem in conjunction with impacted canine and microdont lateral incisor.

Case One involves a 19-year-old female who complained of spaces in her upper front teeth. The space of congenital missing maxillary permanent lateral incisor was closed by mesialisation of the canine and posterior teeth, followed by canine transformation with lateral incisor.

Case Two is about 18 years old boy who disliked his smile. The treatment was carried out by a multidisciplinary approach with orthodontics and restorative dentistry for improvement of aesthetics.

Keywords: Hypodontia; Dental anomalies; Impacted canine; Missing teeth; Multidisciplinary.

Introduction

Tooth agenesis is defined as the developmental absence of one or more primary or permanent teeth[1] and is the most common developmental anomaly identified in human.[2,3] Tooth agenesis can be classified as hypodontia, oligodontia or anodontia. The word hypodontia is used to define agenesis of one to six teeth excluding the third molars, and is subdivided into mild (1-2 teeth absent) and moderate (3-5 teeth absent). Oligodontia is the absence of more than six teeth (excluding the third molars), also known as severe hypodontia, while anodontia is the complete absence of teeth.[4,5] Hypodontia in the primary dentition is rare, ranging from 0.08% to 1.55%,[6] generally appearing in the incisor region and often associated with missing succedaneous teeth.[7] Hypodontia is more common in the permanent dentition and has a prevalence of

6.4% in the population (excluding third molars)[8] and 4% in Saudi Arabia.[9] The most affected tooth (excluding third molars) is the mandibular second premolar followed by maxillary lateral incisor. The tooth agenesis is usually bilateral and of symmetrical occurrence. There is an exception in relation to the upper lateral incisor, which is often absent unilaterally. Hypodontia is more common in females than males by a ratio of 3:2.

Most cases of hypodontia have a polygenetic inheritance pattern. The risk of blood relatives having hypodontia will depend on a combination of numerous genetic and environmental factors, each with a small effect.[10] Hypodontia can occur as an isolated dental anomaly or as part of a syndrome. It has been reported that non syndromic hypodontia occurs in association with other dental anomalies such as disturbance in exfoliation and eruption, microdontia, ectopic maxillary canines, transposition, spacing, rotation of teeth and taurodontism.[11] The absence of teeth may present several signs and symptoms such as reduction of the chewing ability, malocclusion, problems in pronouncing words, compromised aesthetics, periodontal damage and alveolar bone deficiency. These complications may extremely affect the self-esteem, behavioral pattern and social life of these patients.[6]

Management of hypodontia can be challenging and needs interdisciplinary specialist approach.[10,12,13] Different treatment options include closing the space orthodontically, redistributing or re-opening of space for restoration involving adhesive bridge work, conventional bridge work, removable prosthesis or implant. Otherwise, the space could be accepted or infrequently, auto transplantation from an area of arch length deficiency may be considered.[14] Several factors must be considered during treatment planning. In general, treatment options depend on the age of the patient, severity of hypodontia, the amount of space available, the degree of crowding, oral health, patient motivation, patient opinion, skeletal pattern, soft tissue profile, bone anatomy and position of vital structures.[6]

The aim of this report is to present two clinical cases of unilateral maxillary lateral incisor agenesis, treated satisfactorily with orthodontic and restorative dental procedures, one with space closure and the other with reopening of space and replacement with adhesive bridge.

Case One

A 19-year-old female was referred to our orthodontic clinic by a general dental practitioner from a government clinic, with the chief complaint of "spacing between the upper front teeth and lower teeth not straight."

A thorough medical and dental history was taken at first visit, and showed no classical syndromic features. Family history revealed that her mother also has developmentally missing unilateral upper incisor, a finding that highlighted the hereditary conditions that may predispose to hypodontia[15] as it is known that hypodontia has a genetic basis and other family members are often affected.[6]

Clinical Findings

Patient presented with class II division 1 incisor relationship on mild class II skeletal base and normal vertical proportions. This malocclusion was complicated by long term poor prognosis of 36, developmentally missing 12, bilaterally impacted upper canines, retained 53 along with moderate upper and lower arches crowding (6 mm). Upper and lower centerlines were shifted to the right by 3 mm (Figure 1).

Treatment Objectives

The aims of treatment of this clinical case included relieving the crowding in upper and lower arches; leveling, aligning and coordinating the dental arches, assessing eruption and exposure of maxillary canines, reducing the overjet, correcting the centerline discrepancy, closing the spaces, correcting arch relationship, achieving class I incisor relationship and retaining the corrected result.

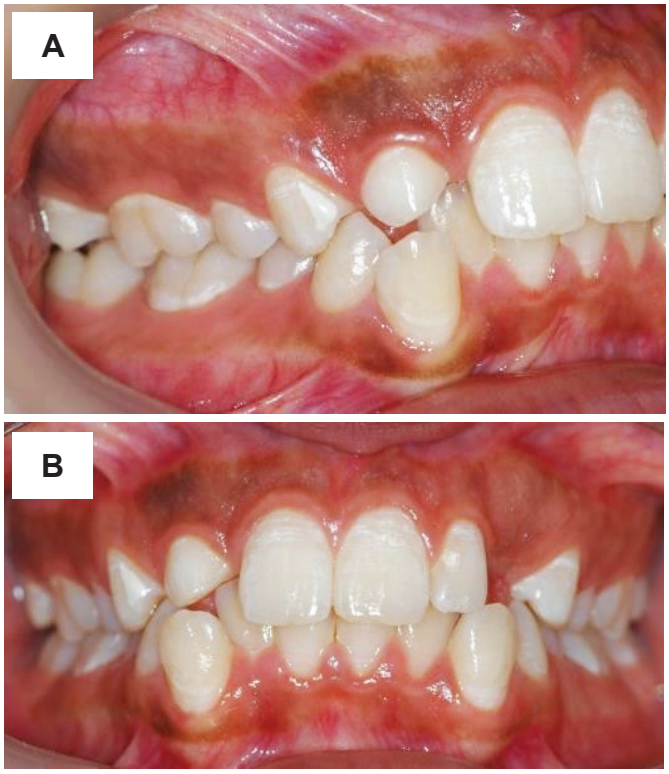

Figure 1: A: Pretreatment intraoral frontal photograph. **B:** Initial panoramic radiograph.

Treatment Plan

Based on clinical and radiographical examination, space closure of the area corresponding to the developmentally missing maxillary right lateral incisor was decided upon, through mesialisation of canine and posterior teeth with canine substitution. Treatment involved orthodontic camouflage, with extraction of retained 53, 22, 36 and 44 to relieve the upper and lower arch crowding, correct centerline discrepancies and retroclined upper and lower incisors followed by upper and lower pre-adjusted edgewise appliances (0.022" x 0.028" slot) with MBT prescription (Figure 2). The palatally impacted canine was surgically exposed and later aligned.

Orthodontic Treatment Progress

An upper and lower pre-adjusted Edgewise appliance (0.022" x 0.028" slot) with MBT prescription was used to treat the patient to minimize lower incisors proclination during lower arch alignment and to reduce the risk of gingival recession. The 13 and 23 brackets were inverted to increase the palatal root torque and were placed more gingivally. 'Piggy- back ' mechanics was used to align the palatally impacted 13. Class II elastics were used to minimize upper incisors proclination and assist lower arch space closure. The 14 and 24 brackets were placed more distally and more occlusally. The retention phase involved bonded retainer in the lower arch along with removable Hawley's retainer in the upper and lower arches.

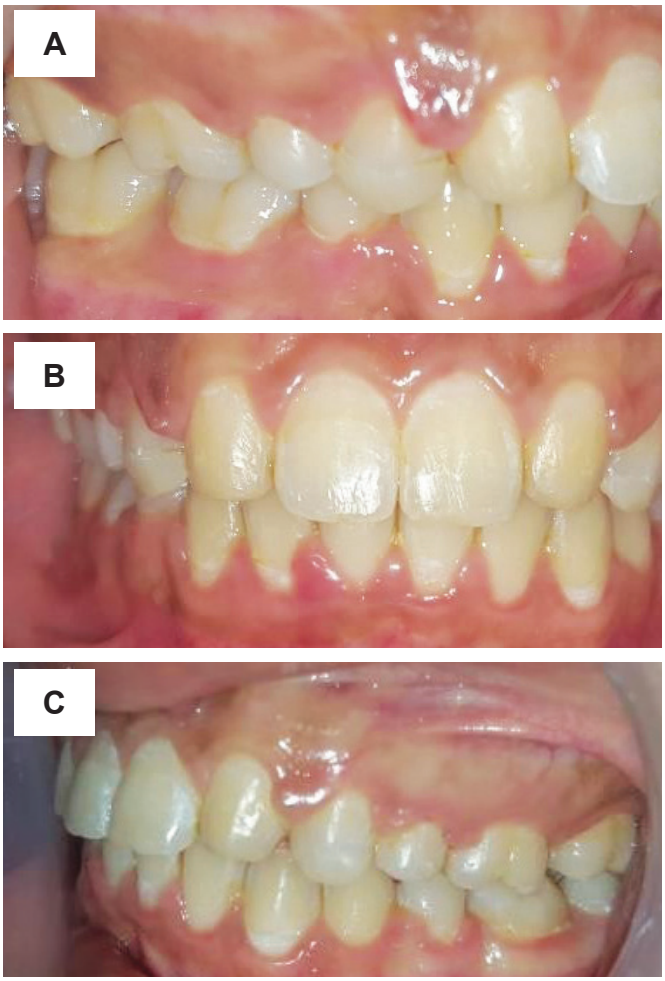

Figure 2: Post treatment intraoral (A-C) photographs showing proper crown torque of mesially located canines, re-anatomization to mimic missing lateral incisors and premolars re-anatomization to mimic canines and an optimum level of marginal gingival contour of the anterior teeth.

Treatment result

Patient was successfully treated by orthodontic camouflage over 32 months. The original treatment aims were accomplished, and the patient's presenting complaint addressed. Patient was notably pleased with the treatment outcome. A good occlusal and aesthetic result was achieved, and this was reflected in the Peer Assessment Rating (PAR) and Index of Orthodontic Treatment Need (IOTN) scores.

Case Two

A male aged 18 years and 8 months was referred to our orthodontic clinic by a general dental practitioner in the government clinic, with a chief complaint of being "unhappy about smile and spacing between front teeth."

A thorough medical and dental history taken at first visit showed no classical syndromic features. Family history revealed that his aunt also has developmentally missing unilateral upper incisor and impacted canine. Similar to the previous case, these findings highlighted the hereditary conditions that may predispose to hypodontia[15] as it is known that hypodontia has a genetic basis and other family members are often affected.[6]

Clinical Findings

The patient presented with class II division 2 incisor relationship on mild class II skeletal base with slightly increased vertical proportions. This malocclusion was complicated by developmentally missing 12, palatally impacted 13, retained 53 and 52, increased overbite, mild lower arch crowding 1.5 mm, diastema between 11 and 21 (2.5 mm) with low frenal attachment and peg shaped 22 (Figure 3).

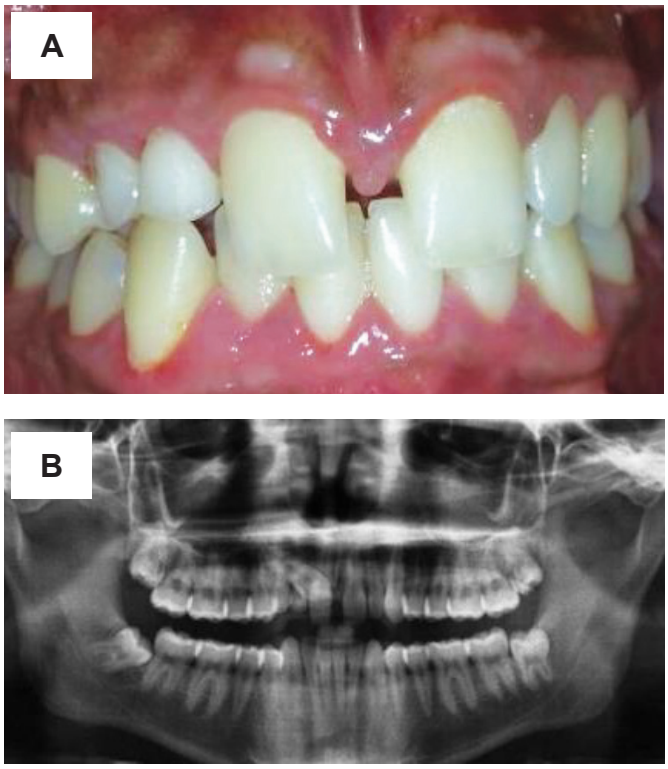

Figure 3: A: Pretreatment intraoral photograph: (frontal view) **B:** Initial panoramic radiograph.

Treatment Objectives

The objectives of orthodontic treatment of this clinical case were establishing ideal overjet and overbite, relieving the crowding in lower arch, leveling, aligning and coordinating the dental arches, exposing maxillary right canine, opening space for replacement of maxillary right lateral incisor, achieving class I incisor relationship and retaining corrected result.

Treatment Plan

A multidisciplinary team approach including orthodontics, oral surgery and advanced restorative dentistry was involved in the consultation process, treatment planning and later clinical management of this case. The treatment plan was based on clinical, radiographical examination, diagnostic setup (Figure 6) and was formulated as follows: space opening for restorative replacement of the area corresponding to the developmentally missing maxillary right lateral incisor. Options of restorative replacement of the missing maxillary right lateral incisor was discussed with the patient. Advantages and disadvantages of each option was explained to the patient and adhesive bridge was chosen as per patient preference.

Treatment involved orthodontic camouflage, with extraction of retained 53 and 52 followed by upper and lower pre-adjusted Edgewise appliances (0.022" x 0.028" slot) with MBT prescription (Figure 7). Open exposure and alignment of palatally impacted maxillary right canine was required

Orthodontic Treatment Progress

Upper and lower pre-adjusted Edgewise appliance (0.022" x 0.028" slot) with MBT prescription was used to treat the patient to minimize lower incisors proclination during lower arch alignment and to reduce the risk of gingival recession. The use of MBT prescription aided the treatment by having +17° labial crown torque in the upper incisors, which helped in maintaining the torque of these teeth.

Upper and lower arches were aligned and leveled with continuous arches using Nitinol and stainless-steel arches to perform bending and torque. Space was created for palatally impacted right canine.

Referred to the oral surgeon for open exposure of palatally impacted right canine. 'Piggy-back' mechanics was used to align the palatally placed upper right canine . Retention phase involved lower and upper fixed bonded retainer supported by upper Begg's retainer and lower Hawley's retainer with pontic acrylic tooth to replace maxillary right lateral incisor.

Figure 4: Two years follow up post orthodontic treatment followed by replacement of the missing lateral incisor.

Treatment Result

Patient was successfully treated by orthodontic camouflage. The original treatment aims were accomplished and the patient's presenting complaint was addressed.

Patient was notably pleased with the treatment outcome.

Discussion

Hypodontia can be treated with different orthodontic modalities. The decision whether to open or close space will depend upon various factors such as the age of the patient, facial profile, the severity of hypodontia, intra-arch (crowding or spacing) and inter-arch relationship. Other factors like shape, size and color of the adjacent teeth, smile, gingival line, clinical situation of the primary and permanent teeth, patient's opinion and cooperation also play an important role.

In the present report, both cases were treated successfully. The first case was treated with space closure and transformation of canine into lateral incisor, taking into consideration the crowding in upper and lower arches, proclination of upper and lower incisors, increased overjet and centerline shift. Based on these factors space closure was considered a good option to treat this case.

In cases of space closure, torque and extrusion of the mesially moved canines to mimic the lateral incisor should be considered. Similarly, the premolar characteristics should be transformed into canine, increasing the intrusion to raise the gingiva. During re-anatomization of the canines, attention must be paid to the shape and colour of the teeth. Canine bleaching may be needed as well.

We treated Case Two with space opening which is usually the best option when there is spacing, as in the case. This case illustrates the need for a multidisciplinary team approach, not just at the treatment planning stage but also later, during the clinical management of this case, as different options of restorative replacement were discussed with the patient and adhesive bridge was used as per patient preference, due to its reasonable cost.

All orthodontic treatment goals were achieved without any undue complications.

Conclusion

Treatment plans to close or open spaces orthodontically should be based on good diagnostic criteria and a sound treatment plan in order to achieve a good clinical outcome.

For the effective management of hypodontia, a multidisciplinary approach with input from different specialties is essential.

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