

Case Report

Management of Bilateral Severely Impacted Mandibular Second Molars: A Case Report

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Impaction of the mandibular second molar is relatively rare but when it occurs it may cause a clinical problem for orthodontist and oral surgeon. There are various treatment options to manage this condition depending on the degree of second molar inclination, the position of third molars, and the desired type of tooth movement. Here, a case of orthodontic up-righting of bilateral horizontal impaction of the lower second molars in a 17-years-old Thai female patient is presented. Correction of the impactions involved removal of the overlying third molars and use of full edgewise appliances with open NiTi-coil spring and super-elastic NiTi archwire.

Keywords: Impaction, Mandibular second molar, Molar uprighing, NiTi-coil spring, Superelastic NiTi archwire

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The impaction of permanent teeth is a common clinical event and may concern any tooth in the dental arch. The teeth most often impacted are maxillary and mandibular third molars followed by the maxillary canine and mandibular second premolars⁽¹⁻³⁾. However, impaction of permanent second molar is a rare condition. The reported prevalence of this condition was 1.9% in a Thai orthodontic population⁽⁴⁾, 1% in a group of Chinese school children⁽⁵⁾, and only 0.06% in 5,000 American army recruits⁽⁶⁾. Second molar impaction is frequently found in the mandible and often occurs only on one side⁽⁷⁾. It can create problems in masticatory function and dental arch stability⁽⁸⁾. Congenital diseases and syndromes such as cleidocranial dysplasia have been noted as systematic factors of molar impaction⁽⁹⁾. As local factors, crowding^(10,11), arch length deficiency^(11,12), ectopic eruption⁽¹³⁾, and periodontal membrane disturbances⁽¹⁴⁾ have been cited for the cause of second molar impaction.

The management of impacted mandibular second molar includes the use of brass wire separator (for a minor impaction), surgical repositioning, extraction of the tooth, extraction of the impacted second molar and its immediate transplantation into correct position or transplantation of the third molar to the second molar

socket, and surgical uncovering of the second molar followed by orthodontic uprighing and assisted eruption⁽¹⁵⁾.

A case report of girl having bilateral second mandibular molar impactions is presented. The details of the treatment, the results, and case discussion are outlined in the following.

Case Report

A 17-years-old female presented with bilateral horizontal impaction of lower second molars. Clinically, she had a Class I malocclusion with bi-maxillary proclination and mild anterior crowding. A panoramic radiograph (Fig. 1) shows the presence of all permanent teeth and revealed severe horizontal inclination of both lower second and third molars, as well as impaction of the maxillary third molars on both sides.

Treatment was initiated by removal of right and left mandibular third molars to facilitate uprighing and eruption of the second molars. Because their positions were very deep, immediate surgical exposure to bond any attachments on them was not feasible. One year after removal of the third molars, panoramic radiograph (Fig. 2) was taken.

Full fixed orthodontic appliances were placed on erupted teeth. The treatment plan included extraction of all first premolars in order to improve patient profile and use the extraction spaces for correcting crowding. After all teeth were well-aligned, the surgical exposures for bonding of orthodontic attachments to the second

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molars for orthodontic uprighting were prepared (Fig. 3).

Under local anesthesia, the impacted mandibular second molars on both sides were surgically exposed and a molar tube bonded on the buccal surface of the crown of each tooth. Open NiTi-coil springs were placed between the buccal tubes of first and second lower molars on extensions of a mandibular NiTi labial arch wire to create the force for driving the crowns of impacted second molars distally and uprighting them. Uprighting was continued with the coil springs until the crowns were at about the levels of the cement-enamel junctions (CEJ) of the first molars. Then, the buccal tubes were rebonded in better positions and a super-elastic NiTi wire (0.017" x 0.025" Copper NiTi) was used to continue uprighting and eruption of the impacted teeth while use of the coil springs was discontinued. This archwire elevated and brought the impacted second molars into alignment with the other teeth (Fig. 4). The patient was also advised to use vertical elastics from the mandibular second molars to elevate these teeth into occlusion, while using

the maxillary teeth with a rigid maxillary arch (0.019" x 0.025" SS) as anchorage.

The time required for uprighting and extruding the impacted second molars into occlusion was 13 months, whereas total treatment time from the time of third molar removal was 3.5 years.

After labial appliance removal, bonded 5-5 maxillary and mandibular retainers were used to maintain the teeth positions and to avoid reopening of the premolar extraction spaces (Fig. 5). Panoramic and periapical radiographs taken 6 months later showed that the mandibular second molars had been successfully uprighted in proper position with no evidence of alveolar bone problems (Fig. 6, 7A, 7B).

This case report was approved by the Khon Kaen University Ethic Committee (number HE562110).

Discussion

Due to low frequency of a horizontally impacted second molar, little literature regarding its clinical management is available. Many causal factors have been proposed associated with mandibular



Fig. 1 Pretreatment panoramic radiograph shows bilaterally horizontal inclination of mandibular second and third molars.



Fig. 2 Panoramic radiograph one year after mandibular third molar removal showing slight improvement of positions of the mandibular second molars.



Fig. 3 Panoramic radiograph after a further 18 months showing all teeth were well-aligned, ready for surgical exposure and bonding of attachments for orthodontic uprighting of impacted mandibular second molars.



Fig. 4 Panoramic radiograph shows extending of the super-elastic NiTi archwire to molar tubes of mandibular second molars to bring them into the occlusion.



Fig. 5 Post-treatment intraoral photograph showing corrected inclination of mandibular second molars and bonded 5-5 mandibular retainer.



Fig. 6 Post-treatment panoramic radiograph taken 6 months after debonding showing successful uprighted mandibular second molars.

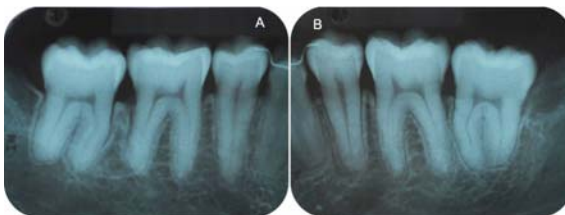


Fig. 7 Post-treatment periapical radiographs taken 6 months after debonding showing good bone level at the distal of the second molars.

second molar impaction, such as crowding^(10,11), arch length deficiency in the mandibular posterior area^(11,12), ectopic development and eruption of mandibular second molar⁽¹³⁾. In this case, the possible cause for bilateral impaction of her lower second molars might be from the ectopic development of these tooth buds; moreover, the development of the mandibular third molar overlying and pressing against the second molar seems to be the additional factor which has caused

severe impaction of the mandibular second molars.

The proper timing for treating impacted second molars is between 11 and 14 years of age, when second molar root formation is still not fully developed⁽¹⁵⁾. Kavadia et al⁽¹⁶⁾ recommended early extraction of mandibular third molar in case of eruption disturbances of the second molar. In this case, although the patient was first seen at 17 years of age with lower second molars root formation completed, these impacted teeth were successfully uprighted and there has been no evidence of relapse of the impacted tooth as results show six months after appliance removal. This implies that any age before full adult may be suitable for uprighting and erupting an impacted lower second molar.

Untreated, the impacted mandibular second molars can cause many clinical problems such as root resorption of the mandibular first molar, dental caries of the first lower molar, and periodontal breakdown of the distal bone support of the first molar, so that it was reasonable to treat the impacted second molars in this case.

Several treatment options have been proposed for management of this problem, depending on the degree of tooth inclination and the required tooth movement⁽¹⁵⁾. The present case was managed by removal of the overlying third molars; then surgical exposure and bonding an attachment on the impacted second molar, followed by orthodontic uprighting and eruption. This option is a better alternative for an impacted second molar compared to extraction or surgical repositioning it. Though orthodontic treatment can sometimes difficult, it can be highly successful⁽¹⁷⁾. Various orthodontic appliances and techniques for uprighting and erupting impacted second mandibular molars have been proposed. Uprighting force can be delivered by means of applying tip-back cantilever at the end of an archwire^(18,19), super-elastic NiTi wire^(20,21), uprighting spring attached to an adjacent erupted tooth^(15,22), or a sectional archwire⁽²³⁾.

Use of miniplates⁽²⁴⁾ or miniscrews⁽²⁵⁾ have been suggested as anchorage for molar uprighting. For the patient in the present report, both NiTi-coil spring and super-elastic NiTi wire were used to deliver the force for uprighting the impacted second mandibular molars. Though mandibular second molars on both sides were deeply and horizontally impacted, they were successfully elevated into the correct position without creating bony defect. Super-elastic NiTi wire has good flexibility, yet it is able to maintain active orthodontic forces and allow gradual and smooth uprighting.

Time required for uprighting and erupting the impacted teeth into the occlusion in this case report was 13 months which was more than other previous reports^(15,19,20,26). This is likely due to their original positions being almost horizontal and very deep. The length of time to upright is likely to vary depending on the angulation/inclination of the impacted tooth in different patients.

Uprighting impacted second mandibular molars in this case proved worthwhile in terms of cost-effectiveness from periodontal, restorative and functional viewpoints. Keeping impacted natural tooth and then uprighting is superior to implant or other prosthetic replacement, though these options can provide function for the patient.

Conclusion

Mandibular second molar impaction is a challenging condition for orthodontists and surgeons, as well as the patient. Careful clinical and radiological examination combined with the good appliance selection can provide successful treatment outcomes. With the advent of the modern appliances and materials such as super-elastic NiTi archwire and NiTi-coil spring, the management of this problem becomes much easier and less complicated.

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Potential conflicts of interest

None.

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การจัดการการคุดของฟันกรามแท้ซี่ที่สองล่างแบบบูรณาการทั้งสองข้าง: รายงานผู้ป่วย

มนเทียร มโนสุตประสิทธิ์, ทศนีย์ วังศรีมงคล, พูนศักดิ์ ภิเศก, เมลิสสา จันทรมังกร

การคุดของฟันกรามแท้ซี่ที่สองล่างเป็นภาวะที่พบได้ค่อนข้างน้อย แต่เมื่อเกิดขึ้นแล้วอาจก่อให้เกิดปัญหาทางคลินิก แก่ทันตแพทย์จัดฟันและศัลยแพทย์ช่องปาก ซึ่งแนวทางการรักษาภาวะการคุดของฟันซี่นี้มีหลากหลาย ขึ้นกับองศาการเอียงตัวของฟันกรามแท้ซี่ที่สอง ตำแหน่งของฟันกรามแท้ซี่ที่สาม และลักษณะการเคลื่อนฟันที่ต้องการ ในที่นี้จะเป็นการนำเสนอรายงานผู้ป่วยหญิงไทยอายุ 17 ปี ที่ได้รับการรักษาการคุดแนวราบของฟันกรามล่างซี่ที่สองทั้งสองข้างด้วยการตั้งฟันด้วยการจัดฟัน การรักษาการคุดของฟันในผู้ป่วยรายนี้ประกอบด้วยการนำฟันกรามแท้ซี่ที่สามที่ขวางออก และใช้เครื่องมือจัดฟันติดแน่นแบบเอจไวส์ร่วมกับสปริงเกลียวนิกเกิลไทเทเนียมแบบเปิดและลวดนิกเกิลไทเทเนียมชนิดยืดหยุ่นยังยาว
