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Surgical Management of Bilateral Ectopic Mandibular Second Premolars

Bilateral Ektopik Mandibular İkinci Premolarların Cerrahi Tedavisi

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ABSTRACT
Impaction of mandibular second premolars is a relatively common pathology following the impaction of third molars and maxillary canines. However, ectopic displacement let alone bilateral migration of mandibular second premolars is very uncommon. In this case report, a 16-year-old female patient with bilateral intraosseous distal migration of mandibular second premolars -below the impacted third molars- is presented. Management was surgical removal of lower wisdom teeth and the ectopic second premolars bilaterally to avoid a possible cyst formation from the enlarged follicular spaces.
Keywords: distal migration, ectopic tooth, mandibular second premolar
ÖZ
Mandibular ikinci premolarların gömülü kalması daha sık görülen üçüncü molar ve maksiller kanin diş gömülülüklerinden sonra meydana gelen yaygın patolojilerdir. Ancak, mandibular ikinci premolarların ektopik yer değiştirmeleri özellikle çift taraflı migrasyonları oldukça nadirdir. Bu vaka raporunda, alt üçüncü molarların aşağısında çift taraflı olarak intraosseöz distal migrasyon gösteren ikinci premolarlara sahip 16 yaşındaki kadın hasta sunulmaktadır. Muhtemel kist oluşumunu önlemek için alt çenedeki yirmi yaş dişlerinin ve foliküler aralığı genişlemiş ektopik ikinci premolarların cerrahi çekimi gerçekleştirilmiştir.
Anahtar kelimeler: distal migrasyon, ektopik diş, mandibuler ikinci premolar

INTRODUCTION

Impaction of mandibular second premolars, though relatively rare, presents unique diagnostic and treatment challenges. This condition can lead to various complications, including adjacent tooth root resorption, cyst formation, and increased risk of infection, making timely diagnosis and intervention crucial. The etiology is often complex, involving local factors such as space limitations in the dental arch, mesial drift of adjacent teeth due to premature loss of primary molars, or anatomical anomalies like ankylosis or supernumerary teeth. Systemic factors, including genetic predispositions and certain syndromes, can also play a role, contributing to the multifactorial nature of impactions.[1-3]

Treatment of ectopically impacted mandibular second premolars requires a comprehensive approach tailored to each patient's unique clinical presentation. Initial observation with regular clinical and radiographic evaluations is essential, allowing dental professionals to predict potential impaction risks and implement early preventive or interceptive measures when possible. Surgical interventions vary based on the available eruption space and may include extraction of primary teeth, surgical exposure of the impacted premolar with or without orthodontic traction, or, in some cases, surgical repositioning or autotransplantation. In cases where other treatments are impractical, surgical extraction becomes the primary option, necessitating careful consideration of the patient's age, dental status, and occlusal relationships to minimize complications and promote optimal healing.[1,3]

Literature Review

Prevelance of Impacted Second Premolar

Impacted teeth represent a common dental pathology, potentially affecting any tooth, though they most frequently involve third molars.[4] The highest prevalence of impacted teeth in the permanent dentition is observed with mandibular third molars, followed closely by maxillary third molars. The reported frequency of impaction for these teeth ranges from 16.7% to 73.82%. Maxillary canines also exhibit a high impaction rate, followed by second premolars. The prevalence of impaction for mandibular second premolars, although significantly lower, is typically reported to be between 0.2% and 0.3%, making it the third most common type of dental impaction after third molars and canines.[1,5,6]

Etiology of Mandibular Second Premolar Impaction

The etiology of mandibular second premolar impaction is complex. Even when sufficient space is present, these teeth may remain impacted due to a variety of factors. These etiologies can be classified into local and systemic factors.

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Local Factors: The impaction of mandibular second premolars is often caused by a lack of space in the dental arch, preventing the premolar from erupting properly. This may result from a discrepancy between tooth size and arch length. It can also occur due to mesialization of the first molar following the early loss of the second primary molar. Irregular resorption or prolonged retention of the second primary molar can similarly lead to impaction. Other local factors include ankylosis (fusion of the tooth to the bone), supernumerary teeth, cysts, ectopic positioning of the tooth bud, or irregular resorption of the roots of the deciduous molars. The presence of odontomas or gingival hyperplasia may also obstruct the eruption path.

Systemic Factors: Genetic factors, hormonal imbalances, and certain syndromes can affect the eruption of teeth. These systemic conditions may interfere with the normal process of tooth eruption, leading to impaction.[2,5,7]

Intraosseous Migration of Mandibular Second Premolar

Migration of a tooth is an eruption anomaly where the tooth develops in an ectopic position rather than its original position.[8,9] This phenomenon that is also referred as ectopia can be seen in various parts of the oral cavity and body.[10]

Tooth migration may occur as a result of localized pathological changes such as cysts or odontomas.[11] Its' etiology is unknown but thought to be a multifactorial condition influenced by genetic and environmental factors.[10] It has a female predilection with a female to male ratio of 1.7:1.[12]

Unilateral migration of unerupted mandibular second premolar is idiopathic, not associated with any other dental anomaly[8] and have been reported to be more common than bilateral migration. The estimated impaction rate of mandibular second premolars range between 2.1 to 2.7%.[13] Intrabony distal migration rate of mandibular second premolars is 0.25%. Early removal of the permanent first molars is reported to increase the chance of distal migration 5-10%.[12]

Intraosseous migration may occur both in mesial and distal directions, on the other hand it is claimed that, masticatory forces may result in medial migration of impacted teeth.[10] The path of migration probably follows the area of lowest resistance.[11]

Surgical menagement

Each patient should be evaluated and treated individually, considering factors like medical history, attitude toward treatment, and oral hygiene.[14]

Observation: Observation and early intervention are critical, as ectopically impacted teeth are associated with an increased risk of resorption of adjacent roots, cyst formation, and potential infection if left untreated. Through clinical and radiographic evaluation, dental professionals can often predict ectopic impaction during early developmental stages, allowing for preventive or interceptive measures, such as space management or surgical exposure, to encourage correct alignment. Regular monitoring of ectopic impactions is necessary to anticipate and address any adverse outcomes, thereby preserving the health and functionality of the dentition.[15]

Intervention: When treatment is deemed necessary, interventions should be as minimal as possible to encourage natural eruption, which is the most physiologic form of tooth movement. This approach supports normal septal development and helps establish an adequate band of keratinized gingiva. Surgical treatment options may vary based on the availability of sufficient space for the tooth to erupt.[15] Surgical treatment options include the following periodic monitoring of premolar development, possibly in conjunction with primary tooth extraction; surgical exposure of the impacted tooth, which may be combined with orthodontic traction; surgical extraction of the impacted premolar; and surgical repositioning or autotransplantation of the affected tooth.[14,16-19]

Extraction: Surgical extraction of ectopically impacted mandibular second premolars is often indicated when other treatment options are insufficient or impractical. Before proceeding with extraction, a thorough assessment of factors such as the patient's age, the dental and periodontal status of adjacent teeth, and the occlusal relationship is essential. Additionally, the position and morphology of the impacted premolar itself, along with the available arch length, play crucial roles in determining the surgical approach. Given the anatomical challenges and potential risks, clinicians aim to preserve as much healthy periodontal tissue and surrounding bone structure as possible to minimize postoperative complications and ensure optimal healing outcomes. Complications associated with the surgical removal of ectopically impacted second premolars may include periodontal damage to adjacent teeth, root fractures, and osseous defects, which could affect the long-term stability of the surrounding teeth. Neuropathy, particularly in the mandible, is a notable risk due to the proximity of the inferior alveolar nerve. In cases involving maxillary teeth, sinus involvement is also a concern. To mitigate these risks, clinicians should employ meticulous surgical techniques and consider additional interventions, such as bone grafting, when necessary, to restore alveolar bone integrity post-extraction.[1,3,20]

CASE PRESENTATION

A 16-year old female patient was referred to our clinic for her bilaterally impacted mandibular second premolars. Impacted premolars can be recognized during routine dental check-ups. The patient's occlusion appeared unaffected. The patient did not have a history of systemic disease or trauma. Family medical history was noncontributory and extraoral examination did not show any abnormality.

Clinical examination revealed missing mandibular second premolars on both sides. Ectopic teeth were noted on radiographic examination that were located under the developing mandibular third molars bilaterally. Enlargement of follicular spaces of both impacted premolars were noted on orthopantomogram and confirmed by CBCT examination (Figure 1 and 2). Due to the risk of pathological fracture or damage to inferior dental nerve during a delayed operation, it was decided to remove the ectopic impacted premolars and the developing adjacent wisdom teeth on both sides. Written and verbal informed consent was obtained for surgical removal of right and left sides on different sessions and under local anesthesia. Surgical access was via conventional envelope mucoperiosteal flaps on both sides. After appropriate osteotomies, the inferior alveolar nerve was disclosed in close proximity to impacted teeth and protected during surgical extractions and excision of the tooth follicles. The patient and families' main concern was managed through a treatment plan focused on preventing future complications, such as cyst formation or nerve injury, given the impacted teeth close proximity to the inferior alveolar nerve. Recovery was uneventful except a transient hypoesthesia of the right inferior alveolar nerve that lasted for a couple of weeks. Her one-year follow-up panoramic image showed radiological recovery (Figure 2b).

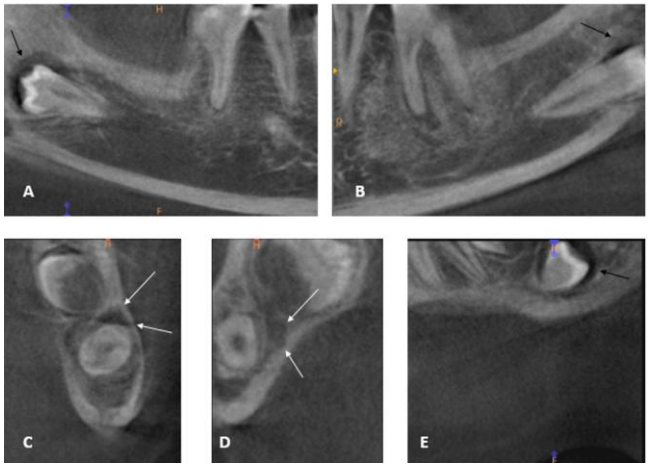

Figure 1. Coronal and sagittal CBCT images (A-E). Black arrows revealed the enlargement of follicular spaces (A, B, E). White arrows display inferior alveolar nerves (C, D).

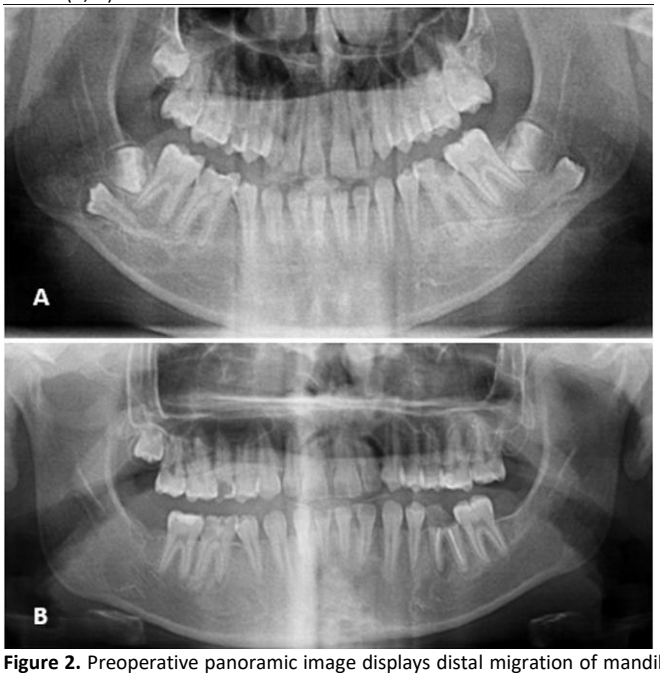

Figure 2. Preoperative panoramic image displays distal migration of mandibular second premolars (A). Postoperative panoramic image a year after the surgery displays uneventful bony healing (B).

DISCUSSION

The etiology of tooth migration is still obscure, and theories suggest trauma, infection, pathologic conditions, crowding, and developmental anomalies for instance displacement of tooth buds.[9,21] Early loss of permanent first molars is also suggested as an etiological factor for migration of mandibular second premolars.[10,12] However, in our case the first molars erupted in their normal positions bilaterally. In this case, lack of space between the first premolar and first molar as a result of early extraction of deciduous second molars might have prevented the eruption of second premolars bilaterally.

The intraosseous migration of teeth cannot be diagnosed on periapical radiographs since the tooth may be located horizontally under the root of adjacent teeth and close to the lower border of the mandible. Therefore, panoramic and occasionally occlusal radiographs are a minimum requirement for detection.[8,11]

Several studies reported distal migration of unerupted mandibular second premolars. [8,10,12,16,21,22] Bilateral migration of mandibular second premolars is an uncommon phenomenon, with few cases reported in the literature. Most reports focus on unilateral migration, as distal migration of unerupted premolars is generally observed on only one side of the mandible. As far as we know only one of them reported such distal migration of mandibular second premolars bilaterally.[10] Furthermore, this case emphasizes the importance of a comprehensive radiographic evaluation, given that such bilateral impactions are rarely detected in routine clinical exams. Our findings support the notion that early intervention and detailed radiographic analysis, particularly with panoramic views, are critical in cases with suspected impaction or unusual tooth migration patterns.

The management of intrabony migration is dependson the position of the migrated tooth, pathologic lesion and the presence of symptoms.[13] Treatment options for migrated premolars include, surgical exposure combined with orthodontic treatment, transplantation, and surgical extraction.[16]

Indications for surgical extraction of migrated second premolars include root resorption of adjacent teeth, neuropathic pain as a result of pressure to adjacent nerves, or cyst formation.[22] In asymptomatic cases with no clinical and radiographic signs of pathology, regular clinical and radiographic reviews should be considered.[13] Cystic and/or neoplastic changes are reported in 16% of cases in relation to unerupted teeth.[23] In our case report, both ectopic premolars and related wisdom teeth were surgically removed as the follicular spaces were considered to be enlarged that might have resulted in cyst formation.

CONCLUSION

This case involved bilateral impaction of mandibular second premolars, which were ectopically positioned beneath the developing third molars. Enlarged follicular spaces suggested an elevated risk for cyst formation. Surgical extraction was performed with meticulous nerve management, resulting in successful healing. The patient experienced only transient hypoesthesia, which fully resolved within a few weeks. Follow-up imaging confirmed complete healing, with no complications observed.

In conclusion, this case underscores the critical role of early diagnosis in identifying impacted and ectopically positioned teeth, especially in cases where asymptomatic presentations may delay detection. Routine radiographic examinations, including panoramic imaging and CBCT when necessary, are essential for the accurate localization and assessment of impactions and their relationship to nearby anatomical structures. Early diagnosis and management, comprising regular reviews, orthodontic and/or surgical treatments, is imperative to prevent possible complications.

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