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Case Report

A Case in which 8 Congenital Permanent Tooth Defects were Treated from a Comprehensive Perspective Centered on Orthodontic Treatment

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Abstract

We report a case of comprehensive treatment centered on orthodontic therapy in a patient with eight congenitally missing permanent teeth and no systemic symptoms, which resulted in favorable outcomes. In cases of multiple tooth agenesis involving five or more teeth, the first phase of treatment focuses on utilizing the patient's growth and development to approximate normal growth and establish proper jaw and oral functions by the appropriate developmental stage. The second phase of treatment is guided by a treatment plan based on VTO and Arch VTO, with the aim of anticipating future prosthetic rehabilitation for the missing areas and achieving optimal long-term outcomes.

Keywords: *Congenital Permanent Tooth Defects; Comprehensive Orthodontic Treatment; Arch VTO*

Introduction

Congenital tooth agenesis can involve a few teeth or many, but when multiple teeth are affected, treatment planning must consider not only orthodontic therapy but also prosthetic rehabilitation. The final positioning of the remaining teeth and the prediction of future growth in cases of agenesis vary widely, and no standardized criteria currently exist for managing such cases. In the present report, we describe comprehensive orthodontic treatment in a patient with eight congenitally missing permanent teeth and no systemic symptoms, planned and executed using VTO and Arch VTO.

Initial Observation (T-1)

1. A brief document of the patient:

- Age and Sex; 9Y6M, M.
- Chief Compliment; Defects of permanent teeth.

2. Facial and intra oral observation

- Facial; Mandibular midline was slightly displaced to the left. Grinding.
- IOP; Deep bite. Upper and lower median mismatch. Unerupted molar #16 (Figure 1).

3. Panoramic X-P; Missing permanent teeth, 17, 12, 22, 32, 35,41,42,45 (Figure 1).

4. Lateral Cephalometric X-ray trace and VTO (Figure 2).

- Angle CL II (skeletal CL I, Mesio facial type FA 83.3°/85.9°, FD 81.5°/87.0, MP 29.1°/26.4°, LFH 47.9°/48.6° Conv. 4.2 mm /5.6 mm, U6 to PTV 9.2 mm/13.0 mm, L1 to Apo 5.6 mm, 24.0°
- VTO; FA 83.7°/85.9, Conv. 3.2 mm/5.6 mm, U 6 to PTV 10.0 mm/13.0 mm, OJ/OB 3.0 mm/2.1m (Figure 2).

Figure 1: *A: Eppendorf tube with inserted tooth; B: Eppendorf tube placed in glass vial; C: Glass vial wrapped in aluminium foil.*

Diagnosis

- Mesio Facial Type
- Angle Class II
- 8 congenital permanent tooth defects
- Unerupted molar #16.

1st phase treatment planning

1. Promote the eruption of the maxillary right first molar.
2. Promote normal growth as much as possible with Bionator (BN).
3. Functional problems such as one-sided mastication should be corrected.
4. Observation.

1st phase mechanics step (Figure 2)

1. The maxillary right first molar was opened.
2. The biotemplate was placed on the mandible and enlarged, the occlusion was adjusted, and the lingual button was adhered for traction (7.5M).
3. BN was worn for 1 year and molar submission was also performed by adjusting the molar region of the BN.
4. As a result, the labial inclination of the maxillary central incisor was improved and the upper and lower medians were nearly aligned.

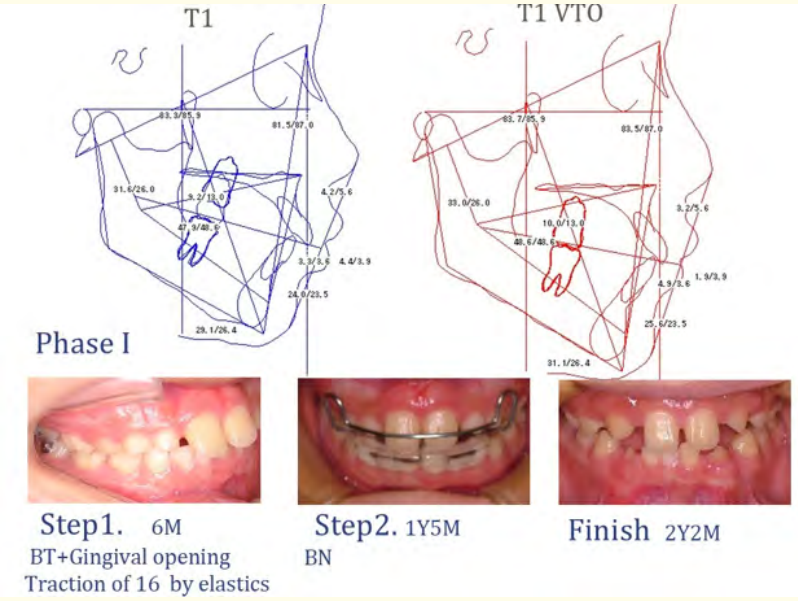

Figure 2

Before 2nd phase observation (T-m)

1. Age; 14Y7M
2. Lateral Cephalometric X-ray trace and VTO (Figure 3)

- Angle CL I (skeletal CL I, Mesio facial type FA 83.4°/85.9°, FD 85.4°/88.1°, MP 28.8°/25.1°, LFH 48.1°/48.6° Conv. 3.0 mm/4.8 mm, U6 to PTV 12.9 mm/17.2 mm, L1 to Apo 0.9 mm/17.2°.
- VTO; FA 83.7°/85.9, U 6 to PTV; 15.3 mm/17.2 mm (Figure 3).

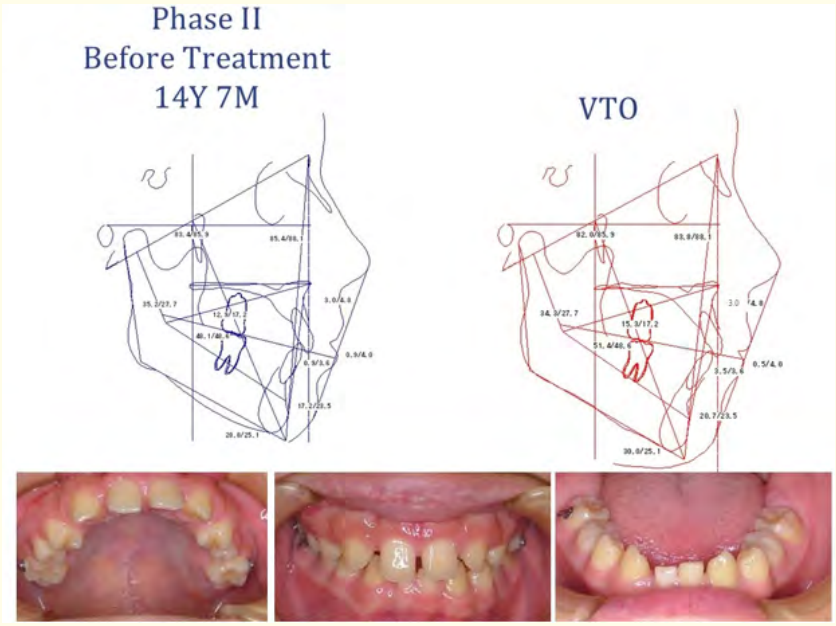

Figure 3

2nd phase treatment planning

1. Arch VTO [1] (Figure 4)

- The position of the maxillary first molar was not changed and the torsion was corrected.
- The mandibular bilateral second molars were preserved since no root resorption was observed.

2. The deletion amount of proximal and distal teeth. Portion; 85:1.4 mm, 75:2.6 mm

- Widen the left and right lateral incisors by 2.8 mm.
- 81and 82 were extracted due to the poor root condition.
- 31 did not move.

2nd phase mechanics step (Figure 4)

1) A bite block was placed on the mandibular anterior teeth and the molars were pulled with elastics to raise the occlusion as a pretreatment measure.
2) Multi bracket system; 1Y4M.
3) The maxillary bilateral lateral incisors were restored by direct bonding.
4) 42, 41 and 31 were reproduced with artificial teeth, and fixed retainers were bonded with the left and right canines, first premolars, and left central incisor.
5) 35, 45 were restored with HJC with the occlusal surfaces in the form of permanent teeth.

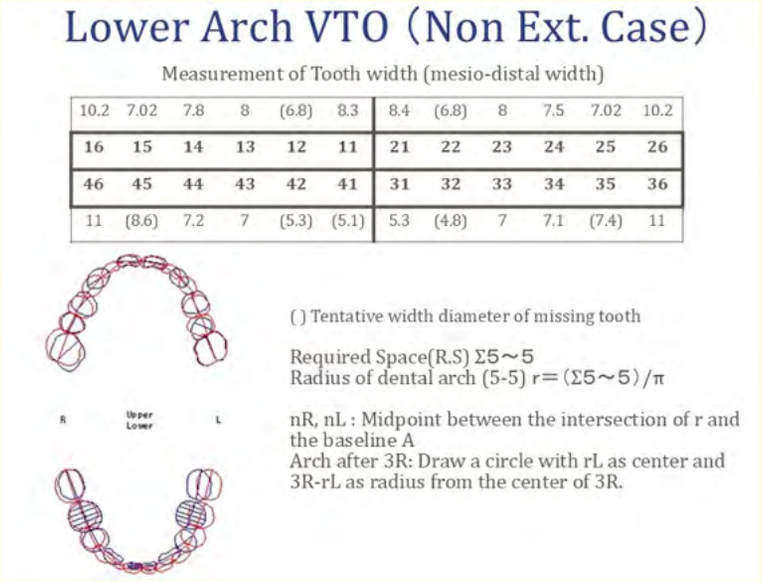

Figure 4

After treatment (Figure 5)

1. Facial findings: The frontal face was almost symmetrical, with adolescent anterior growth.
2. Intraoral findings: The occlusal height was raised and the cuspid relationship and the molar relationship was Angle Class I.
3. Panoramic radiographic findings: Slight root resorption was observed in 85 75, but no teeth mobility. 27 was still in an embryonic state.
4. TMJ: No significant changes were observed.
5. Lateral cephalometric X-ray trace: Facial Axis was open at 85.9° but within 1 SD. Interincisal Angle: 122°. The lower lip was 1.5 mm anterior to the E-line.
6. Five years after retention, the eruption of the upper left second molar was also observed, with good results (Figure 6).

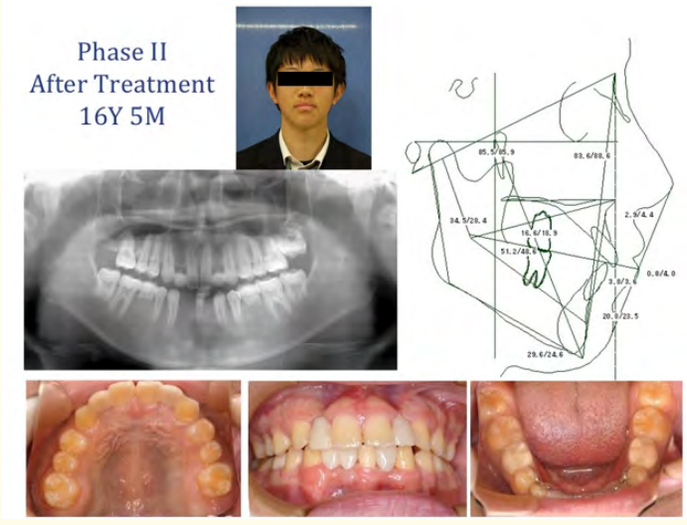

Figure 5

Figure 6

Discussion

The absence of five or more permanent teeth can significantly affect the dental arch and craniofacial morphology, commonly leading to malocclusion, deep overbite, diastema, and shortening of the dental arch. These changes are thought to arise from the lack of mechanical stress on the alveolar bone in edentulous regions, which may compromise normal bone development [2,3].

According to GeneReviews® Nonsyndromic Tooth Agenesis Overview [4], recommended management for asymptomatic tooth agenesis includes oral hygiene, orthodontic therapy, prosthetic rehabilitation, and implant therapy. Because treatment spans multiple disciplines, the optimal timing of intervention depends on the patient's stage of growth and development. For orthodontic therapy, intervention typically coincides with the period of permanent tooth eruption, extending from early childhood through adolescence.

During this phase, the treatment goal is to harness growth and development to approximate normal growth and to establish proper jaw and oral functions at the appropriate developmental stage. In cases with multiple missing teeth, the allocation of space in edentulous areas is especially critical for future prosthetic planning.

The positions of the first molars and central incisors, combined with the predicted mesiodistal tooth widths, can be used to calculate the Individual Arch Form. An Arch VTO can then be constructed for both the maxillary and mandibular arches. When combined with lateral cephalometric VTO, this approach is considered highly effective in predicting changes in arch symmetry, transverse width, and the anteroposterior movement of teeth during diagnosis.

Conclusion

Treatment of multiple tooth agenesis generally extends from childhood into adolescence. Lateral cephalometric analysis of VTO, together with Arch VTO for predicting individual arch form, proved highly effective in establishing an appropriate treatment plan.

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