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## FEATURE

# Uprighting Bilateral Impacted Mandibular Permanent Second Molars with the Brass Wire Technique: A Case Report

### By João Paulo Veloso PERDIGÃO, DDS, MS; Romulo Maciel LUSTOSA; Elen de Souza TOLENTINO, DDS, MS, PhD; Liogi IWAKI FILHO; Lilian Cristina Vessoni IWAKI, DDS, MS, PhD

Abstract: revalence of impaction of mandibular permanent second molars is between 0.06 and 2.3 percent. In order to reduce treatment time and complications associated with tooth impaction, intervention should take place once the problem is detected. The usual treatment options consists of surgical exposure, luxation of the impacted tooth, extraction of adjacent third molar, orthodontic treatment, and uprighting with brass wires or mini-screws. Aim: The present paper reports a case of bilateral impaction of mandibular permanent second molars (MM2s) treated with extraction of the mandibular third molars (MM3s) and surgical-orthodontic uprighting with the brass wire technique. Method: The MM3s were removed, and the impacted MM2s were surgically exposed. Brass wire was placed apically to the mesial of the MM2 from the lingual tissue out toward the buccal. The lingual end of the wire was bent over the area of contact and twisted with the buccal end. Monthly wire tightening gradually moved the MM2s distally and towards the occlusal plane. Results: Uprighting was achieved in 4-5 months, with discrete pain caused by activation of the wire. Conclusion: This technique proved to be a simple, low-cost, and quick treatment option for uprighting impacted mandibular permanent second molars.

Key words: Impacted tooth; Ectopic tooth eruption; Tooth uprighting; Orthodontics.

### ntroduction

Impaction of a mandibular permanent second molar (MM2) is uncommon, affecting around 0.06 to 2.3 percent of the population<sup>1-3</sup> with bilateral MM2 impaction being rarer than unilateral impaction.<sup>45</sup>

Impacted MM2s are usually mesioangular, followed by distoangular and vertical impactions.<sup>1,5,6</sup>

Crowding and arch length deficiency are the main local causes of MM2 impaction.<sup>1,5-7</sup> Although research found evidence that third molars are generally adjacent to impacted second molars,<sup>1,2,5,8-10</sup> the association between the presence of third molar and impaction of MM2 remains controversial. Early detection and corrective measures of MM2 impaction are important to reduce the need for complicated orthodontic treatment.<sup>11</sup>

Usual treatment of impacted permanent molars consists of surgical exposure and removal of any possible barrier, or orthodontic treatment for abnormal tooth position, malocclusion, lack of space in the dental arch, and if spontaneous eruption is not expected.<sup>8,10</sup> One of the most common treatments for impacted MM2 is extraction of the third molar, surgical exposure, and orthodontic uprighting of the impacted tooth.<sup>6,8,12</sup> The most widespread method to upright MM2 is the use of orthodontic miniscrews and miniplates.<sup>12,13</sup> However, the brass wire technique can be an alternative to upright impacted MM2. It was first described by Levitas in 1964<sup>14</sup> to aid the eruption of a maxillary permanent first molar impacted on a second primary molar. Research on this technique is scarce (Table 1), despite its satisfactory results and advantages over more invasive long-term techniques such as its low-cost, little discomfort, and simplicity.<sup>15</sup> The present paper presents a successful case of uprighting bilateral impacted MM2s using the brass wire technique.

### **Case Report**

A 12-year-old boy was referred to surgery consultation because of retained third molars (MM3s) associated with bilateral impacted MM2s. Clinical examination revealed good oral health, Class I interarch relationship, no crowding or lack of space posterior to the mandibular permanent first molars (MM1s), and mandibular incisor midline deviated 2 mm to the left (Figures 1A, 1B). Although maxillary canines and second molars had not erupted, there was enough space for them.

Panoramic radiograph revealed bilateral impacted MM2s close to the MM3s (Figure 1C), which, in turn, were at the same height of the MM2s. The MM2s were mesially impacted under the distal aspect of the MM1s. Maxillary canines, second, and third molars showed no observable pathology.



Figure 1 – A. Intra-oral frontal view before treatment. B. Occlusal view: absence of bilateral MM2. C. Panoramic radiograph: impacted MM2 and retained MM3.

Treatment planning consisted of extraction of the MM3s and orthodontic uprighting of the MM2s with the brass wire technique. The MM3s were removed under local anesthesia, and the impacted MM2s were surgically exposed (Figure 2A, 2B). Brass wire (0.20-0.30", Morelli Ortodontia, Sorocaba- SP, Brazil) was placed apically to the mesial of the MM2 from the lingual tissue out toward the buccal. The lingual end of the wire was bent over the area of contact and twisted with the buccal end. The wire was twisted against the embrasures (Figure 2C). The excess wire was cut, and the twisted end was tucked into the buccal surface of the MM1s at the level of the gingival margin to avoid irritation of the buccal mucosa, and the gingiva was sutured (Figure 2D). A panoramic radiograph taken immediately after wire placement confirmed its correct position (Figure 3).

Monthly wire tightening gradually moved the MM2s distally and towards the occlusal plane. The patient reported mild discomfort after each tightening. The wire was removed when the MM2s were deimpacted, and their mesial aspects were out of contact with the distal surfaces of the MM1s. The time required for uprighting and erupting the molars was 4



Figure 2 – A. Area of incision. B. Surgical exposure of MM2 and MM3. C. Brass wire placement under the contact area between MM1 and MM2. D. Brass wire twisted, cut and pressed towards MM1.

months for the right MM2 and 5 months for the left MM2. Orthodontic treatment was performed for better alignment of the arches (Figure 4). Panoramic radiograph was taken at the end of the orthodontic treatment—3 years after the placement of the brass wire (Figure 5). No damage to the periodontal ligament of the MM1s was observed on the clinical and radiographic evaluations.

### Discussion

Although Bondemark and Tsiopa<sup>3</sup> found no association of MM2 eruption disturbances with sex, Shapira et al.<sup>11</sup> reported higher prevalence among women. In fact, prevalence of MM2 impaction varies among studies on the issue.<sup>3,10,11</sup> Shapira et al,<sup>11</sup> comparing the incidence of MM2 impaction among Israeli, Chinese-American, and Swedish groups, suggest that genetics may be involved in the problem. Cassetta et al<sup>5</sup> suggest that the increasing tendency to MM2 impaction may be due to the decreasing rate of extraction of first molars as well as fewer extractions for orthodontic treatment.

The main local causes of MM2 impaction are crowding and arch length deficiency,<sup>1,5-7</sup> while Class II malocclusion is associated with MM2 impaction.<sup>2</sup> Evans<sup>7</sup> pointed out that unilateral impactions were associated with the lower midline deviated to the side of the impaction. In the present study the patient had Class I relationship inter-arch and no crowding or



Figure 4 – Views of MM2s' final position. A. Occlusal. B. Frontal. C. Left. D. Right.



Figure 3 - Postoperative panoramic radiograph showing brass wires.



Figure 5 - Final panoramic radiograph showing complete eruption of the MM2s.

lack of space posterior to the MM1s. In addition, the patient had bilateral impacted MM2s with the lower midline deviated to the left, whereas there was no difference between the right and left side of the mandible concerning degree of impaction or crowding.

Mesial angulation is the most common form of MM2 impaction, and angulation greater than 20°-24° or 30° seems to be associated with higher impaction risk.<sup>5</sup> One of the reasons for this angulation may occur during the early stages of development, when mandibular molars are mesially inclined.8 Other causes of MM2 impaction may be slow development of the MM2 mesial root<sup>11</sup> and excessive space between the developing MM2 and MM1, which allows a more mesial angulation of the MM2 and, in turn, can result in impaction under the distal bulge of the MM1 or under the height of contour of the MM1 crown.9 In the present study, the mesial angulation of both MM2s was approximately 35°, a moderate impaction, and panoramic radiograph revealed that the mesial roots of both MM2s were slightly reduced in length. A study<sup>9</sup> examining 43 permanent molars with eruption disturbances in 25 patients found that almost half of the patients had more than one retained or impacted molar, and that 44% of the non-erupted molars had non-erupted opposing teeth. The authors9 suggest that these findings could explain bilateral impaction in the mandible associated with retained maxillary second molars, and that there might be other factors that predispose patients to eruption disturbances.

Early diagnosis of impacted MM2 is important in order to start treatment at the optimal time, to minimize complications, and to reduce the need for complicated orthodontic treatment.<sup>3,11,16</sup> Valmaseda-Castellón et al.<sup>9</sup> found that delay in the diagnosis led to more severe occlusal disturbances, such as malposition of neighboring teeth (16 percent), extrusion (19 percent), or infraocclusion of opposing teeth (44 percent). The success rate of uprighting treatment of impacted second molars depends on the patient's age at the time of diagnosis and on the severity of the impaction. In the present study, impaction of MM2s was early diagnosed, a factor that might have contributed to the success of the brass wire technique for uprighting the impacted teeth.

A recent uprighting technique is the use of orthodontic miniscrews and miniplates placed distally to the impacted tooth that generate a counterclockwise movement.<sup>13,17,18</sup> Orthodontic miniscrew and miniplates have minimal side effects, provide more controllable orthodontic movements, superior accuracy, do not require installation of devices, and do not use several teeth in the process.<sup>13</sup> In addition, miniplates provide good anchorage stability.<sup>19</sup> However, the disadvantages of using miniscrews and miniplates lie in greater risk of failure and mobility, relatively high cost, difficulty for maintaining oral hygiene around the miniplate, risk of infection, and discomfort in the first days because of the size of the device in the retromolar region.<sup>13,20</sup>

The brass wire technique has been used to aid the eruption of impacted permanent maxillary first molar and MM3s<sup>14,15,21,22</sup> and has traditionally been used for degrees of molar impaction ranging from minimum to moderate. To the best of our knowledge, this paper reports the only use of the technique for uprighting impacted MM2. More specifically, the brass wire technique, associated with extraction of the MM3s, was successfully used to upright a moderate case of impacted bilateral MM2s.

The present case report demonstrates the advantages of the brass wire technique over other techniques: a simple procedure with minimal chair time, no laboratory work, no impressions, minimal local anesthesia required, no damage to permanent teeth (no etching, bonding or banding), no fixed tooth movement, no requirement for anchorage, no need for headgear use, and no space maintenance.<sup>15</sup> Disadvantages are mild trauma to the buccal mucosa if the wire is too long and need for a new intervention if the wire breaks.

To sum up, this case report showed that the brass wire technique was successful for uprighting mesially impacted MM2s associated with retained MM3s in a young patient. The technique can be used before attempting more complicated and more costly methods, and impacted third molars can be extracted earlier than usual, so brass wire placement and molar uprighting can take place.

### References

- Varpio M, Wellfelt B. Disturbed eruption of the lower second molar: clinical appearance, prevalence, and etiology. ASDC J Dent Child 1988;55:114-8.
- Vedtofte H, Andreasen JO, Kjaer I. Arrested eruption of the permanent lower second molar. *Eur J Orthod* 1999;21:31-40.
- 3. Bondemark L, Tsiopa J. Prevalence of ectopic eruption, impaction, retention and agenesis of the permanent second molar. *Angle Orthod* 2007;77:773-8.
- Raghoebar GM, Boering G, Vissink A. Clinical, radiographic, and histological characteristics of secondary retention of permanent molars. J Dent 1991;19:164-70.
- Cassetta M, Altieri F, Di Mambro A, Galluccio G, Barbato E. Impaction of permanent mandibular second molar: a retrospective study. *Med Oral Patol Oral Cir Bucal* 2013;18:e564-8.
- 6. Wellfelt B, Varpio M. Disturbed eruption of the permanent lower second molar: treatment and results. ASDC J Dent Child 1988;55:183-9.
- Evans R. Incidence of lower second permanent molar impaction. Br J Orthod 1988;15:199-203.
- Raghoebar GM, Boering G, Vissink A, Stegenga B. Eruption disturbances of permanent molars: a review. J Oral Pathol Med 1991;20:59-66.
- Shapira Y, Borell G, Nahlieli O, Kuftinec MM. Uprighting mesially impacted mandibular permanent second molars. *Angle Orthod* 1998;68:173-8.
- Valmaseda-Castellón E, De-la-Rosa-Gay C, Gay-Escoda C. Eruption disturbances of the first and second permanent molars: results of treatment in 43 cases. Am J Orthod Dentofacial Orthop 1999;116:651-8.
- Shapira Y, Finkelstein T, Shpack N, Lai YH, Kuftinec MM, Vardimon A. Mandibular second molar impaction. Part 1: genetic traits and characteristics. *Am J Orthod Dentofacial Orthop* 2011;140:32-7.
- Magnusson C, Kjellberg H. Impaction and retention of second molars: diagnosis, treatment and outcome. A retrospective follow-up study. *Angle Orthod* 2009;79:422-7.
- Miyahira YI, Maltagliati LA, Siqueira DF, Romano R. Miniplates as skeletal anchorage for treating mandibular second molar impactions. *Am J Orthod Dentofacial Orthop* 2008;134:145-8.
- 14. Levitas TC. A simple technique for correcting an ectopically erupting maxillary first permanent molar. *J Dent Child* 1964;31:16-8.
- 15. Kupietzky A. Correction of ectopic eruption of permanent molars utilizing the brass wire technique. *Pediatr Dent* 2000;22:408-12.
- Fu PS, Wang JC, Wu YM, Huang TK, Chen WC, Tseng YC, et al. Impacted mandibular second molars. *Angle Orthod* 2012;82:670-5.

- Derton N, Perini A, Mutinelli S, Gracco A. Mandibular molar uprighting using mini-implants: different approaches for different clinical cases – two case reports. *Orthodontics* (Chic.) 2012;13:138-45.
- Ruellas AC, Pithon MM, dos Santos RL. Miniscrew supported coil spring for molar uprighting: description. *Dental Press J Orhod* 2013;18:45-9.
- Sherwood KH, Burch JG, Thompson WJ. Closing anterior open bites by intruding molars with titanium miniplate anchorage. *Am J Orthod Dentofacial Orthop* 2002;22:593-600.
- Choi BH, Zhu SJ, Kim YH. A clinical evaluation of titanium miniplates as anchors for orthodontic treatment. *Am J Orthod Dentofacial Orthop* 2005;128:382-4.
- 21. Sharma PS, Rypel TS. Ectopic eruption of permanent molars and their management (I). *Quintessence Int Dent Dig* 1978;9:47-52.
- Moro N, Murakami T, Tanaka T, Ohto C. Uprighting of impacted lower third molars using brass ligature wire. *Aust Orthod* 2002;18:35-8.



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