

## Uprighting a Mesially Partial Impacted Mandibular Second Molar: A Case Report

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### Abstract

Impaction of the lower second molar is not a common problem (0.03%), but it is very challenging for orthodontists. Unilateral mandibular second molar impaction is the most popular form of second molar impactions. The etiology of which is related to some disturbances in physiological mandibular growth and tooth development. Other factors have been cited for this problem is iatrogenic such as space gaining procedures in mixed dentition. Treatment options depend on degree of tooth inclination, the position of third molar and desired type of tooth movement. Advantages of impacted molar uprighting are functional, periodontal and restorative. In this case report, treatment of partially impacted second molars in a 12 year – old girl with class I malocclusion is presented. Uprighting of both second molars was performed in two stages. It was concluded that using continuous stainless steel wire with T-loop and gable bend is an effective method for correction of second molar inclination with the least risk of molar extrusion.

**Key Words:** second molar, partial impaction, mini screw, uprighting (IJO 2006;1:203-8).

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**I**mpaction of permanent teeth is a common clinical occurrence that may involve any tooth in dental arch. The teeth most often impacted in order of frequency, are the maxillary and mandibular third molars, the maxillary canines and mandibular second premolars.<sup>1</sup>

The real incidence of mandibular second molar impaction is unknown, but is reported to be in the range of about 3 in 1000(0.03%).<sup>2</sup>

Unilateral impaction of second molar is more common than bilateral impaction and occurs much more frequently in the mandible than in maxilla. It has been found more often in males than females and more frequently on the right side than on the left. Impacted second molars are most commonly mesially inclined.<sup>3</sup>

The etiology of impaction is related to some disturbance of physiological mandibular growth and tooth development.

The space for second permanent molar is obtained by resorption of the bone at the anterior border of mandibular ramus and mesial migration of the first molar into leeway space. The tooth bud of second permanent molar develops with some mesial inclination and the ability for natural self-correction manifests as the remodeling changes occur. Mesial drift of the first permanent mandibular molar creates approximately 2.7mm of space per side for

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angular adjustment and eruption of the second molar. Disturbances of this natural process may lead to impaction and be associated with an arch length deficiency because of inadequate mandibular growth.<sup>4</sup>

The mandibular second molar impaction may result from a space regaining procedure in the mixed dentition or from a space between the developing mesially inclined tooth bud and the anterior adjacent tooth, which is not contributory to normal development and eruption. This extra space can develop after extraction or mesial movement of the adjacent tooth.<sup>5</sup>

The most important iatrogenic factor includes an incorrectly fitted band cemented on the first mandibular molar, previous orthodontic sagittal expansion<sup>6</sup>, and prevention of mesial shift of the first permanent molar caused by lip-bumper or lingual arch therapy. Sometimes the second molar gets impacted unexpectedly, which is probably related to third molar position.<sup>7</sup>

Advantages of impacted molar uprighting and extrusion are functional, periodontal, and restorative.

Uprighting second molars allows avoidance of a shortening of occlusal plane that may result from impacted tooth loss, especially in the cases of unpredictable third molar position. Moreover, unopposed teeth have a tendency to erupt excessively. The periodontal benefit of molar uprighting is the elimination of pseudo pockets, which facilitates plaque control in the area.<sup>8</sup>

As proper oral hygiene in the area of impacted teeth is difficult, caries may easily affect

unerupted teeth. Uprighting of impacted molars, therefore, seems beneficial in caries prevention. Undiagnosed second molar impaction may damage the distal root of the first molar.<sup>7</sup>

The treatment options depend on the degree of tooth inclination as well as the required tooth movement. The position of a slightly-tipped molar can be corrected by placing a brass wire separator between the teeth.<sup>9</sup> A more severe inclination requires surgical methods or orthodontically – assisted eruption with or without surgical uncovering.<sup>10,12</sup>

In this case, a sequence of approaches for partial second molar uprighting were used, including separator (brass wire), continuous NiTi arch wire (0.016 inch) and continuous stainless steel arch wire with loop and tip-back for final proper second molar positioning.

### Case

A 12 year-old girl was referred for orthodontic consultation and treatment to Orthodontic Department, Shiraz Dental School. The patient has an ovoid facial form and moderately protrusive profile. Clinically a class I malocclusion with a normal arch form, a 2-millimeter- overjet and 30% overbite were diagnosed. She was in the early permanent dentition with normal erupting upper second molars, but mesially inclined lower second molars, with only distal cusps clinically apparent, very close to the distal cusps of the first molars. (Fig 1)



**Fig 1:** Mesially inclined lower second molars





Panoramic radiograph revealed the presence of all permanent teeth in their normal position, as well as developing third molars, while both second molars had severe mesial inclination. (Fig 2)



**Fig 2:** Panoramic view at the start of treatment

Both mandibular second molars were obliquely impacted under the distal bulge of the first molars. The third molars' bud was located on the top of the second molars' distal roots. (Fig 3)



**Fig 3:** Closer view of mesially inclined second molars

Due to the nearly perfect and optimal occlusion, it was only decided to upright both lower second molars. The treatment was performed in two stages. In the first stage, brass wires were placed between the first and second molars for a period of 3 months to move the ectopically erupting second molars away from distal surface of the first molars for correcting the second molar eruption pattern. A piece of 20 mil brass wire was looped and tightened around the contact of the first and second molars in each side. The brass wires were tightened approximately every 2 weeks and new brass wires were used as required. After 3 months, second molar positions were improved in both sides with more improvement in the right side. (Fig 4)



**Fig 4:** Improvement in the position of second molars

In the second stage for complete molar uprighting we used full arch setup (0.018 inch slot width system) in the lower arch. The first molars were cemented with convertible bands and the distobuccal surface of the second molars was bonded with tube attachments. The tubes were bonded in a similar and nearly ideal position with regard to occlusal surface of the second molars in a way that mesial aspects of tubes were placed more gingivally than the distal aspects. For distalizing the second molars a continuous 0.016 inch NiTi wire was inserted in the lower arch and two stainless steel compressed coil springs were placed between first and second molars to release the mesial marginal ridge of second molars from the contact with first molars. Consequently NiTi wire could exert an uprighting moment on second molars.

The patient was scheduled for follow – up every 3 weeks. Two month after initiation of second stage of the treatment, inclination of second molars' crown were nearly normal, but for complete second molars root uprighting, the NiTi wire was replaced by a continuous 0.016 inch stainless steel wire with a T-loop between first and second molars. The distal end of the T-loops inserting in the second molars tube had a 40° Tip back and distal vertical leg of the loops were formed to be longer than mesial vertical leg. This design was supposed to help correct the position of the second molars with creating suitable moment and increasing wire flexibility. (Fig 5)





**Fig 5:** Orthodontic appliance in place

From a biomechanical perspective sometimes it is better to leave third molar bud on the top of the second molar to facilitate the uprighting.<sup>13</sup> In our case that was true and the third molars were not removed during second molars uprighting.

The patient was instructed to return for observation every 3 week and horizontal distal leg of T- loops was reactivated. With this approach 5 months later, a satisfactory lower second molar inclination was achieved bilaterally. Subsequently, germectomy of third molars was performed.

A corrected inclination of impacted molars was obtained and confirmed on post-treatment panoramic radiograph. (Fig 6)



**Fig 6:** Corrected position of second molars



## DISCUSSION

The proper time to treat mandibular second molar impaction is when the patient is 11 to 14 years old, during early adolescence when root formation is still incomplete and before the third molars complete their development on top of the second molars.<sup>7</sup> Any uprighting technique may have application in a given situation, the technique of choice would be determined by the severity of mandibular second molar impaction, the accessibility of the coronal surface of impacted molar, the undesirable side effects, as well as simplicity of uprighting mechanics.<sup>14</sup>

Different treatment options are discussed in the literature.<sup>4,25</sup> If the second molar is tipped slightly to mesial, a separator can be placed between the teeth. This may relieve the tight contact between molars, enabling self-correction and eruption of the second molar.<sup>7</sup> In this case brass wire was used for 3 months (stage I) during active eruption of second molars. By this approach we could use erupting potential of second molar during treatment.

However when the tooth is tipped severely, surgical repositioning may provide a quick and easy solution.<sup>10,12</sup> But this approach has some risks such as molar necrosis, root resorption and ankylosis as well as potential problems for adjacent teeth.<sup>9</sup>

Extraction of an impacted second molar that appears to have no chance of uprighting to allow for eruption of third molar is another option.<sup>7,9</sup> This approach depend also upon the positional



development of third molar and its eruption path, which is unpredictable.<sup>9</sup> Another alternative for second molar uprighting is orthodontically assisted eruption with or without surgical uncovering. The choice of appliance should base on proper evaluation of impacted molars and developing third molar positions. Other factors, such as degree of impaction and desired type of movement, should also be considered when choosing an appliance prior to orthodontic therapy. Also, the need for third molar extraction should be evaluated.<sup>7</sup> Frequently, the third molar position may impede the distal movement of impacted second molar, indicating the need for extraction. However, from a biomechanical perspective, some times it is better to leave the third molar bud to facilitate the second molar rotation.<sup>13</sup>

A variety of mechanotherapies and orthodontic appliances have been suggested for uprighting and erupting impacted second molars: Bonded attachment to the distobuccal surface with push coil springs<sup>15</sup>, and NiTi coil springs<sup>16</sup>, interarch vertical elastics<sup>5</sup> and removable appliances with a spring.<sup>17</sup> have all been used for initial uprighting of impacted lower molars. Other approaches include a pin placed in the crown of the impacted second molar<sup>18</sup>, a bonded attachment on occlusal surface of second molar and uprighting spring<sup>19</sup>, bonded tube on the buccal surface and uprighting spring<sup>20-22</sup>, superelastic NiTi wire<sup>6,23,24</sup> or sectional arch wire<sup>14</sup> to upright and drive tooth distally. Placing Titanium miniscrew in the retromolar area for molar uprighting also was recommended by Giancotti and colleagues.<sup>25</sup> After stage I of uprighting with brass wire for better molar inclination, we used continuous NiTi wire in lower arch with push coil between first and second molars to release mesial marginal ridge of second molar from the contact with the first molars. In this mechanotherapy, third molar buds could act as a fulcrum at the distal surface of the second molars so that teeth could be rotated in a way that the molars' roots moved mesially.<sup>13</sup>

After 2 months for complete second molar uprighting the NiTi wire was replaced with a stainless steel arch wire included T-loops and gable bends that were incorporated between the first and second molars. With adjusting the

length of T-loop distal leg and tip back bend, we could control the magnitude of molar extrusion and tip-back moment.

The advantage of this wire configuration was its simplicity and better control of the second molar extrusion compared with uprighting cantilever spring. The side effects of orthodontic molar uprighting include lingual tipping of second molars and buccal tipping of other teeth. This is attributed to extrusive force on second molars and intrusive force to other teeth, which is not applied at their center of resistance.<sup>26</sup> With T-loop approach the length and range of activity of the wire was increased and the force magnitude would be decreased resulting in the least undesirable side effects and increasing visit intervals.

## CONCLUSION

Treatment of partially impacted second molar could be performed with a proper result by the following simple stages:

- 1) Use of brass wire as a separator for partial distal movement of second molar.
- 2) Use of continuous wire such as NiTi (0.016 inch) and stainless steel (0.016 inch) with T-loop and gable bend.

## REFERENCES

- 1-Dachi SF, Howell FV. A survey of 3,874 routine full mouth radiographs. II A study of impacted teeth. *Oral Surg Oral Med Oral Path* 1961; 14:1165-9.
- 2- Johnsen DC. Prevalence of delayed emergence of permanent teeth as a result of local factors. *J Am Dent Assoc* 1977; 94: 100-6.
- 3- Wellfelt B, Varpio M. Disturbed eruption of the permanent lower second molar: Treatment and results. *J Dent Child* 1988; 55:183-9.
- 4- Majourau A, Norton LA. Uprighting impacted second molars with segmented springs. *Am J Orthod Dentofac Orthop* 1995; 107: 235-8.
- 5- Gazit E, Lieberman M. A mesially impacted mandibular second molar. Treatment considerations and outcome: A case report. *Am J Orthod Dentofac Orthop* 1993; 103:374-6.

- 6- Eckhart JE. Orthodontic uprighting of horizontally impacted mandibular second molars. *J Clin Orthod* 1998; 32: 621-4.
- 7- Sawicka M, Pilszak RB, Mazurkiewicz AR. Uprighting partially impacted permanent second molars. *Angle Orthod* 2007; 77: 148-54.
- 8- Shellhart WC, Oesterle LJ. Uprighting molars without extrusion. *J Am Dent Assoc.* 1999; 130: 381-5.
- 9- Shapira Y, Borell G, Nahlieli O, Kuftinec MM, Stom D. Uprighting mesially impacted mandibular permanent second molars. *Angle Orthod* 1998; 68: 173-8.
- 10- McAboy CP, Grumet JT, Siegel EB, Lacopino AM. Surgical uprighting and repositioning of severely impacted mandibular second molars. *J Am Dent Assoc* 2003; 134: 1459-62.
- 11- Porgel MA. The surgical uprighting of mandibular second molars. *Am J Orthod Dentofac Orthop* 1995; 108: 180-3.
- 12- Ferrazzini G. Uprighting of a deeply impacted mandibular second molar. *Am J Orthod Dentofac Orthop* 1989; 96: 168-71.
- 13- Melsen B, Fiorelli G, Bergamini A. Uprighting of lower molars. *J Clin Orthod* 1996; 30: 640-5.
- 14- Kogod M, Kogod HS. Molar uprighting with piggyback buccal sectional arch wire technique. *Am J Orthod Dentofac Orthop* 1991; 99: 276-80.
- 15- Freeman RS. Mandibular second molar problems. *Am J Orthod Dentofac Orthop* 1988; 94: 19-21.
- 16- Aksoy A, Aras S. Use of nickel titanium coil spring for partially impacted second molars. *J Clin Orthod* 1998; 32: 479-82.
- 17- Henns RJ. Uprighting impacted mandibular second molars. *Angle Orthod* 1975; 45: 314-6.
- 18- Buchner HJ. Correction of impacted mandibular second molars. *Angle Orthod* 1973; 43: 30-3.
- 19- Johnson E, Taylor RC. A surgical orthodontic approach in uprighting mandibular second molars. *Am J Orthod Dentofac Orthop* 1972; 61: 508-14.
- 20- Miao YQ, Zhong H. An uprighting appliance for impacted mandibular second and third molars. *J Clin Orthod* 2006; XL: 110-6.
- 21- Park DK. Australian uprighting spring for partially impacted second molars. *J Clin Orthod* 1999; 33: 404-6.
- 22- Orton HS, Jones SP. Correction of mesially impacted lower second and third molars. *J Clin Orthod* 1987; 21: 176-81.
- 23- Going RE Jr, Reyes-Lois DB. Surgical exposure and bracketing technique for uprighting impacted mandibular second molars. *J Oral Maxillofac Surg* 1999; 57: 209-12.
- 24- Wright DM. Treatment of mesially impacted mandibular second molar: A case report. *N. Y. State Dent J* 1995; 61: 44-6.
- 25- Giancotti A, Muzzi F, Santini F, Arcuri C. Mini screw treatment of ectopic mandibular molar. *J Clin Orthod* 2003; 37: 380-3.
- 26- Proffit WR, Fields HW, Sarver DM. *Contemporary orthodontics*. 4 th ed. St Louis: Mosby Co. 2007: 639-43.