Prevalence of impacted permanent mandibular second molars in South Indian population: A cross-sectional study

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ABSTRACT

Aims: The aim of this study is to retrospectively determine the prevalence of impacted second molars and associated dental and radiographic findings in South Indian population.

Settings and Design: Cross-sectional design.

Materials and Methods: Dental records of 4976 patients depending on the selection criteria from various dental clinics in South India were retrospectively analyzed in this study. All selected radiographs and records were examined by the two authors. The angle of impacted second molars was also recorded on panoramic radiographs. Data were tabulated and analyzed.

Results: The prevalence of impacted second mandibular molars was found to be 0.16%. In seven cases, the impaction was unilateral with three on the left and four on the right, and in one case, it was bilateral. The prevalence was found to be more in females than males. The angle of impaction was found to range from 19° to 80°.

Conclusions: Although the prevalence of impacted second molars is low, it is crucial to diagnose early for optimal treatment.

Key words: Impacted second molars, prevalence, second mandibular molar

Impaction is defined as failure of tooth eruption caused by a physical obstacle in the eruption path or the abnormal position of the tooth.[1] The commonly impacted permanent teeth are usually the third molars, maxillary canines or central incisors, and mandibular second premolars.[2] Nevertheless, the occurrence of impacted second molars is on the rise in today’s clinical practice.

The prevalence rate of impaction of permanent molars is 0.08% for second maxillary molar and <0.01% for the first mandibular molar.[3] Literature search revealed that there are not many studies that have reported the prevalence of impacted second mandibular molars. In a radiographic study of 5000 American army recruits, it was 0.06%.[4]

The prevalence seemed to be higher when patients of younger age were included. Varpio and Wellfelt[5] found 88 such cases among 10–19-year-olds in the public dental service in Sweden between 1960 and 1974, and estimated the prevalence to be 0.15%. A higher prevalence of 0.3% was found by Johnsen,[6] who examined radiographs of 1032 young people, aged 8–18, in the United States. In a radiographic study of 1041 12-year-old Hong Kong Chinese children in 1988, the prevalence of impacted permanent mandibular second molars was 0.58%.[7] Literature search also revealed the prevalence of impacted mandibular second molars in other similar population.[8–11] Since there was a paucity of this data in the Indian population, the current study was undertaken. Thus, the aim of the present study is to investigate the prevalence of impacted permanent mandibular second molars and associated dental and radiographic findings in South Indian population.

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MATERIALS AND METHODS

Dental records within 10 years obtained from 4976 patients of various dental clinics in South India were retrospectively analyzed in this study. The selection criteria were as follows:

- Records belonging to the period from 2004 to 2014
- Indians and older than 14 years
- No history of orthodontic treatment
- No hereditary diseases or systemic syndrome
- Unilateral or bilaterally impacted permanent mandibular second molars observed in the good-quality panoramic radiographs of the patients taken earlier for other reasons.

For all patients in the sample, the annual records and panoramic radiographs, in some instances supplemented by periapical and occlusal radiographs, were examined. The selected dental records and radiographs were examined by the first author. Demographic data and dental findings for these patients were recorded. All selected radiographs and records were re-examined by the second author, and the results of the two examinations were compared for discrepancies. Data were tabulated and analyzed for distribution by sex and side of jaw, as well as for associated malocclusion.

The angle of inclination of the impacted second molar was calculated by tracing the radiographs on overlying matte acetate paper. A line, which was perpendicular to the tangent to the tips of the cusps, was drawn through the middle of the crown and root of the impacted second molar, and another was drawn on the adjacent permanent first molar. The angle between these lines was measured twice, and the mean of the two measurements was taken as the angle of impaction.

RESULTS

The dental records of the 4976 patients with an age range of 15–67 years from various clinics in South India were reviewed. Impaction of one or both permanent mandibular second molars was found in eight patients [Figures 1–4], of which six were females and two were a male. The resulting prevalence of impacted second mandibular molars was found to be 0.16%. The male:female ratio was found to be 1:3. In seven cases, the impaction was unilateral, and in one case, it was bilateral. Of the seven unilateral impactions, three were on the left and four on the right [Table 1]. The frequency of impacted second molars was found more on the right than on the left. All the cases presented with mesioangular impactions except one case that had a distoangular impaction.

All eight cases had either developing or impacted third molars. All cases have a significant malocclusion that required orthodontic intervention. Only one patient had both the first and second molars impacted. None of the cases reported missing first molars. The associated dental and radiographic findings are summarized in Table 2. The angle of impaction was found to range from 19° to 80°.

DISCUSSION

The results of the present study showed that the prevalence of impacted second mandibular molars in South Indian population is 0.16%. This may be an underestimation as panoramic radiographs are not routinely taken for all the patients in clinical practice, and some deep impactions may have gone unnoticed. In spite of this, the prevalence was found to be a little higher than few other populations. This can also be due to the larger tooth size in Indian population although the association has not been proved.

The molar impactions are difficult to prevent and detect early due to their multifactorial etiologies. The etiology of impaction may be related to an insufficient arch length, excessive tooth size, or excessive axial inclination. According to Andreasen et al., three main causes have been identified for eruption disturbances: Ectopic position, obstacles in the eruption path, and failures in the eruption mechanism. Failure of tooth eruption is associated with various systemic and local factors. Heredity is also mentioned as an etiologic factor. Recently, mutations in parathyroid hormone receptor 1 have been identified in several familial cases of primary failure of eruption. The iatrogenic factors contributing to the second molar impaction are incorrectly fitted bands cemented onto the first molars, prevention of mesial drift of the first molar caused by a lip bumper or lingual arch therapy, and excessive tip back of the first molar during previous orthodontic treatment.

In the normal growth and development process, the second permanent molar tooth buds are distal to the first permanent

| Table 1: Overall prevalence of number of patients with impacted mandibular second molars in 4976 patients |
|---------------------------------------------------------------|
| **Gender**          | **Number of patients with impacted second molars** |
| Males               | 2 |
| Females             | 6 |
| Unilateral/bilateral| 7 |
| Unilateral          | 7 |
| Bilateral           | 1 |
| Among unilateral    | 10 |
| right/ left         | 3 |
| 37                  | 4 |
| 47                  | 4 |

| Table 2: Other associated dental and radiographic findings |
|----------------------------------------------------------|
| **Associated findings** | **Number of cases in present study** |
| Impacted third molars | All |
| Impacted first molar  | 1 |
| Malocclusion          | All |
molar and have a mesial inclination. This inclination is usually self-correcting as the resorption of the anterior border of the mandibular ramus occurs and the first permanent molar migrates into the leeway space for angular adjustment and eruption. However, this correction does not always happen, and the second molar can become impacted. Extraction of impacted second molars has been suggested to make room for unerupted third molars. Unfortunately, the eruption of the third molar in an upright position cannot be guaranteed.[19,20]

Problems associated with impacted second molars include caries, periodontitis, resorption of adjacent teeth, cyst formation, malocclusion, and pain.[21,22] Treatment options for an impacted molar include extraction, orthodontic uprighting, surgical uprighting, transplantation, surgical-orthodontic approach, and dental implant replacement.[21-24] Many orthodontic appliances and techniques have been suggested for uprighting impacted molars. A bonded attachment with a spring fixed in a vertical lingual sheath, push coil springs, interarch vertical elastics, a removable appliance with an uprighting spring, and miniscrews/miniplates have all been used for the uprighting of impacted molars.[2,25,26] Most of the aforementioned methods, however, have limitations in the approach of deeply impacted teeth or in the site of installation. The impacted angle plays an important role during treatment planning. In the present study, the angle of impacted tooth was calculated using a method proposed by Evans.[27]

The angle ranged from 19° to 80°, similar to that of other population.[27]

The proper time to treat impacted second molars is when the patient is 11–14 years old, whereas second molar root formation is still incomplete and before the third molars complete their development in close proximity to the second molars.[2,12] Once the chance of self-correction has been ruled; the various treatment options must be discussed. However, the early detection and appropriate correction helps in certain cases.

CONCLUSIONS

The prevalence of impacted mandibular second molars in South Indian population was low but slightly higher than the previous published reports in other populations. Although the occurrence is rare, it is crucial to diagnose early for optimal treatment time and reduction of complications.

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Conflicts of interest
There are no conflicts of interest.

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