A Case of Unilateral Agenesis of Premolars treated with Simple Mechanics

Umarevathi Gopalakrishnan, S Ramaswamy, Lodd Mahendra, AV Arun

ABSTRACT

This is a case report of a young male patient who had unilaterally missing second premolars with severe midline shift and an unesthetic smile. The case was treated with extraction of contralateral premolars by using a simple modification of regular sliding mechanics.

Keywords: Missing premolars, Midline shift, Molar stop, Auxiliary archwire.

INTRODUCTION

Agenesis of one or more teeth is the most common anomaly in dental development. The incidence for permanent tooth agenesis ranges from 1.6 to 9.6% in the general population excluding third molars. Third molars being the most commonly missing tooth, opinions vary on the second most commonly missing tooth. Some investigators believe that this is the maxillary lateral incisor whereas others believe that mandibular second premolar agenesis has a higher incidence. An interesting correlation on the number of missing teeth and the tooth class has been made by Muller et al. They have noted that maxillary lateral incisors are the most frequently missing teeth, when only 1 or 2 teeth are absent; whereas second premolars are the most frequently missing teeth when more than two teeth are absent. Defective MSX1 gene in chromosome 4p was found to be associated with agenesis of second premolar and third molar formation. The orthodontic and prosthetic treatment options for the agenesis of premolars depends on the associated malocclusion. This case report deals with unilaterally missing upper and lower second premolars with severe dental midline shifts to the affected side.

CASE REPORT

A 15-year-old patient presented to our clinic with a complaint of unesthetic smile. History revealed that he had undergone extraction of some carious deciduous teeth some years back, details of which could not be collected. Clinical examination revealed a dolichocephalic head and leptoprosopic face with convex profile and competent lips. Nasolabial angle was average. Clinical FMA was above average. The smile arc was flat (Fig. 1). Intraoral examination revealed a Class I molar and canine relation on both sides. There was moderate crowding in upper and lower anterior teeth with 22 in crossbite relation. Permanent second premolars were absent both clinically and radiographically (Fig. 2) on the 2nd and 3rd quadrant. The dental midlines of both the arches were shifted to left by about 5 to 6 mm. Overjet was 3 mm and overbite was 2 mm (Fig. 3). Cephalometric data revealed a mild Class II skeletal base with vertical growth pattern (Table 1 and Fig. 4).

TREATMENT PLAN

Goals of treatment were:

- Maintaining the Class I molar and canine relation on both sides
- Correction of crossbite related to 22
- Aligning the dental arches to relieve the crowding
- Correction of upper and lower dental midlines
- Achieving a consonant smile arc.

The treatment plan was to extract the first premolars on the 1st and 4th quadrant to correct the midlines and crowding.

Table 1: Cephalometric data

<table>
<thead>
<tr>
<th>Angles/variables</th>
<th>Pretreatment</th>
<th>Posttreatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNA</td>
<td>81°</td>
<td>80°</td>
</tr>
<tr>
<td>SNB</td>
<td>76°</td>
<td>75°</td>
</tr>
<tr>
<td>ANB</td>
<td>5°</td>
<td>5°</td>
</tr>
<tr>
<td>SN-GoGn</td>
<td>39°</td>
<td>40°</td>
</tr>
<tr>
<td>FMA</td>
<td>36°</td>
<td>37°</td>
</tr>
<tr>
<td>PP-SN</td>
<td>12°</td>
<td>10°</td>
</tr>
<tr>
<td>U1-SN</td>
<td>107°</td>
<td>105°</td>
</tr>
<tr>
<td>L1-GoGn</td>
<td>91°</td>
<td>90°</td>
</tr>
<tr>
<td>Nasolabial angle</td>
<td>118°</td>
<td>118°</td>
</tr>
<tr>
<td>Lower lip to E line</td>
<td>5 mm</td>
<td>5 mm</td>
</tr>
</tbody>
</table>
A Case of Unilateral Agenesis of Premolars treated with Simple Mechanics

Treatment Progress

A 0.022” MBT appliance was bonded with upper triple tubes and lower double tubes. Second molars were also banded. Initial wire used was 0.016 NiTi for aligning. Posterior glass ionomer build up was done on the lower arch to relieve the occlusion for correcting the crossbite related to 22. After alignment was complete, 17"×25” NiTi followed by 17” × 25” SS was placed for 2 months period. After the arches were aligned and
leveled, canine to canine ligation was given in both arches and custom-made 0.018” premium plus wilcock wires with a 2 mm internal diameter coil placed vertically just mesial to the first molars in the 1st and 4th quadrant were engaged as the main archwires (Fig. 5). The wires were cinched back distal to second molars. A ligature was tied connecting the coil with the second molars. Accessory archwires made of 0.016” premium wilcock wire with a gable bend of 30° (Fig. 6) were engaged in the auxiliary tube of the molars in both arches and the anterior part was tied to the main archwire in between the central and lateral incisors. Unilateral tie backs were given on right quadrants between molars and canine hooks to allow free tipping of the deflected anterior teeth toward the right side till the correction of their deflection which was verified with periodic radiograph. Passive lace backs between canines and molars were given on the left quadrants to prevent opening of space during unilateral retraction. The remaining extraction space was closed on the 0.018” base archwire with active tie backs after removal of vertical stops but maintaining the auxiliary archwire. Sufficient time was given between activations to allow root paralleling. After space closure,
A Case of Unilateral Agenesis of Premolars treated with Simple Mechanics

The Journal of Indian Orthodontic Society, October-December 2012;46(4):278-282

19” × 25” titanium molybdenum archwire was placed for root alignment. Following this 21 × 25 stainless steel archwire was used for a 2-month period for prescription expression. The case was debonded after 18 months of active treatment. Upper Hawley retainer and lower lingual bonded retainer from premolar to premolar were given.

**Treatment Result**

After 18 months of active treatment, the patient revealed a Class I occlusion with a consonant smile arc (Fig. 7) and ideal overjet and overbite. Crowding and crossbite were relieved. Dental midlines were made to coincide with facial midlines (Fig. 8). Superimposition showed mild tipping of incisors with some distal tipping in the molars (Figs 9A and B). Lip competence and nasolabial angle remained stable (Table 1 and Fig. 10). Patient’s smile perception was improved (Fig. 7). Root parallelism was achieved (Fig. 11).

**DISCUSSION**

Management of cases with missing teeth depends on the associated malocclusion. According to Proffit,16 in nearly every patient with malaligned teeth, the root apices are closer to the normal position than the crowns, because malalignment almost always develops as the eruption paths of teeth are deflected. In our case, this was clearly evident in the tipping of anterior teeth in pretreatment OPG. This case had severe dental midline shifts in both the arches leading to an unesthetic smile. The obvious decision was to extract the contralateral first premolars for midline correction, relieving the crowding and achieving good smile esthetics. A 0.018” round base archwire was chosen for sliding, based on frictional studies14,15 which claim that frictional forces were lesser in round wires. Round wires have the disadvantage of anchor loss in the posteriors and bite deepening in the anteriors, when used for retraction.16 The auxiliary intrusion wire was engaged with gable bends to counteract the bite deepening effect in the anteriors and the gable bend had a distal tipping effect on the molars. Since the patient was in growing stage extrusion on the molars did not have a major effect on the vertical dimension (see Table 1). The distal tip moment by the auxiliary intrusion wire17,18 and the 2 mm coil stop in the main archwire served

---

Fig. 10: Posttreatment cephalogram

Fig. 11: Posttreatment orthopantomogram
in preventing the mesial movement of molar. The first and the second molars were consolidated as a single unit with the coil medially and the cinch distally. No additional anchorage mechanisms were used in this case. The case was finished with simple tie backs and the modified archwires.

**CONCLUSION**

A simple modification in biomechanics helped in finishing the case without requiring additional anchorage mechanism. This can be of great use especially in noncompliance patients.

**REFERENCES**