Case Report

Conservative Management of Mandibular 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**.** This paper reports the conservative management of an impacted left mandibular second premolar which exhibited self-correction and erupted into occlusion within 18 months. The purpose of this article is to review the principles of case management of impacted mandibular premolars and to illustrate their potential to respond well to treatment.

Key Words: Impaction, Mandibular Premolar, Submerged tooth.

Introduction:

An impacted tooth is one that is prevented to erupt in its normal functional position by bone, tooth or fibrous tissue (Andreasen, 1997). Tooth impaction is a frequently observed anomaly of eruption in dental practice. The prevalence of premolar impaction has been reported to be 0.1% to 0.3% for maxillary and 0.2% to 0.3% for mandibular premolars (Thilander & Myrberg, 1973; Oikarinen & Julku, 1974). According to the frequency of impaction- Mandibular second premolars (MnP2) rank third-after third permanent molars and maxillary permanent canines. (Alling & Catone,1993). The most common cause of mandibular second premolar impaction is premature loss of deciduous predecessor (Carr, 1963 ; Maclaughlin et al 1967). Impaction of the MnP2 has also been related to the initial angulation of the tooth and the early loss of the first permanent molar (Sutton, 1969). The other causes leading to this problem include, over-retained or infraocclusal and ankylosed primary molars (Winter et al 1997); ectopic positioning of the developing premolar tooth buds; or pathology such as inflammatory or dentigerous cysts (Rubin et al, 2002; Mahajan et al, 2006**;** Yawaka et al, 2002); extrinsic obstructions, such as supernumerary teeth and odontomas (Kaugars et al, 1989). They may also be associated with, thick and fibrous gingival tissue or with syndromes such as cleidocranial dysostosis (McDonald et al, 1994). Impaction of second mandibular premolar may lead to several problems in occlusion such as loss of space due to mesial drift of molar and distal movement of mandibular first premolar, lower midline shift towards the impacted side, spacing in the mandibular arch and deep overbite.

There are several treatment options available to manage this problem. First, the impacted tooth can be extracted and the resulting space can be closed by orthodontic mechanotherapy. From periodontal point of view, extraction of unerupted mandibular second premolar may leave a marked bony defect in the area, even after the adjacent teeth have been fully uprighted. Prosthetic rehabilitation can be considered in non–extraction cases, after second premolar space has been reopened by orthodontic mechanotherapy. Another alternative will be to uncover the tooth surgically and move it into the arch by orthodontic treatment**.** The time span required for this treatment may be long and depends upon several factors, such as the initial distance between the tooth and the occlusal plane, angulation of the impacted tooth, age of the patient, the stage of the development of the particular tooth and the manner in which hard and soft tissue healing occurs after the surgical procedure (Kokich & Mathews, 1993; Proffit et al, 2000). The case described below illustrates the inherent potential for even the most unfavorably impacted mandibular premolars to respond

Case Report:

An 18 year old girl was referred to the Department of Orthodontics with the chief complaint of mild pain and pus discharge from lingual surface of left mandibular region. Her medical and dental history was not significant. She had no history of dental extractions or orthodontic treatment. Clinical examination revealed normal development of dentition except the submerged left primary mandibular second molar and absence of mandibular left second premolar. The submerged deciduous mandibular left second molar

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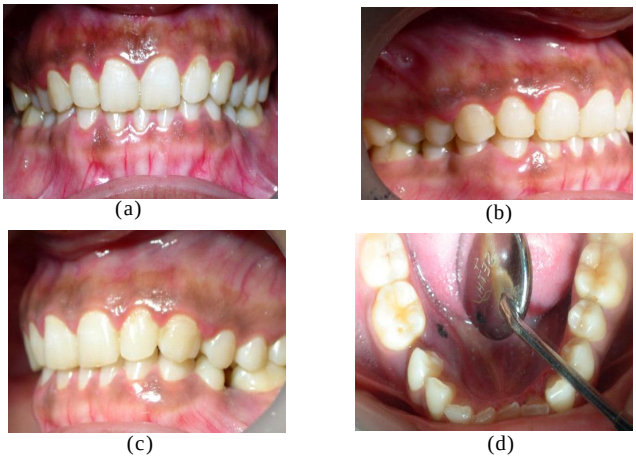
was identified as site of pus discharge, and was located at lingual surface of left posterior mandibular alveolar process near lingual sulcus and almost completely covered by gingivae. There was a mesial shift of first mandibular permanent molar and distal tipping of first mandibular left premolar on the affected side, leaving about 3 mm of space for impacted tooth. There was mild crowding of lower anteriors with deep bite and mild attrition of lower anterior teeth (Fig. I).



(a) (b) (c) (d)

Fig:I. Pre-treatment intra-oral photographs showing (a) Frontal view with deepbite & midline deviation (b) Right lateral view (c) Left lateral view showing missing second premolar (d) Occlusal view with sub-merged primary left second molar.

OPG confirmed the presence of all the permanent teeth, including the third molars. The left mandibular second deciduous molar was submerged between roots of first molar and first premolar; left mandibular second premolar was almost horizontally impacted with crown facing towards first molar. The impacted tooth was located below deciduous submerged tooth and in close proximity to inferior alveolar nerve canal (Fig. II).

Based on clinical and radiographic findings the submerged primary molar was extracted surgically. A pre- adjusted edgewise appliance (0.022" slot) was placed in the upper arch initially. A 0.016" Nitinol arch wire with .017×.025 TMA intrusion arch 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 0.019" × 0.025" heat activated NiTi to 0.019" × 0.025" SS wire. After six months appliance was placed in mandibular arch, with 0.016" Nitinol arch wire being placed as the initial archwire. After two months, 0.018” SS wire with Nitinol open coil spring was placed between mandibular first premolar and first molar to create space for the second premolar. Once adequate space was created, cusp tip of the impacted second premolar was seen

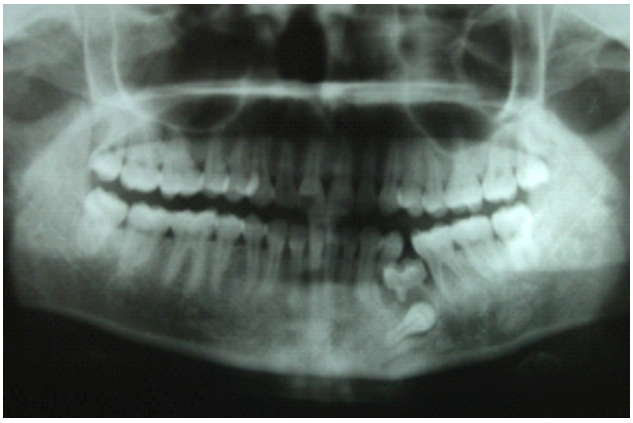
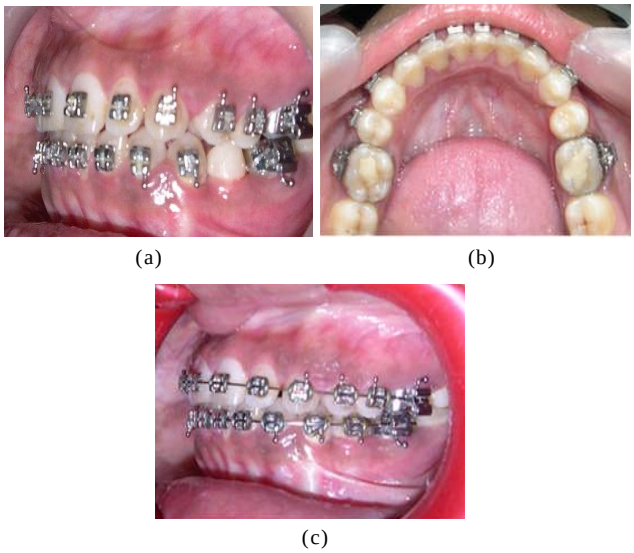


Fig: II. Pre-treatment OPG showing sub merged left primary mandibular second molar & impacted left second premolar.



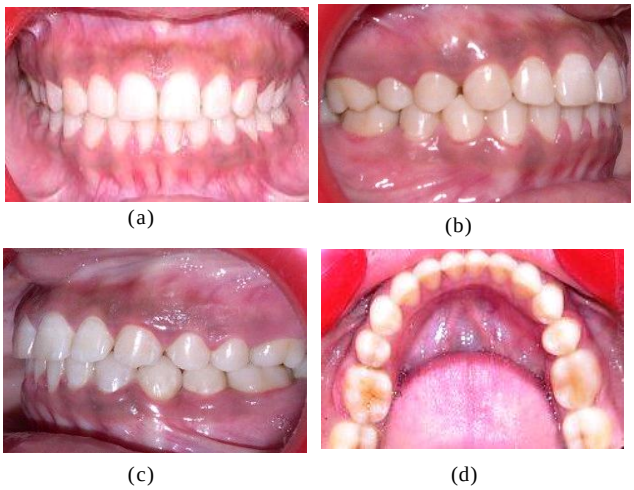
(a) (b) (c)

Fig.III: Mid treatment photograph showing spontaneous erupetion of left mandibular second premolar (a) Left lateral view (b) Occlusion view (c) Alignment of the erupted premolar

clinically. After ten months of treatment in lower arch, the second premolar erupted spontaneously into the occlusion without applying any force onto it (Fig.III). A bracket was bonded to the erupted premolar for final positioning of the tooth. 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 19 months after initiation of the treatment (Fig. IV & V).

Discussion

Literature specific to impacted premolars is not extensive despite the fact that mandibular second premolars alone account for approximately 24% of all dental impactions excluding third molars (Thilander & Myrberg, 1973) and exhibit dramatic intraosseous migration (Okada et al, 2002). Treatment options for



(a) (b) (c) (d)

Fig: IV: Post treatment photographs showing mandibular second premolar in occlusion.

Fig. V: Post treatment OPG with left mandibular second premolar in occlusion.

impacted teeth include observation, intervention, relocation and extraction (McNamara & McNamara, 2005). On occasion, there may be some interaction between these treatment options (Frank, 2000). Observation involves no treatment other than monitoring the patient clinically and radiologically. Generally it involves following a child or adolescent for a specific time, which can be divided into pre-impaction and post-impaction periods. Intervention may involve simple extraction of a tooth or teeth, usually primary. Intervention may include a brief period of orthodontic treatment to eliminate the impaction. If sufficient space exists or created in the dental arch, impacted MnP2 then has a high potential for self-alignment and eruption without orthodontic intervention (Collett, 2000). Relocation refers to either surgical repositioning of the impacted tooth or, more commonly, orthodontic eruption of the impacted tooth. Orthodontic relocation may be more demanding in terms of time but results in fewer long-term complications (Kokich & Mathews, 1993; Frank 2000). The position and angulation of the impacted tooth, length of treatment time, available space and the presence of keratinized gingival tissue are few critical factors that affect the prognosis and treatment outcome of this condition. Operational complications, none of which occurred in this case, include injury to adjacent periodontium, injury to adjacent teeth, nerve damage, multiple exposures of the impacted teeth and failure of the orthodontic bond when performing a closed-flap eruption procedure (Alling & Catone, 1993; Kokich & Mathews, 1993; Proffit et al, 2000; Frank, 2000).

In selecting an appropriate treatment option, the underlying etiological factors, space requirements, need for extraction of primary molars, degree of impaction and root formation of the impacted premolar should be considered. Factors such as the patient's medical history, dental status, oral hygiene, functional and occlusal relationships and attitude toward and compliance with treatment will influence choice of treatment options. (Kokich & Mathews, 1993; Proffit et al, 2000; Okada et al, 2002; McNamara & McNamara, 2005; Frank, 2000; Collett, 2000).

The treatment outcome was uncertain in this case due to the submerged primary molar below alveolar bone height, severity of impaction, the completion of root formation of the impacted premolar, the reduced level of dentoalveolar bone and proximity of the impacted tooth to inferior alveolar canal. The patient's age and lack of growth potential further complicated the situation. Adding to the complexity of the problem, the mandibular left second premolar was transversely impacted with the crown facing distally (Fig. II).

An erupting tooth follows the line of least resistance (Sutton, 1968). Jacobs (1987) advocated that the removal of bone over the eruption path of the MnP2 should follow extraction of the second primary molar. In the present case, after extraction of submerged tooth, orthodontic procedures were applied to regain space for the impacted premolar tooth. Subsequently the mandibular second premolar erupted spontaneously and finally aligned into the arch with fixed orthodontic appliance.

Although the degree of impaction in this case was marked, presence of submerged second primary molar and a large bone defect left after extraction of submerged tooth may have been a contributory factor in the rapid and efficient alignment of her impacted premolar. Andreasen (1997) suggests that surgical exposure should be confined to cases, both maxillary and mandibular, with no more than 45° of tilting and

limited deviation from the normal position. Reported case fell well outside these guidelines. This case report suggests that the degree of premolar impaction, the early onset-late diagnosis of submerged primary tooth with impacted mandibular premolar, the lack of dentoalveolar bone and root form are not definitive obstacles to the spontaneous eruption and relocation of impacted mandibular premolars.

Conclusions:

Patient's age, early onset submergence of primary molar, disruption to dentoalveolar bone development, severity of impaction, and premolar root form at presentation did not prove an obstacle to successful treatment. Space regaining is the key to successful treatment of these cases, since eruptive movement is always directed towards the site of least resistance.

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