



## REVIEW

# Research on the Related Factors of the Second Molar Dislocation and Orthodontic Erect Method

Jinhong Guo \*

Jinan Central Hospital Affiliate to Shandong First Medical University, Jinan, Shandong, 250013, China

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### ABSTRACT

The second molar dislocation is more common clinically. To investigate the related factors of the second permanent molar dislocation, and provide reference for the clinical diagnosis and treatment of orthodontics. From the current clinical research, the clinical methods of orthodontic erect secondary molars are also diverse and clinical.

The narrower first molar alveolar arch width, smaller ANB angle, and crowded maxillary posterior segment arch are the factors that cause the maxillary second permanent molar dislocation. The narrow alveolar arch width, the smaller SNB angle, the larger ANB angle, and the crowded lower mandibular arch are the factors leading to the dislocation of the mandibular second permanent molar. In addition, for the second mandibular molar malposition, it is particularly important to select the corrective treatment plan. It is especially important to improve the treatment.

## 1. Introduction

During human evolution, due to changes in food, it causes degradation of the chewing organs. The alveolar and jaw are degraded faster than the teeth, so the length of the entire jaw is relatively short, making it difficult to accommodate all the teeth, resulting in crowded teeth, malocclusion, and impact, and the second molar is no exception. In recent years, in the clinical work, the second permanent molar dislocation is more and more common<sup>[1]</sup>. It is widely believed that tilting molars can cause or at least aggravate the periodontal tissues damage<sup>[2]</sup>. There are two most common clinical ones: one is the dentition period the second molar is nearly tilted due to factors such as eruption. There are imaging studies

reporting that the former incidence rate is in all the impacted teeth. Occupy 0.3% to 0.6% ridicule<sup>[3]</sup>. This study aims to summarize the incidence of second permanent molar dislocation and its related factors, in order to provide reference for orthodontic clinical treatment.

## 2. Relevant Factors

With the evolution of human race, modern people's chewing organs have a deteriorating trend, and the imbalance of tooth volume and bone mass is one of the main causes of malocclusion<sup>[4]</sup>. The related research results show that the incidence of dislocation of the second permanent molar is 52%, which provides a certain data reference for orthodontic treatment. The result of the study is higher than

\*Corresponding Author:

Jinhong Guo,

Born in 1990, Jinan, Shandong province; postgraduate and senior economist; Research Direction: stomatology;

Corresponding Address: Jinan Central Hospital Affiliate to Shandong First Medical University, Jinan, Shandong, 250013, China;

Email: 804230204@qq.com

that of Han Chun<sup>[8]</sup> in 2006, which is slightly higher than 51.5% of the survey results of Cai Huibin<sup>[9]</sup> in 2015. The reason may be that the inclusion conditions of the samples are different.

Wang et al<sup>[10]</sup> measured the projection of the most prominent point of the maxillary first molar in the lateral plane of the skull and the projection of the maxillary fissure in the anterior skull base plane in 23 patients with second molar occlusion. The distance between the two molars was found to be significantly smaller than the normal occlusion of the maxillary first molar to the posterior wall of the maxilla. Therefore, it is considered that the second molar is closely related to the posterior gap of the dental arch. Soonshin et al<sup>[11]</sup> in the study of 40 patients with maxillary second permanent molar dislocation, that the dislocation of the maxillary second permanent molar is related to the length of the arch, the ANB angle and the distance from the distal to maxillary nodules of the maxillary first molar.

The cephalometric measurements, SNA angle, SNB angle, ANB angle and SN/MP reflect the sagittal plane and vertical bone type. Different bone type jaws grow differently, and the second permanent molars erupt. The situation may be different, so this study will analyze it. Zhang Jianhang<sup>[12]</sup> studied that vertical bone type and sagittal plane type had no effect on the malposition of the second permanent molar during orthodontic treatment. Soonshin et al<sup>[13]</sup> study that the dislocation of the maxillary second permanent molar is closely related to the ANB angle.

The related research results show that the dislocation of the maxillary second permanent molar is related to the width of the maxillary first permanent molar. The dislocation of the maxillary second permanent molar is related to the size of the maxillary ANB angle, and is independent of the vertical bone type (SN/MP). This is consistent with Soonshin's findings. The misalignment group showed a smaller ANB angle, the average value of the SNA angle was smaller, and the position of the A point was relatively posterior, which means that the position of the maxilla was relatively posterior, in accordance with the previous Pulver<sup>[15]</sup> study.

The dislocation of the mandibular second permanent molar is related to the width of the alveolar arch between the first and second molars of the lower jaw and the crowdedness of the posterior segment of the mandibular arch, which is consistent with the results of Ma Haiqing<sup>[16]</sup>. The dislocation of the mandibular second permanent molar is also related to the SNB angle and the ANB angle. In patients with larger ANB angles, the mandibular arch and alveolar arch are narrower than the normal arch<sup>[21]</sup>, and the posterior segmental arch and alveolar arch form

a suitable occlusal environment and dynamic balance<sup>[17]</sup>, mandibular The eruption of the second molar may be affected by these local factors, and the probability of misalignment increases. The increase in mandibular length is achieved by the growth of the posterior condyle and the absorption of the new bone of the posterior margin of the mandibular branch. Different vertical bone types have different growth directions of mandible. LAUCK<sup>[21]</sup> found that patients with mandibular third permanent molars had more high-angle features. Tsai<sup>[20]</sup> found that the maxillary second molar was in the early stage of development, and the crown was oriented to the far center. After that, the axis of the lower molar gradually erected with eruption. The second molar of the mandible was in the early stage of development, and the crown was tilted to the middle, and there was no significant difference in the developmental stages. Most of the maxillary molars have a long-term tilt, while the mandibular molars have a near-middle tilt which is consistent with the direction of the dip angle of the upper and lower jaw second molars, suggesting that there is a correlation between the tilt angle of the second molar and the malocclusion. This is for further study.

### 3 The Purpose and Clinical Practice of Vertical Second Molars

The purpose of vertical molars is to improve the health of the periodontal tissue and the function of the jaw by adjusting the position of the teeth, facilitating the eruption of the impacted teeth in the near-middle tilt or facilitating the repair of the edentulous area.

In 1973, Brown proposed that the orthodontic process may create a more appropriate degree of dental tilt for patients with periodontal disease, restore normal sacral plane, and improve occlusion<sup>[18]</sup>. He uses thin orthodontic arch wires to reduce the undesired movement of the teeth, using accessories such as upright springs and spiral-opening springs to achieve the desired molar movement. Although the proximal alveolar bone loses 0.5 to 1 mm, the vertical molar is still considered a routine step in the treatment of periodontal disease sequences. Upright molars reported from the current literature, and there are two main categories of methods.

The first type of surgical replantation: although simple and convenient, it may cause loss of tooth pulp vitality, root resorption and root adhesion.

The second type is orthodontic assisted upright: orthodontic treatment is currently a relatively safe treatment, mainly using the principle of arch wire suspension arm, which mainly includes full-mouth fixed appliance or fragment with auxiliary spring or auxiliary arch. In addition,

there are also implant-supporting traction erect or indirect anchorage with auxiliary springs, movable appliances and belt loops with far-reaching hooks<sup>[22]</sup>. The traditional orthodontic erect mandibular second molar is mainly the primary tooth. The full-mouth fixed appliance or segmental arch technique is used together with the auxiliary spring or the push spring to erect the mandibular second molar, which has higher requirements on the collar, but with the rise of temporary anchorage devices (TADs) will slowly be discontinued. The nailing technique is a representative of the TADs technology that has emerged in recent years. Although it follows biomechanics, it has some characteristics of its own, such as strong anchorage, low pressure effect and high efficiency mechanics<sup>[6]</sup>. These features are more effective and effective in the application of traditional methods, improve treatment efficiency, and expand the application of orthodontics. The implant is used as a direct or indirect anchorage with an auxiliary spring or an elastic orthodontic attachment<sup>[22]</sup>. The erect mandibular second molar is simple and efficient.

#### 4 Develop a Plan

As mentioned above, due to individual differences, the development of correctional treatments needs to be different from individual to individual to improve efficiency. Firstly, according to relevant research, the mandibular second molar is gently tilted forward. The simplest method is to place a separate device between the first molar and the second molar to loosen the contact points of the two teeth, so that the second molar can erupt. If the slanted mandibular second molar is lower than the functional sacral plane, the mandibular molar needs to be extended, and the torque is about 2000~3000 gm. Secondly, If the posterior teeth need significant elongation, then the force applied in the anchorage should be larger. If elongation is not required, the force needs to be smaller, and the forearm of the suspension arm should be as long as possible. At this time, the full-back fixed appliance technology or the segment bow technique can be used with the auxiliary spring (such as the scorpion, the Tip. back device, the modified slider, the "T" shape, etc. At last, When the distal crown of the oblique molar is higher than the functional fetal plane, the molars need to be lowered, and the biomechanics becomes more complicated. According to the balance principle, the torque required to be loaded onto the molar is smaller than the torque applied to the anchor. However, a straight spring similar to a backward tilt has side effects, that is, the molars are elongated during the erecting process. Therefore, in the past, the sputum should be constantly adjusted or used to avoid severe trauma. At this time, the implanted nails can be avoided by indirect

anchorage with Sander. The pre-formed Sander spring, the rear part of the spring is a  $0.016 \times 0.022$ -inch super elastic arch wire connected to a straight  $0.017 \times 0.025$  inch stainless steel bow with a flexible tube Composed on the silk fragments. The front part is inserted into a prefabricated vertical cross tube. In order to make the molars stand upright and depressed, the angle of the anterior teeth should be  $135^{\circ}$ <sup>[23]</sup>. The angle of the posterior teeth should be  $90^{\circ}$

#### 5. Conclusion

In summary, due to the high incidence of dislocation of the second permanent molar, it is recommended that the second permanent molar be included in the correction at the initial stage of correction, combined with the type of dislocation, to shorten the treatment time and reduce the patient's pain. Clinically, patients who are newly diagnosed should not only pay attention to the anterior segment of the arch, but also pay attention to the analysis of the gap of the posterior arch. Patients with dislocation of the second molar due to insufficient posterior interdental space should first develop a gap in the correction process. The condition of the dislocation of the second molar is provided. For the pusher teeth to the distal patient, the amount of jaw bone growth should be combined with the growth of the jaw before the correction. Be careful not to transfer the crowd in the anterior region to the posterior region, artificially causing the dislocation of the second permanent molar or even locking the teeth. At the same time as the correction of the mandibular relationship in patients with different sagittal planes, attention should be paid to the correction of the dislocation of the second permanent molar. The best method of correcting the molars must be based on the individual's condition, and the best method should be chosen to improve the corrective effect of the vertical molars. Although there are clinical reports, patients with bifurcation lesions, near-middle edge bone loss, increased tooth mobility, mainly because the previous appliance is too simple, without considering individual differences, we should design according to individual circumstances Appliances, micro-planting nail technology is the future development trend, we should give full play to its advantages to achieve the best results.

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