

MANAGEMENT OF LOWER SECOND PREMOLAR IMPACTION

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ABSTRACT

The mandibular second premolar is one of the most frequently impacted teeth. The recommended treatment is to extract the second primary molar with or without removing the bone along the eruption path, to uncover the tooth surgically and move it into the arch by orthodontic treatment.

The purpose of this article is to review the principles of case management of soft tissue impacted second premolars mandibular and to illustrate their potential to respond well to the treatment. Although the scope of treatment may depend on a varying range of factors, this case report demonstrates the inherent potential for good treatment outcome in cases of soft tissue impactions.

Key Words: Mandibular Premolar; Unerupted Tooth; Submerged tooth

INTRODUCTION

The mandibular second premolar is highly variable developmentally. Agenesis, abnormal tooth germ position, and distal inclination of the developing tooth are among the reported developmental anomalies¹. In addition, the second most frequently impacted tooth was found to be the mandibular second premolar, excluding third molars, in some populations^{1,2}.

The mandibular premolars erupt after the mandibular first molar and mandibular canine; thus if the room for eruption of premolars is inadequate, one of the premolars usually the second premolar remains un-erupted and chances of getting

impacted are more³. The prevalence of impacted premolars varies according to age. The overall prevalence for impaction in adults has been reported to be 0.5% the range being 0.2% to 0.3% for mandibular premolars.^{1,2,3,4}

The main etiological factors for premolar impaction appear to include arch length deficiency, lack of space, ectopic position of tooth germ, obstacles to eruption such as an ankylosed primary molar, and the presence of supernumerary teeth or odontomas. Some systemic and genetic factors involved include cleidocranial dysplasia, osteopetrosis, Down's syndrome, hypothyroidism, and hypopituitarism^{2,4}

Genetic and environmental factors involved in tooth development may be disturbed at any stage of tooth development². Tooth germ of mandibular second premolar is ideally positioned between roots of second deciduous molar. Normally the path of eruption follows resorption of roots of deciduous molar with no major deviations. The mandibular premolars erupt after the mandibular first molar and mandibular canine; thus if the room for eruption of premolars is inadequate, one of the premolars usually the second premolar remains un-erupted and chances of getting impacted are more.^{5,6}

The overall prevalence in adults has been reported to be 0.5% (the range is 0.1% to 0.3% for maxillary premolars and 0.2% to 0.3% for mandibular premolars)⁷.

Tooth impaction is frequently observed anomaly of eruption and is often the sole complaint of young patients visiting dentists.¹ If a tooth has erupted out of the jaw bone but not through the gumline, It is termed as soft tissue impaction. The impaction of premolar may be caused by loss of space due to early extraction of deciduous second molars, resulting in the mesial drift of permanent molars and the ectopic position of the tooth bud, obstacles to eruption such as an ankylosed primary molar, the presence of supernumerary teeth or odontomas and genetic factors⁸. Various treatment methods have been suggested including observation, intervention, relocation, and extraction depending on the tooth's position, depth of the impacted tooth, relationship with adjacent teeth, and orthodontic treatment.

Conservative management with exposure of the crown has been advocated. The majority of reported cases involved distally impacted premolars in which the long axis was inclined to favour eruption if exposed. Surgical exposure is unpredictable and best limited to cases with no more than 45° tilting of the long axis from its normal position⁶.

The case described below illustrates the inherent potential for even the most unfavorably impacted mandibular premolars to respond.

CASE REPORT:

Medical history and Diagnosis:

A 16 years old girl was referred to our dental clinic- Center for dentistry, esthetics and research, Jatt, Israel, with the chief complaint of mild pain. Her medical and dental history was not significant. She had no history of dental extractions or orthodontic treatment. .

The process near lingual sulcus and almost completely covered by gingivae. There was a mesial drift of first mandibular permanent molar and distal tipping of first mandibular right premolar on the affected side, leaving about 3-3,5 mm of space for impacted tooth. There was mild crowding in the lower anterior region with deep bite and mild attrition of lower anterior teeth (FIG. 1, 2).

OPG confirmed the presence of all the permanent teeth, including the third molars. Right mandibular second premolar was almost horizontally impacted associated with follicular cyst with crown facing towards first molar. The impacted tooth in close proximity to inferior alveolar nerve canal (FIG. 3, 4, 5).

Treatment:

The treatment begins with orthodontic treatment by using a straight wire appliance (0.022" slot). A 0.012" NiTi arch wire was placed in upper arch first with the objective of correction of deep overbite. Leveling and aligning was accomplished through sequential change in arch wire from 0.018" × 0.025" heat activated NiTi to 0.018" × 0.025" SS wire.

After six months appliance was placed in mandibular arch, with 0.014" NiTi arch wire being placed as the initial archwire. After two months, 0.018" SS wire with NiTi open coil spring was placed between mandibular 1st premolar and 1st molar to create space for the 2nd premolar. Once adequate space was created, then we're ready for the surgical exposure of the 2nd premolar.

Before performing the surgical intervention, we should examine the interocclusal clearance of the opposing dentition, in order to verify that sufficient vertical space exists between the impacted second premolar tooth, in the mandible and the opposing maxillary premolar tooth.

The surgical procedure, itself, can be carried out under local anesthesia. The surgical method used here is the closed exposure surgery.

A muco-gingival incision is made and a muco-periosteal flap extending from the first molar to the first premolar area from the buccal side, the flap at the 2nd premolar area, is reflected, as to expose the bone surrounding the impacted second premolar (FIG. 6).

Bone is carefully removed in order to expose the height of the crown of the impacted second premolar tooth. Then we use the tunneling technique and we attach the tooth with Titanium button with chain by Watted (FIG. 7, 8a), Soft tissue closure is done in an ordinary fashion, using resorbable or unresorbable sutures. In selected cases, apically repositioned flaps, has to be incorporated, in order to better expose the uprighted tooth crown.

After the surgical exposure we start to expose the 2nd premolar tooth by applying force with lace back to the arch wire, after a few months of treatment in lower arch, the second premolar was seen clinically in the mouth (FIG 8 b, c). A bracket was bonded to the erupted premolar for final positioning of the tooth (FIG. 9).

The objectives of eruption of impacted tooth into the occlusion, correction of deep overbite and correction of midline deviation were achieved. The appliance was removed 18 months after initiation of the treatment (FIG. 10, 11, 12)

DISCUSSION

Impacted permanent mandibular second premolar are detected quite regularly in the clinical and radiographic examination of a young dental patient⁷.

The orthodontist role in Surgical Orthodontics is presurgical dental decompensation using fixed mechanotherapy and postsurgical establishment of functional occlusion.¹

Kokich describes the surgical and orthodontic management of impacted teeth and identifies the position and angulation of the impacted tooth, length of treatment time, available space and the presence of

keratinized gingival as critical factors that will affect prognosis and treatment Outcome⁹.

Andreasen suggests that surgical exposure with or without orthodontic intervention should be confined to cases with no more than 45 % tilting and limited deviation from the normal position.^{2,10}

Wasserstein and Shalish failed to find a significant correlation between premature loss of mandibular second primary molar and malposition of mandibular second premolar¹¹

Becker advocated that by whichever method space is made, the tooth will normally erupt with considerable speed, without further assistance, if teeth are with moderately disturbed axial angulations. If sufficient space exists or created in the dental arch, impacted mandibular premolar then has a high potential for self-alignment and eruption without orthodontic intervention¹.

Proffit states that a tooth will erupt into its correct position after obstacles to eruption have been removed by surgical exposure, but after root formation is completed eruption of tooth rarely occur. Even a tooth that is aimed in the right direction usually requires orthodontic force to bring in to position.¹²

Aizenbud et al., have described a case of impacted mandibular second premolar with a tilt of 90° which was surgically exposed after extraction of overlying deciduous tooth followed by its orthodontic extrusion and alignment.¹³

McNamara & McNamara have described two cases of mandibular Premolar impactions, one in 33- year-old female

where surgical intervention was essential to allow for orthodontic alignment of the tooth.⁸

Jain U. & Kallur, the most common cause of mandibular second premolar impaction is premature loss of deciduous predecessor. The other causes leading to this problem include, over-retained or infraocclusal and ankylosed primary molars; ectopic positioning of the developing premolar tooth buds; or pathology such as inflammatory or dentigerous cysts; extrinsic obstructions, such as supernumerary teeth and odontomas. Impaction of the premolars may also be associated with, thick and fibrous gingival tissue or with syndromes such as Cleidocranial dysostosis¹⁴

Orthodontic treatment with traction of a tooth can be divided into three phases, the first phase comprises the beginning of orthodontic treatment to surgical exposure of the tooth lasting from two to five months and varying, depending type of malocclusion and which teeth are involved. The second phase occurs when starting traction, going to the placement of the tooth in the arch, between 12 to 18 months. The third phase is when the orthodontic treatment is finalized with the tooth in the arch. The traction of an unerupted tooth adds between 10 to 18 months to complete orthodontic treatment time¹⁵.

Before orthodontic forces are applied, it is necessary to make sure that there is enough space for the tooth to be taken to its desired position in the arch. Also, one must be sure that the correct osteotomy around the crown is made and that there is no present.^{1,2,3}

The researched authors mentioned methods suggested for surgical orthodontic traction and alignment, the use of mobile or fixed anchorage in the same arch or opposing arch, or the use of magnets with the removable appliance^{16,17}

The literature is not unanimous referring the amount of force used to traction and some suggest 24-35 gr, others, 40 gr but keeps all forces between 5 and 100 gr. This force must be achieved by means of elastic spring steel ligature or a device helicoidal shaped attached to the orthodontic arch.¹⁷

The current case demonstrates the importance of judicious planning after a thoughtful analysis of the diagnostic records and stresses the individualistic approach in management of any case. The correct diagnosis greatly simplified the mechanics and an impacted tooth was allowed to erupt just by relieving it from under the bulge of the adjacent molar. The case is also unique as it proves that even the impacted teeth have eruption potential provided the impediment to their natural eruption is identified and managed successfully. Even after 5 years of the normal eruption timing, the tooth demonstrated eruptive movement as soon as the molar that obstructed its path was corrected. An orthodontic force was added just to reduce the time taken by it to take its occlusal position after it was visible under the gingiva.

Preventing mandibular premolar tooth impaction is the ideal form of treatment and provides the best long-term results. With early detection, timely interception, and well-managed orthodontic treatment, impacted tooth can be allowed to erupt naturally and can be guided to an

appropriate location in the dental arch. Management of impacted tooth, by regaining space so as to allow its natural eruption, can offer a better and long term prognosis with no adverse pulpal or periodontal risk to the tooth and the supporting structure.^{17,18}

The authors corroborate themselves citing the sequels and postoperative problems, both surgical and orthodontic as infection after surgery, ankylosis, bone and gingival recession, resorption of adjacent teeth, the pulpal obliteration, the darkening of the tooth, root resorption of neighboring teeth, in addition to decreased bone level between the retained tooth and the neighboring teeth

CONCLUSION:

Constant interaction and communication among the team members and the patient at all level of treatment are the keys to the success of the interdisciplinary treatment. . From the literature review and case presentation clinical-surgical, it can be concluded that:

- A).The age of the patient is a important fact to be considered for the success of the treatment.
- B). During the clinical and radiographic examinations, it should be observed carefully the location of the tooth, the amount of bone and teeth adjacent to ascertain whether or not the traction will be possible.
- c). The most used method to enable the traction of the tooth is the direct bonding of an orthodontic appliance on the most accessible surface of the tooth.

d). For the mechanics of orthodontic traction is most recommended to install a fixed appliance to offer greater control and effectiveness of the traction force applied.

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FIGURES:



Fig 1: Clinical Photo in Occlusion shows the area of the missing 2nd premolar



Fig 2: Clinical Photo shows the lower arch and the missing 2nd premolar



Fig 3, 4: OPG x-ray shows the impacted 2nd premolar associated with follicular cyst



Fig 5: Lateral cephalogram x-ray.

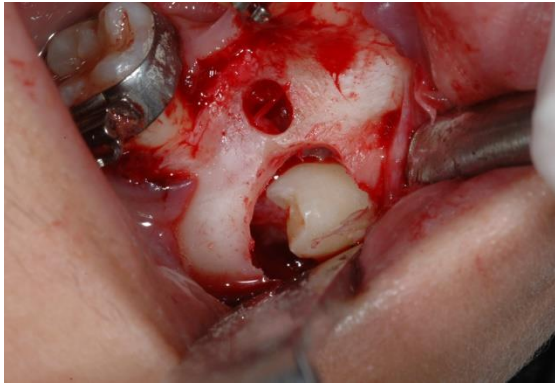


Fig 6: clinical photo shows the exposure of 2nd premolar with the tunneling technique



Fig 7: clinical photo shows the button with chain by Watted bonded the 2nd premolar tooth.



Fig 8 a: OPG x-ray shows the traction of the 2nd premolar.

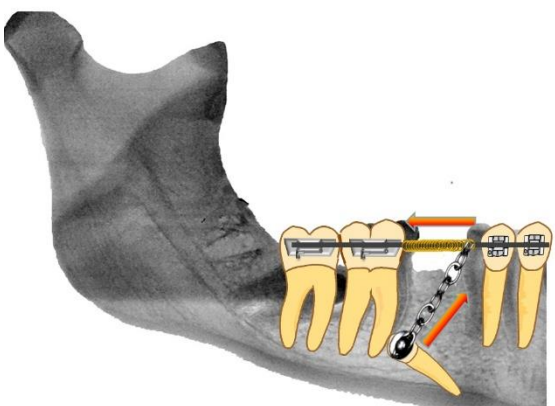


Fig 8 b: schematic representation of the initial phase when setting the displaced premolar. the mesialization of the impacted tooth from the molars was carried out by the pressure spring. This was pressed in the distal direction.

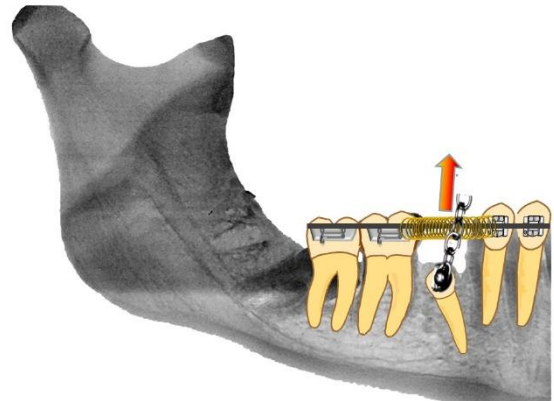


Fig 8 c: schematic representation of the second phase in the adjustment of the impacted premolar. the vertical movement of the impacted tooth was performed by ligature. This was vertically attached to the main arch and activated.



Fig 9: clinical photo shows the 2nd premolar bonded with brackets



Fig 10: clinical photo at the end of treatment.



Fig 11: clinical photo of the lower arch at the end of treatment.



Fig 12: OPG x-ray at the end of treatment.