



## INTER DISCIPLINARY MANAGEMENT OF MAXILLARY LATERAL INCISORS AGENESIS WITH IMPLANT PROSTHESES: A CASE REPORT.

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### ABSTRACT

Agenesis also called hypodontia is the most prevalent developmental dental anomaly in human. In order to treat a patient we need to identify the etiology of malocclusion and its accompanying factors. Three long-term management options exist: Lateralization of canine, Tooth borne restoration and Implant prostheses. This case report presents a 17-year-old Malaysian girl, congenitally missing upper lateral incisors having skeletal class III malocclusion complicated by mesially drifted canines and anterior crossbite. Fixed orthodontic alignment after space regaining followed by surgical placement of two single tooth implant for missing lateral incisors and provision of crown prostheses later on. Missing teeth were replaced by two single tooth implants, crossbite was resolved and normal overjet and overbite were established with coinciding midlines. Emphasis on early diagnosis with a team consultation followed by a timely planned and well executed inter-disciplinary treatment plan is the ultimate solution for such diverse cases.

**Keywords:** Hypodontia, Single tooth implant, Anterior crossbite, Mesially drifted canines.



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## INTRODUCTION

Agenesis also called hypodontia, the congenital absence of one or more teeth, is the most prevalent developmental dental anomaly in human <sup>1</sup>. It occurs either from developmental disturbances or teeth can be congenitally absent. Maxillary laterals are amongst the most common congenitally absent dentition <sup>2</sup>. De Marchi, L.M., et al. concluded an incidence of 0.5-2% of missing maxillary laterals <sup>3</sup>. Absence of both maxillary laterals is more common instead of just one side <sup>2</sup>. Three long-term management options exist: Lateralization of canine <sup>4</sup>, Tooth borne restoration <sup>5</sup> and Implant prostheses <sup>6</sup>. Canines during eruption drift mesially in the absence of maxillary lateral incisors which results in spaces posterior to canines and difficult for dentist to restore lateral incisor simply by provision of prostheses straight away <sup>7</sup>. To create space for lateral incisors orthodontically involves drifting canines distally but careful considerations should be then given to root position if implant prosthesis is planned for substitution of the missing laterals. Anterior crossbite frequently co-exists with a skeletal Class III <sup>8&9</sup>. Management of crossbite is based upon diagnosis and etiology. In order to treat a patient we need to identify the etiology of malocclusion and its accompanying factors. It can be of skeletal or dental origin. It can be single or involving multiple teeth. Fixed or removable appliances are used for its correction. Fixed inclined bite planes, tongue blades and reversed stainless steel crowns etc. are used for heavy and

intermittent force delivery. Hawley retainers and fixed braces etc. can be used for light and continuous force delivery. This case report presents a skeletal class III malocclusion due to missing both upper lateral incisors leading to mesially drifted canines and an anterior crossbite.

### **DIAGNOSIS AND ETIOLOGY**

The patient is a 17-year-old Malaysian girl. Presenting complaints are localized spacing and tilting of upper canines. She has no previous orthodontic treatment history. The pretreatment extra oral photographs show a concave facial profile (Fig. 1). The intraoral examination showed a Class I molar relationship of 46 and Class II molar relationship of 36. All permanent teeth were erupted except maxillary lateral incisors (12 and 22). Both maxillary canines (13 and 23) had tilted mesially creating spaces distally (Fig 1). 11 was in single tooth crossbite and a reduced overbite of the 21 was identified. On radiographic examination, 12 and 22 were absent and the roots of maxillary canines were present distally whereas only crowns were tipped mesially towards 11 and 21 respectively (Fig.2). Cephalometric analysis revealed a skeletal class III relationship. The inclination of the maxillary incisors was normal, but the mandibular incisors showed a lingual inclination (Fig. 2). Soft tissue analysis showed protrusive lower lip.

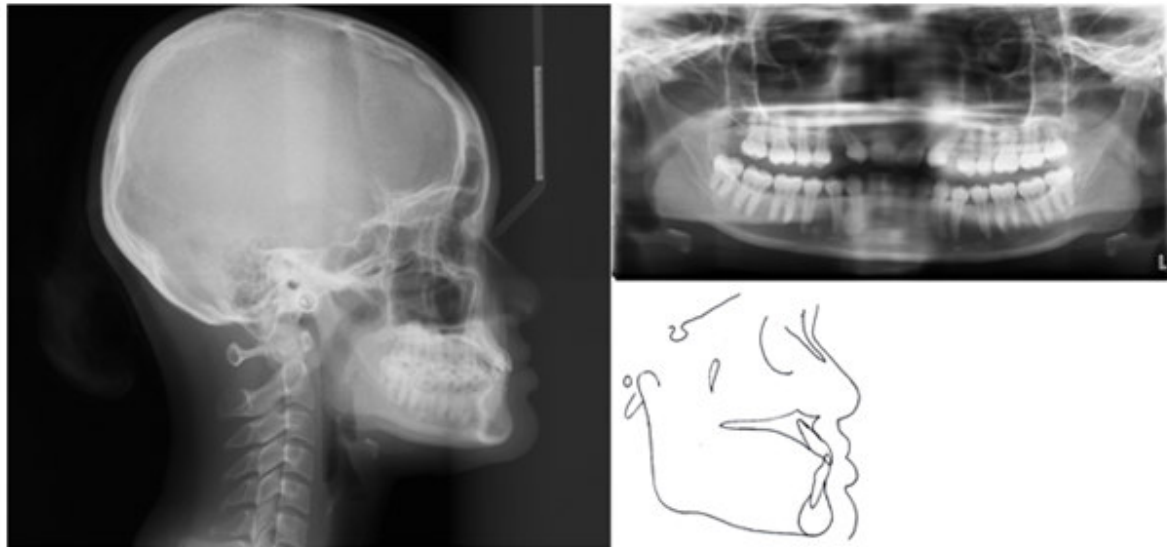
**Figure 1**  
*Pre Treatment Extra Oral Photographs*



**Figure 2**  
*Pre Treatment Intra Oral Photographs*



**Figure 3**  
**Pre Treatment Lateral Cephalogram and Orthopantomogram**



### **TREATMENT OBJECTIVES**

#### **Treatment objectives were**

- (1) Correction of anterior crossbite.
- (2) Distalization maxillary canines.
- (3) Regaining space for maxillary lateral consequentially closing spaces posterior to canines.
- (4) Surgical implant placement.
- (5) Prostheses provision.
- (6) Correction of overjet and overbite.

### **TREATMENT ALTERNATIVES**<sup>4; 5; 6</sup>

Following alternatives for replacing the congenitally missing maxillary lateral incisors: (1) closing the spaces with canine lateralization, (2) a restoration, such as an acid-etched retained bridge or (3) opening up the spaces for an implant.

### **TREATMENT PLAN**

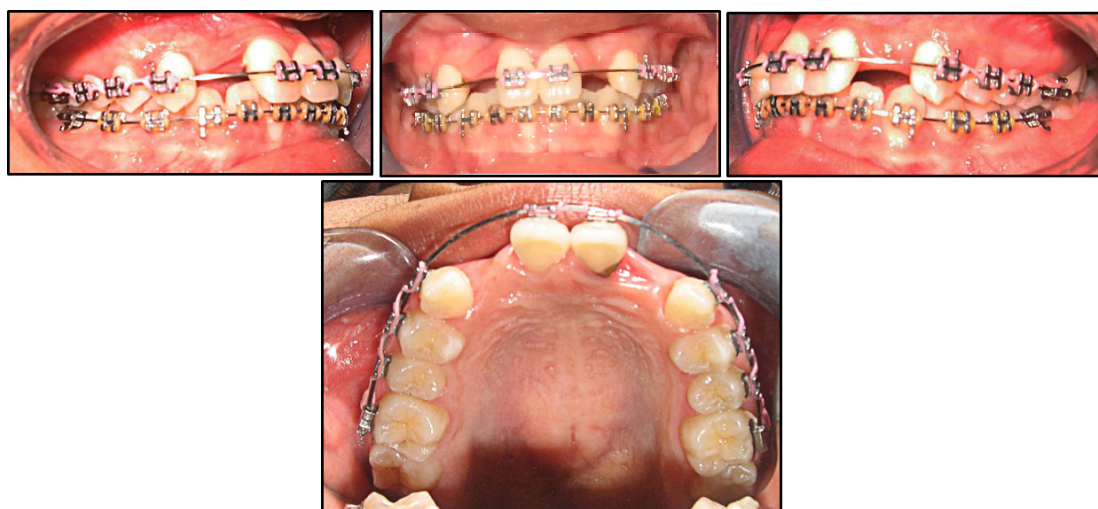
1. Fixed orthodontic re-alignment of teeth was planned.
2. Space regaining by distalization both maxillary canines.
3. Single-tooth Implant placement for each missing lateral incisor.
4. Design and insertion of fixed prostheses for both lateral incisors.
5. To give passive Hawley's retainer with two Adam's clasps for retention.

### **TREATMENT PROGRESS**

#### **Orthodontic Part**

Conventional fixed appliance (0.022 X 0.028 in) slot were first placed in upper arch and leveling alignment was started by 0.012 NiTi. Then 0.016 NiTi, 0.017 X 0.024 NiTi and 0.018 SS were installed sequentially. 0.016 NiTi, 0.018 NiTi, 0.017 X 0.025 NiTi, and 0.018 SS were installed in lower arch chronologically. Crossbite was corrected using fixed orthodontic treatment. The mesially tilted maxillary canines were aligned distally to create spaces for maxillary lateral incisors. The canines and central incisors were aligned in the dental arch.

**Figure 4**  
**Treatment Progress (Regained Lateral Spaces)**



**Surgical Part**

After 15 months of orthodontic treatment, exact locations for surgical implant placement were determined by CBCT 3-D positioning system. (Strauman Standard Plus Implant Ø 3.3mm RN SLA) 10mm implant for 11 and (Strauman Standard Plus Implant Ø 3.3mm RN SLA) 12mm implant for 21, were placed. The temporary crowns were inserted while waiting for the healing process.

**Prosthodontic Part**

Temporary prostheses were inserted to maintain and prevent vertical space loss of final crown. Final prostheses were inserted after six months of surgery for the optimal osseointegration and Vacuum form clear retainer were initially fabricated. Then passive Hawley's retainers were given for maintenance of final finishing.

**Figure 5**  
**Treatment Progress (Surgical Implant Placement)**



## TREATMENT RESULTS

Post-treatment visit confirmed that patient's complaints had been addressed. Teeth were esthetically pleasing. Upper and lower arches were well aligned (Fig.3). Appropriate distalization of canines created spaces required for implantation of missing maxillary lateral incisors. Posterior occlusion had good overall intercuspation and was well settled in a Class I molar relationship. Crossbite of mandibular central incisor had been corrected after which normal overjet and overbite were achieved. Upper and lower dental midlines were coincident with facial midline.

Superimpositions of cephalometric tracings (Fig.6) show significant changes in midfacial region. 3D CBCT positioning was used to guide implant surgery. Post-surgical Orthopantomogram revealed ideal placement of implants (Fig.4). After 6 months of surgical placement of implants, crown prostheses were placed. On 6 month follow up patient had nicely aligned teeth with ideal occlusion and stability. Patient was completely satisfied with the treatment results and had no complaints with the use of implants. After provision of clear retainers, passive Hawley's retainers were given for the maintenance of occlusion.

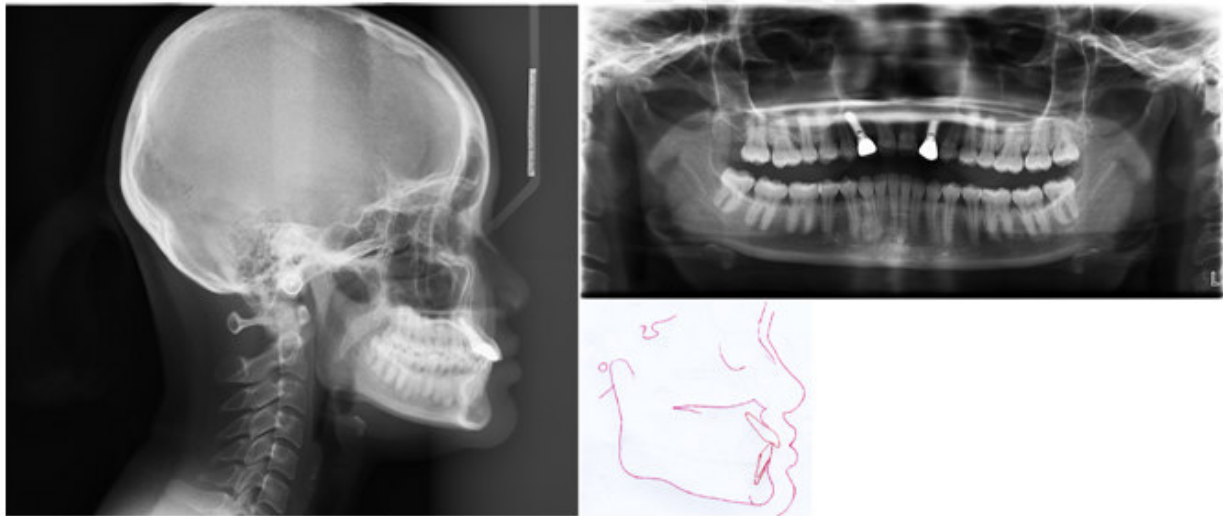
**Figure 6**  
*Post Treatment Extraoral Photographs*



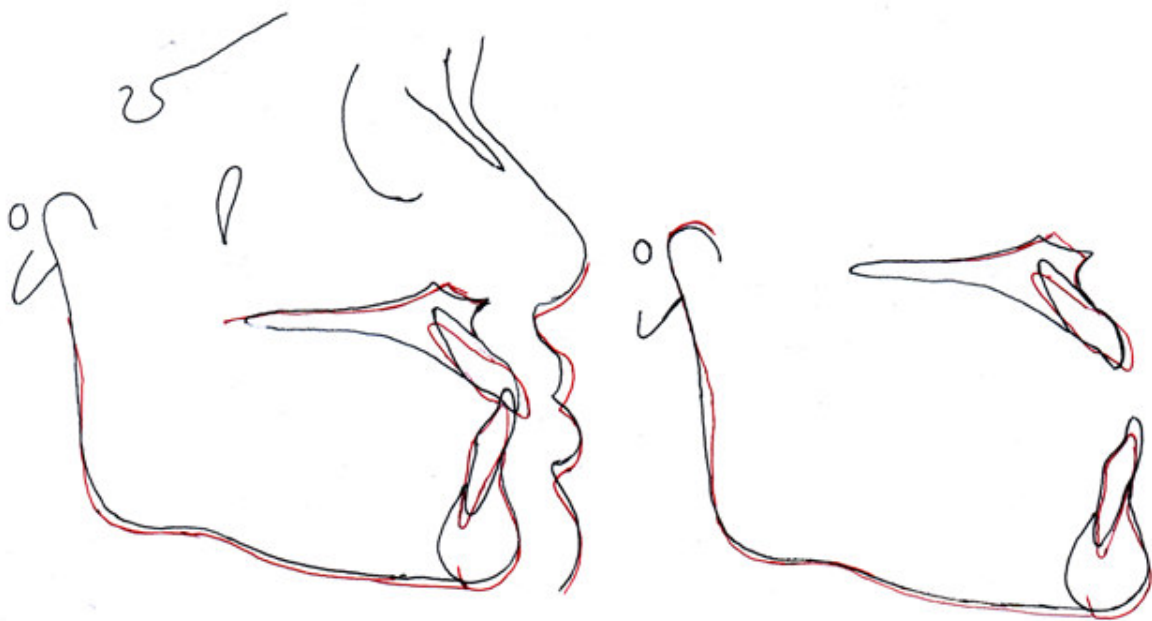
**Figure 7**  
*Post Treatment intraoral Photographs*



**Figure 8**  
**Post Treatment Lateral Cephalogram and Orthopantomogram**



**Figure 9**  
**Lateral Cephalometric Tracing Superimposition**



## DISCUSSION

We selected single tooth implant as the most suitable approach in replacement of congenitally missing lateral incisors considering minimal intervention as a prime objective<sup>10</sup>. It is also the most commonly used option<sup>6</sup>. Regarding osseointegration and occlusal function single tooth implants posed excellent long-term results<sup>11</sup>. Excellent inter-disciplinary

effort is required for the provision of an optimal implant after a thorough examination which involves 3-D assessment of implant placement, bone height, bone density, coronal space, root space etc.<sup>11</sup>. Considering cost of implant, maintenance of space post-placement until permanent prostheses insertion and apical migration of marginal gingiva were among the few disadvantages<sup>11</sup>. There is a wide array of conditions that indicate, canine lateralization,

the right choice as, Angle class II malocclusion with no crowding in the mandibular arch or an Angle class I malocclusion with a severely crowded lower arch in which extractions are indicated. For substitution, the canine must have comparable linear proportions as of the estimated lateral it replaces. In addition its color, torque, crown height, gingival contour, convexity etc. are to be considered. Alterations to premolars to replace canines are also to be considered. Provision of excessive restorative treatment would be required to fulfil the esthetic requirements. Functional occlusion is also compromised and long-term retention of space closure following lateralization is a challenging situation. Life-long outcome of restorations provided are also a limitation<sup>4; 12</sup>. In comparison to canine, implant placement provides better long-term stability (as space closure always has a relapse tendency<sup>12</sup>) and immensely restores occlusal function and guidance<sup>3</sup>. It also does not have any identifiable harmful effect on temporomandibular joint which is a neglected aspect of space closure option<sup>3</sup>. For minimal invasive dentistry, acid etched bridges gained some attention as an alternative treatment option until the arrival of implant prostheses. Cases that have a minimal overbite, that only

provide incisal guidance, are considered ideal for such type of treatment option. Apart from this, angulation, crown angulation, crown thickness and periodontal status of abutment teeth and long term bond strength of prostheses etc. are also to be considered. In deep bite situations, the amount of occlusal force is increased, leading to a greater bond stress and eventually a higher bond failure<sup>5</sup>. A long-term follow up for statistical data of the implant category patient is required to establish norms and formulate guidelines for treatment of hypodontia patients. There is a current need, and it is requested, to review similar cases in retrospect that would contribute in data collection and analysis.

## CONCLUSION

Emphasis on early diagnosis with a team consultation followed by a timely planned and well executed inter-disciplinary treatment plan is the ultimate solution for such complex cases.

## ACKNOWLEDGMENT

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