Combined aplasia of maxillary first molars and lateral incisors: a case report and management

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Congenital absence of teeth, as the most commonly known developmental dental anomaly in man, has a multitude of adverse affects that could be detrimental to normal function and esthetics. This report presents a rare case of combined agenecies of maxillary permanent first molars and lateral incisors. The management plans are highlighted, and phase I orthodontic–restorative treatment mechanics and its result are described. The benefits for early orthodontic treatment intervention for this case presented here are discussed.

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INTRODUCTION

Congenital absence of teeth is the most commonly known developmental dental anomaly in man.[1] The frequency and rank order of congenitally missing permanent teeth are cited in the literature.[2,3] In a survey conducted by Muller *et al.*, the authors found that girls had a higher incidence of congenitally missing permanent teeth than boys.[3] The most frequently missing teeth are the maxillary permanent lateral incisors, followed by the mandibular second premolars, maxillary second premolars, and the lower central incisors.[3,4] The maxillary and mandibular permanent first molars have the least frequency.[2] Furthermore, a unilateral absence of the maxillary first molar is an infrequent occurrence, while a bilateral incidence is a rare finding.[5]

Predisposing factors that may contribute to congenital absence of teeth are several. The foremost of these is the developmental disturbances during tooth-bud initiation and proliferation.[4] Lesions of the jaws occurring during infancy are also considered to be culprits for missing teeth. Moreover, at the early stage of tooth germ formation, exposure to irradiation therapy may lead to the absence of one or more dental units.[6] It was reported that in patients with partial anodontia, the hereditary factor was associated with one or several missing teeth.[7] Dahlberg has reported the absence of anterior teeth in the same family over a period of four generations while Gardener reported missing teeth in six generations.[8,9]

This report presents a rare case of an infrequent occurrence of bilateral aplasia of the maxillary first permanent molars combined with bilateral absence of the maxillary lateral incisors. The multi-disciplinary approach for this case management will be discussed.

CASE REPORT

An eight year-two months old female presented with her parents. The chief complaint was "baby front teeth were lost and adult teeth haven't come in yet". The patient's dental history disclosed nocturnal bruxing and thumb sucking habits. The medical history was non-contributory. The patient's first cousin, an eight-year old boy, was reported to have agenesis of the maxillary permanent lateral incisors.

CLINICAL AND RADIOGRAPHIC FINDINGS

Extra oral clinical examination of the patient revealed facial symmetry. The patient profile suggested mid-facial deficiency, and a retrusive upper lip was displayed. The patient lips closed without mentalis strain, and upon smiling, maxillary constriction was evident. Intra-oral view disclosed a six-millimeter central diastema, while no gingival display was present. An anterior open bite of one and half millimeters was combined with the maxillary central incisors in a cross bite (Figure 1A). Posteriorly, the maxillary constriction was manifested by the lack of buccal overjet. The patient occluded in a class II primary molar relationship, with an anterior open bite and bilateral posterior cross bite in a mixed dentition stage. These features were confirmed by the findings of dental cast examination.

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Figure 1A. Intra oral view of the pretreatment condition.

Figure 1B. Panoramic radiograph illustrates the pre-treatment condition of the dentition.

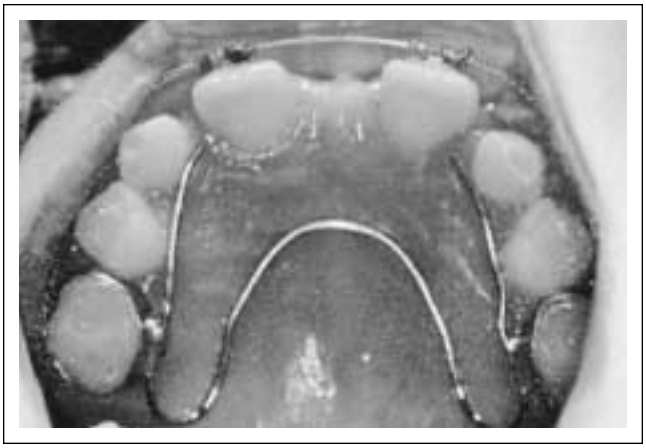

Figure 2. Intra oral view of the treatment progress.

The permanent mandibular incisors and first molars, and permanent maxillary central incisors were present. Noticeable however was the absence of the maxillary permanent first molars and the lateral incisors. Among the primary teeth that were still in function are the maxillary and mandibular cupids and the first and second molars. There was no clinical evidence of any detectable caries lesions in the entire mixed dentition, nor were there any signs of adverse gingival condition.

The panoramic radiograph (Figure 1B) confirmed the presence of the dentition that was revealed from clinical examination. Moreover, bilateral permanent maxillary lateral incisors and first molars were congenitally missing. The permanent maxillary and mandibular cuspids, first and second premolars, and permanent second molars were at various stages of development.

DIAGNOSIS AND MANAGEMENT PLAN

In light of the aforementioned clinical and radiographic findings, a bilateral congenital aplasia involving the maxillary permanent first molars and lateral incisors was concluded. This was combined with a large central diastema, anterior open bite, and a posterior cross bite. Thus, in order to manage this case and circumvent the potentially adverse effects, a multidisciplinary approach was considered.

Two orthodontic-restorative phases were planned. The primary phase had to be implemented immediately, while the secondary phase is to be executed at a later age when the patient reaches adulthood. The objectives of the primary orthodontic-restorative phase were to: 1) Correct the posterior cross bite, by expanding the maxillary arch width; 2) Correct the diastema between the maxillary central incisors and close the anterior open bite; 3) Deliver a retainer with denture teeth to replace the congenitally missing lateral incisors; 4) Monitor the migration of the maxillary second permanent molars mesially to occupy the space of the congenitally missing permanent first molars; 5) Follow-up the case to implement the second phase of orthodontic-restorative treatment in due time.

TREATMENT METHODOLOGY

A maxillary W expansion arch was used to widen the maxillary arch (Figure 2). The bands for the W arch were fitted on the primary maxillary second molars. An alginate impression was made with the bands in place, and a W expansion arch was fabricated. The W arch was also utilized as an anchor to control the movement of the maxillary incisors, close the diastema, while preventing distal movement of the primary maxillary second molars. Once the maxillary arch was sufficiently widened, the brackets were then placed on the maxillary central incisors. An Australian round arch wire (018 mil) was fabricated and open coil springs were inserted between the maxillary primary second molars and the permanent maxillary central incisors, to affect the mesial movement of the incisors. Home care instructions were given. Follow-up visits were scheduled at six-week intervals to activate the coil springs as needed. Upon completion of phase one orthodontic treatment, the appliances were removed and an acrylic maxillary

Figure 3A. Post treatment intra-oral view.

Figure 3B. Post treatment intra-oral view shows the temporary acrylic teeth replacing the lateral incisors, mounted on the maxillary retainer.

Figure 4A. Post-treatment panoramic radiograph.

Figure 4B. Post-treatment periapical radiograph of the maxillary central incisors, following orthodontic treatment of phase one.

retainer with two denture teeth to restore the missing maxillary lateral incisors was used (Figures 3A and 3B).

RESULTS

The orthodontic appliance used has deterred the patient from continuing the thumb sucking habit. Furthermore, initiation of the treatment in the mixed dentition expanded the maxillary arch, corrected the posterior cross bite and closed the anterior open bite. The maxillary permanent central incisors were approximated in a symmetrical fashion relative to midline, thus the large central diastema was corrected (Figures 4 A and B). The congenitally missing maxillary lateral incisors were temporarily restored with a removable partial prostheses, hence the improvement of the appearance of the child. The post-treatment panoramic radiograph (Figure 5) confirmed the mesial migration of the permanent maxillary second molars.

Figure 5. A follow up panoramic radiograph shows the maxillary permanent second molar in place of the congenitally missing maxillary permanent first molar.

DISCUSSION

In view of this family history that reflects the occurrence of congenitally missing lateral incisors of a family member of her generation, hereditary factor may be cautiously considered among etiologic factors for this dental anomaly. Congenital absence of teeth could adversely

affect normal growth and development, disrupt function and phonetics, alter occlusion and could prove detrimental to esthetics. The following examples are a few illustrations of these shortcomings that are relevant to the reported case. Congenitally missing maxillary lateral incisors provide the space, and thus allow for distal and palatal migration of the maxillary central incisors. Consequently a large central diastema may be created which could be combined with anterior cross bite as occurred in this case. The spaces created by the missing lateral incisors allow the erupting canines to migrate mesially, leading to esthetic and occlusion complications.

Agenesis of the second premolar often lead to delay in the exfoliation of the primary second molar. In these cases, if the decision is made to keep the primary second molars, the mesio-distal dimension differential with the second premolar could cause a class II molar relationship to develop. Absence of the mandibular first permanent molars could lead to tipping of mandibular permanent second molars. As these teeth drift mesially, the adjoining gingival tissue becomes folded and distorted. Thus, a plaque-harboring pseudopocket could be formed which would be virtually impossible to clean by routine oral home care.[10] In severe cases of mesial drifting of the second mandibular molar a posterior bite collapse may be experienced.

Agenesis of the maxillary first permanent molars, though a rare occurrence, could cause mesial migration of the permanent second molars. It is less likely, however, that the second molars tip mesially as they migrate. This is due to the reduced resistance of the maxillary trabecular alveolar bone compared with that of the mandible. Nonetheless, because of the conical shaped roots, maxillary permanent second molars tend to rotate mesiolingually as they move in an anterior direction, hence the wisdom in monitoring their migration during the active eruption stage.[5]

The importance of early diagnosis and long term planning, and implementation of orthodontic treatment for patients with multiple agencies of permanent dentition has long been underscored.[11-14] Given ample time, possible alternative treatment options could be selected by the practitioner and presented to the patient. Early intervention could allow for proper remedial measures, and minimizes the complexity of orthodontic therapy at a late stage. The case described in this report accurately reflects these benefits. The esthetic deficiency that had resulted from the agencies of the maxillary permanent lateral incisors and the development of large central diastema was corrected.

The thumb-sucking habit that had contributed to the creation of an anterior open bite, which, in turn, left the patient without anterior incisal guidance, was discontinued. The posterior cross bite, which if left untreated, could lead to functional deficit, was corrected. The absence of the maxillary permanent first molars allowed for the second molars to migrate mesially into a proper occlusion, thus occupying the space which, otherwise, would have been kept patent by a space maintenance appliance for future prosthetic replacement.

The orthodontic bio-mechanic technique used in this case was unique. In the presence of the permanent first molars, the clinician could use the primary second molars as anchors to move the permanent central incisors together. As in this case, in the absence of the maxillary first molars, using the primary molars as anchors without any other preventive measures could cause the primary molars to move distally. To prevent this movement, the W expansion appliance was used and a light force was employed to move the maxillary central incisor mesialy.[15] The W expansion appliance was kept in place until the completion of phase one orthodontic treatment. The combined absence of the maxillary lateral incisors and first molars created an ample maxillary arch space. That was a clear indication for an orthodontic space-opening approach and prosthetic replacement of the missing lateral incisors. This treatment option was augmented by the presence of the large central diastema, and the anterior cross bite that required correction for esthetic and functional purposes.

It was noted that this treatment approach, although committing the patient permanently to prosthetic restoration in a region where esthetics is highly desirable, offered a multitude of advantages.[12] Among these were 1) Redistribution of the anterior maxillary space; 2) Closure of the median diastema and coinciding the median line; 3) Corrections of the anterior open bite and cross bite; 4) Establishment of normal buccal occlusion in a class I relationship of the canines upon their eruption to allow sufficient space to restore the laterals; 5) Reduction of need to occlusal equilibration and reshaping of sound tooth structures at a later stage.[13,16]

During the second phase, the orthodontic management of will be focused on four points. 1). Maintaining the achieved space for the lateral incisor that is equal to two-thirds of that of the patient's central incisor.[17] This is accomplished by timely removal of the primary canines to allow for adequate spaces for the permanent canines to erupt in proper alignment. 2). Monitor the eruption of the remaining permanent dentition into functional occlusion. 3) Adjust any possible occlusal discrepancy of the second molars. 4). Fine tuning and adjusting of the occlusion in a class I relationship.

For the required esthetically pleasing result, osseointegrated implants will be the primary choice for prosthetic replacement of the missing lateral incisors. To that end, the mesio-distal width of the maxillary lateral incisor space and the labio-lingual bone thickness would be evaluated to assess suitability of this line of treatment. If necessary, an onlay bone graft to augment the alveolar bony crest might

be considered.[18] However, if any contraindication would be encountered, other conventional prosthetic options may be considered.

These are traditional fixed partial prostheses, resin bonded appliance, or removable metal frame partial denture. Each has advantages and drawbacks. Thus selection of the treatment plan would be dependent on abutment teeth, the edentulous ridge, esthetic parameter, functional and biologic considerations of the selected prostheses, economic consideration, and patient's choice.

The esthetic result achieved through implementing the first phase of treatment had a recognizable dramatic effect on the patient and her parents. Given the time for normal growth and development, and the direct supervision and efforts of the orthodontic-restorative team, the results already achieved would certainly be enhanced.

CONCLUSION

The reported case described the clinical and radiographic findings of a rare combination of congenitally missing maxillary first molars and lateral incisors. The management protocol for proper immediate and long-term treatment approach is discussed. The benefits of early intervention in cases of compound agenesis are illustrated.

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