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ORIGINAL RESEARCH ARTICLE

The prevalance and radiographic evaluation of mandibular second premolar migration: A retrospective study

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Abstract

Purpose: To investigate the prevalence and radiographic characteristics of migrated mandibular second premolars by using panoramic radiography.
Materials & Methods: The previously taken 27758 panoramic radiographs were evaluated regarding the determining the prevalence of mandibular second premolar migration. Thirty-six radiographs were excluded from the study due to not providing the inclusion criteria. 27722 radiographs were evaluated retrospectively by the same operator. In the diagnosis of migrated teeth, radiographic features and demographic characteristics were recorded.
Results: Nine migrated second premolar teeth were detected in the evaluation of all the radiographs (%0.03). The mean age of the cases was 37 years. All the migrated teeth were impacted, unilateral and the average distance between normal and migrated location was 41 mm. In most of migration case (in 6 case) absence of first permanent molar tooth was observed.
Conclusion: It is concluded that, if the mandibular second premolar tooth are not located at physiologic position on the dental arch, a panoramic radiographic examination should be recommended to view all the jaws and related structures. Early detection of dental migration may be beneficial to prevent the possible further complications.

Key words: Impacted tooth; migrated teeth; panoramic radiograph

Introduction

Dental ectopia is a rare clinical finding characterized by an alteration in the physiological eruption pathway in the jaws.[1-4] Dental migration, a type of ectopia, is the movement of unerupted teeth to an area distant from its normal position in the jaws.[1] Dental transmigration, also known as a rare anomaly, is the movement of impacted teeth to the contralateral side of the dental arch.[2,3] Dental transmigration mostly affects the permanent dentition especially the upper canines, the lower second premolars, canines and lateral incisors.[4] The prevalence of intraosseous migration of the mandibular second premolar teeth is 0.25% according the previous studies and males are less affected than females.[1,5-7] Dental migration is mostly seen in the second decades of the lide and unilateral migration of the mandibular premolars is more common.[5,7] The etiology of the second premolar migration is still unclear although the multifactorial conditions have been reported.

The buds of mandibular second premolar teeth germ develop under the roots of primary molars.[8] Once root resorption process of primary second molars is initiated and the permanent first molars are extracted before the physiological exfoliation cycle, mandibular second premolars may tend to migrate distally towards to the permanent second molar region.[6,8] The first angulation of the second premolars and the early loss of the primary second molars are crucial factors regarding the distal migration. The process of migration continues until encountering with the another impacted or unerupted teeth.[4] Migrated teeth are also associated the abnormal eruption and masticatory forces.[9,10] On the other hand, other etiological factors are neoplasms, cysts, early loss of primary teeth, tooth retention, arch crowding, and supernumerary teeth.[11] The ob-

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jective of this research is to determine the prevalence and probable etiological factors of the migration of the second premolar teeth by using radiographic assessments.

Materials and Methods

This retrospective research was performed on panoramic radiographs taken from the patients who referred Oral and Maxillofacial Radiology Department. Ethical approval was obtained for this study (Uşak University Faculty of Medicine Ethics Committee Decision No: 202-06 Date: 19.06.2019). 27758 panoramic radiographs were evaluated regarding the determining the prevalence of mandibular second premolar migration. The following inclusion criteria were used to select the panoramic radiographs in this study:

1. No symptoms of multiple supernumerary teeth
2. No symptoms or evidence of syndromic features
3. No symptoms of skeletal problems
4. The age of the participants would be 13 or older.

Thirty-six radiographs were excluded from the study due to not providing the inclusion criteria. 27722 radiographs were evaluated retrospectively by the same oral radiologist. The radiological findings of migrated premolar teeth were recorded according to the following evaluation methods:

- Age and gender
- Medical history
- Migration pathway
- Right/left side of jaw
- Unilateral/bilateral
- Diagonal radiographic distance to normal position
- Eruption/impaction status
- Presence of primary second molar
- Absence of permanent first molar
- Absence of additional pathology
- Treatment history.

Results

In all the radiographs evaluated in the study, 9 migrated mandibular second premolar teeth were found (6 female, 3 male) (0.03%). All of the migrated teeth were unilateral, unerupted and the range of the age was between 18 to 67 (mean 37). Six of migrated teeth were located at left side of mandible and three were at right (Table 1).

In all affected cases, in six case, persistent primary second molar was observed without successors. All the migrated teeth had moved towards to distal direction. The distance among normal and migrated position were measured between 25.4-60.5 mm (mean 41 mm). While three migrated teeth had no pathologies, cystic lesion was observed in one case. Additionally, five of the cases had pre-eruptive intracoronal resorption (PIR). The case having cystic lesion was treated with enucleation and tooth extraction (Figure 1-6).

Discussion

Impaction is termed partially or totally uncomplete tooth eruption and impacted teeth have not erupted in dental arch beyond the physiological exfoliation time.[12] Inadequate dental arch length, supernumerary teeth, early loss of primary teeth, retention, dento-alveolar trauma, long-term chronic inflammation, developmental anomalies, crown/root malformation, genetic disturbances, neoplasms and cysts may be the etiological factors of impaction.[13,14] The most common impacted teeth are

Table 1. Clinical and radiographical features of migrated mandibular second premolar

Patient Number	Age	Sex	Medical History	Dm	Side	Uni / Bi	Distance	Er / Im	Primary Second Molar	Extracted of per. 1.m	Associated Pathology	Treatment Protocol
1	67	F	N.A	D	L	Uni	52,4 mm	I	CE	Yes	None	Observation
2	24	F	N.A	D	R	Uni	29,6 mm	I	CE	Yes	PIR	Observation
3	30	M	N.A	D	L	Uni	25,4 mm	I	CE	No	Cyst	Extraction
4	18	F	N.A	D	L	Uni	27,4 mm	I	CE	No	None	Observation
5	32	F	N.A	D	L	Uni	39,5 mm	I	CE	Yes	PIR	Observation
6	35	M	N.A	D	L	Uni	28,5 mm	I	CE	No	PIR	Observation
7	66	M	Cholesterol	D	L	Uni	53,5 mm	I	CE	Yes	PIR	Observation
8	36	F	N.A	D	R	Uni	60,5 mm	I	CE	Yes	PIR	Observation
9	27	F	N.A	D	L	Uni	52,1 mm	I	CE	Yes	None	Observation

F; Female, M; Male, N.A; Not Available, Dm; Direction of Migration, D; Distal, R; Right, L; Left, Uni / Bi; Unilateral / Bilateral, mm; millimeter, Er / Im; Eruption / Impaction, I; Impact, CE; Exfoliated Primary Second Molar, CR; Retained Primary Second Molar, Per; Permanent, m; molar;,PIR; Pre-eruptive Intracoronal Resorption

Figure 1. The impacted premolar has observed at angulus mandible in Patient number(PN 9)

Figure 2. An impacted right mandibular second premolar with the exfoliated primary second molar, located in right ramus mandible (PN 8)

Figure 3. An impacted left mandibular second premolar has observed next to impacted mandibular third molar crown (PN 4)

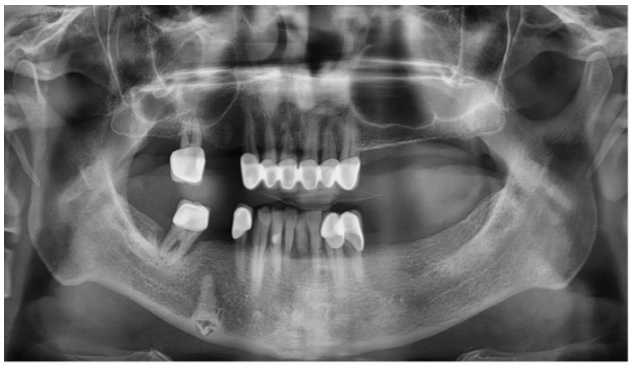

Figure 4. An impacted right mandibular second premolar at the mandibular lower edge (PN 6)

Figure 5. An impacted left mandibular second premolar associated with PIR (PN 7)

mandibular third molars followed by maxillary third molars, maxillary canines, mandibular canines, mandibular premolars, maxillary premolars, maxillary central incisors and maxillary lateral incisors.[14] Intraosseous tooth migration is a rare condition that occurs mostly in the lower jaw, especially in canines and second premolars.[15] According the results of the present retrospective study, we found 6 migrated premolars with the absence of permanent first molar. However, there is no additional information about timing of the extraction of permanent first molars. Thus, it is not certain that early loss of permanent firs molars could be the reason for the second premolar migration. In the present study, the mean distance between the normal position and migrated position of the mandibular second premolars was 40 mm. However, Okada et al. reported that approximately 10 mm movement of migrated mandibular premolars.[16] The over-distance of migration of impacted premolars showed that migrated tooth had continued until encounter any intrabony obstruction. Five of the 9 migrated mandibular premolars were associated with PIR. PIR is the radiolucent lesion that often appears in the coronal dentin, adjacent to the dentoenamel junction of unerupted teeth.[17,18] The authors have decided to follow-up all the migrated teeth with PIR. One of the 9 migrated mandibular premolars had cystic lesion and this case was treated by tooth extraction and enucleation of the cystic cavity. In this dental anomaly, clinical and radiological findings should be carefully investigated. Treatment options of the migrated teeth are surgical treatment, transplantation, orthodontic traction or periodic observation. If the migrated tooth is asymptomatic, it should be monitored by radiographic examination.[11] In case of dental follicle expansion or other pathologies such as infection, cyst, neurological symptoms, periodontal damage/root resorption in adjacent teeth extraction should be considered. In case of absence of mandibular second premolar on dental arch, panoramic radiograph should be advised, due to the potential distant migration. Migrated mandibular second premolars are often horizontally positioned

Figure 6. An impacted left mandibular second premolar associated with a cystic lesion (PN 3)

below the apices of the permanent teeth and near the border of the mandible. Therefore, periapical radiographs are not beneficial in the diagnosis of migration. According to the findings, radiographic examination of this entity should include panoramic radiographs, occlusal radiographs and cone beam or multidedector computerized tomography.[16,19]

Conclusion

The migration of mandibular second premolars is a rare asymptomatic condition. If mandibular second premolars are not seen on dental arch, panoramic radiographical examination should be performed due to potential distant migration. Migration-related complications may occur later stages of the life and early diagnosis of migration helps preventing the further complications.

Author Contributions

Study Idea / Hypothesis: H.T.Y., I.K. Study Design: A.T. Data Collection: H.T.Y., I.K. Biological material handling / collection: I.K., A.T. Literature Review: H.T.Y., I.K. Analysis and / or Interpretation of Results: I.K., H.T.Y. Article Writing: A.T. Critical Review: I.K., H.T.Y., A.T.

Conflict of Interest

Authors declare that have no conflict of interests.

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