SECOND MOLAR UPRIGHTING AFTER PREMATURE LOSS OF MANDIBULAR FIRST PERMANENT MOLAR - CASE REPORT

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SECOND MOLAR UPRIGHTING AFTER PREMATURE LOSS OF MANDIBULAR FIRST PERMANENT MOLAR - CASE REPORT (Abstract): Introduction: Uprighting a tipped molar by using an uprighting spring is a fundamental orthodontic treatment technique. Following a weak anchorage done only by the anterior teeth the permanent lower second molar will rotate around its center of resistance, and besides the distalizing movement will occur its extrusion. Following the reaction, the mandibular anterior teeth will have a movement of intrusion. All these elements will lead to anterior open bite. Correction of vertical problems has become easier with the advent of mini-implants. Case presentation: U.I patient aged 24 years presenting for aesthetic and functional disorders. Clinical examination reveals intraoral Class I molar malocclusion on the right side, upper narrowing arch with a slight overbite, and the both permanent first molars on the left side lost prematurely. The tooth 37 is inclined at 60° degrees to the plane of occlusion. To avoid front opening occlusion we used an orthodontic miniscrew inserted between the canine and the first premolar on the same side to achieve the second molar uprighting. Lower second molar uprighting was achieved without unwanted movements in anterior mandibular region and without molar extrusion. Conclusions: Using mini implants in uprighting a tipped molar will achieve the desired tooth movement and will reduce the number of unwanted side effects and eventually to improve patient’s esthetics. Keywords: SECOND MOLAR UPRIGHTING, PREMATURE LOSS, MANDIBULAR FIRST MOLAR, ORTHODONTIC MINISCREW

The first permanent molar has been reported to be the most caries prone tooth in the permanent dentition. More than 50% of children over the age of 11 years have some caries experience in this tooth (1, 2, 3). The early loss of permanent first molars is a routine problem in the orthodontic clinic and results in mesial inclination of the second molars. Especially the early loss of the lower first permanent molar should be immediately addressed by prosthetic replacement or orthodontic space closure as it may lead to functional and anatomical disturbances. The sequelae of events include distal migration of premolars, extrusion of the antagonist molar, premature contacts in centric relation, occlusal interferences during lateral and protrusive movements. In addition there is a difficulty in prosthetic adaptation when the inclina-
tion is excessive. Mesial inclination favors the appearance of vertical bone defects and infra-osseous pockets in the mesial region of molars (4, 5).

Molar uprighting into its correct position leads to the normalization of functional and periodontal occlusion situation, enabling the roots to be positioned perpendicular to the occlusal plane so that they are better able to resist to occlusal forces, in addition to facilitating the plane of insertion of the prosthesis parallel to the long axis of the tooth (6).

Various conventional orthodontic approaches were used to achieve such a movement, but all have been plagued to a greater or lesser extent by the following issues: extrusion of the molar to be uprighted, unwanted movement of the anchorage unit, the need for bulky appliances, the frequent need of accessories to strengthen anchorage, and long treatment time (7).

With the advent of the use of miniscrews as orthodontic anchorage, molar uprighting procedures have become simpler, with more predictable results, and since there is no need to use other teeth as anchorage, there is better control of undesirable effects (6).

The aim of this study is to describe a method for molar uprighting with the use of a titanol spring supported on a mesially placed miniscrew.

**CASE REPORT**

Therefore we want to present a case that presented in the clinic of Orthodontics and dento-facial orthopedics in the Ambulatory Pediatric Dentistry from Iasi, Romania. U. I. patient aged 24 years presenting for functional disorders. The extra-oral examination (fig. 1) revealed an oval shape of the face, a mesocephalic head shape, a mesoprosopic face, and a mild convex profile. Facial changes occur hyperdivergent profile and an acute naso-labial angle. The patient showed a good range of mandibular movements and no temporomandibular-joint symptoms.

![Fig. 1. Extraoral aspect—before treatment](image)

Clinical examination revealed intraoral Class I molar malocclusion on the right sight, upper narrowing arch with a slight overbite, and the both permanent first molars on the left side lost prematurely. The space for 26 and 36 decreased due to mesial inclination and migration of the second molars. Tooth 16 was covered by a metal-ceramic crown (fig. 2).

Orthopantomogram (OPG) examination revealed good root canal treatment on tooth 16. All wisdom teeth were present.

The OPG was processed by tracking the following structures (fig. 3):

- the occlusion plane – line tangent to the vestibular cusps tips of premolars and the canine tip on the same side;
- the axis of lower second permanent
molar – the line passing through the center of the crown and the center of radicular bifurcation.

The tooth 37 was tipped at approximate 60° degrees to the plane of occlusion (fig. 3). Second permanent molar from the four quadrants had an inclination of 78 ° to the plane of occlusion.

Cephalometric analysis using Onyx Ceph software revealed a Class I skeletal (∠ ANB=2.2°) with a hyperdivergent profile ∠GoGn/SN=35°.

![Fig. 2. Intraoral aspect-before treatment](image)

![Fig. 3. OPG and Cephalometry - before treatment](image)

The patient’s chief concern was the difficulty of achieving chewing on the left side. There were two treatment alternatives for this case:

(1) Opening the space, uprighting and distalization of upper and lower left molars and implant/prosthetic replacement of the left first permanent molars or (2) orthodontic space closure by uprighting the second and third molars and translating them into mesial space.

Because the patient did not want a prosthetic/implant replacement he accepted an orthodontic treatment. The treatment plan included a surgical palatal expansion (fig.4), extraction of 18 and 48, uprighting the second permanent molar and a full fixed appliance therapy with space closure.

We use a prefabricated superelastic Sand-er spring (Memory-Titanol-Fefer; Forestadent,
Bernard Förster GmBH, Pforzheim, Germany) to achieve the second molar uprighting. Because the patient had a slightly hyperdivergent profile ($\angle \text{GoGn/SN}=35^\circ$) and to avoid front opening occlusion we used a titan orthodontic miniscrew (8 mm, OrthoEasy® Pin Forestadent®) inserted between the canine and the first premolar on the lower left side as for anterior anchorage (fig. 5).

**Fig. 4.** After surgical palatal expansion

**Fig. 5.** Achieving uprighting of 37: superelastic Sander spring and mini implant insertion
DISCUSSION
Permanent first molars are the first permanent teeth to erupt into the oral cavity. They have been quoted as the most caries-prone tooth in the permanent dentition leading to their early loss, probably as a result of their early exposure to the oral environment (1, 2). Loss of a first permanent molar should be immediately addressed by prosthetic replacement or orthodontic space closure as it may lead to functional and anatomical disturbances (4). The second and third molars from that side will incline and rotate, canine and premolars will move distally into the molar space, and the opposing first molar will extrude. Correction of these problems is the biggest challenge to the orthodontist (5).

The ideal solution of six years molar syndrome is protraction of the second and the third molars and toothless gap closure without biological sacrifice. The procedure is not simple, as these strong roots and a significant path that follows the apex, if we take into account initial second molar inclination. In a second molar inclination of $30^\circ$-$40^\circ$ correspond to 11 mm travel only apical-uprighting recovery (8) (fig. 7).

The optimal molar uprighting technique for most situations in adults should thus apply an intrusive force to the molar crown, within an inflammatory-free environment. A safe and simple method to achieve such conditions is to use the prefabricated superelastic Sander spring (Memory-Titanol-Fefer; Forestadent, Ber-
Second molar uprighting after premature loss of mandibular first permanent molar - case report

Although the prefabricated Sander spring is a simple and effective method for mandibular molar up righting, the method can involve unwanted movements in anterior mandibular region (9) (fig. 8).

Lee et al. have promoted the use of miniscrew as direct anchorage changing the mini implant position in order to obtain two different types of force. The miniscrew can be positioned in the retromolar area, where it acts as a fulcrum for the traction by pulling distally to the second molar (10). This position of the miniimplant can be used in mild tipped molars cases with mesial inclination of the crown, because it generates a sufficient effective uprighting moment to allow the complete straightening of the molar. Instead in moderate to severe tipped cases, the generated moment is too small to produce a sufficient straightening of the tooth (11). For this reason it is essential to consider the possibility of placing the mini implant mesially to the tipped tooth so as a thrusting action force from mesial to distal in generated (12). To avoid front opening occlusion we used in this case an orthodontic miniscrew inserted between the canine and the first premolar on the same side to achieve the second molar uprighting. Achieving uprighting of 37 the slightly hiperdivergent profile remained constant (\( \angle \text{GoGn/SN}=35^\circ \)).

CONCLUSIONS

In this article we used a miniimplant in uprighting a tipped molar to achieve a desired tooth movement and to reduce the number of unwanted side effects and eventually to improve patient’s esthetics. It is necessary a proper clinical, radiological, and biomechanical evaluation and a thoughtful selection of the best orthodontic devices to grant successful treatment results.
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