



Analysis of Impacted Mandibular Second Premolar Finding Trough Panoramic Radiograph: A Case Report

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Received: October 4, 2024; Accepted: October 25, 2024; Published online: October 30, 2024

Abstract: An impacted tooth is a tooth that cannot erupt to its normal functional position after the development of the root. The mandibular second premolar is the third most impacted that can potentially cause problems in the tooth and surrounding structures. Panoramic radiography can detect and evaluate the impacted tooth, surrounding tissues, and possible pathologies including cysts and tumors. This study aimed to discuss the findings of impacted mandibular second premolar on panoramic radiograph. We reported a 13-year-old male patient who came to RSIGMP-UMI complaining of protruding upper front teeth and occasional food impaction in the right lower anterior molar area. Panoramic radiograph showed a vertical angulation of tooth 45, with the crown directed towards the occlusal line between teeth 46 and 44, and the apex directed towards the mandibular ramus border approaching the mandibular canal, with an inclination 0° and type I. Panoramic radiographs are essential in dentistry, particularly in orthodontic treatment. In this case, the radiograph revealed an impacted mandibular second premolar. Extraction of this tooth is often necessary for optimal treatment outcomes. However, in this case, the patient's parents were still hesitant to proceed with tooth extraction.

Keywords: impacted teeth; second premolar; panoramic radiography

INTRODUCTION

Radiography is one of the supporting examinations that can help dentists in establishing a diagnosis, determining a treatment plan for patients, and evaluating the results of previous treatments.¹ In the field of dentistry, the radiographic techniques consist of two types, namely intraoral and extraoral radiography. Extraoral radiography is a radiography examination used to look at large areas of the skull and jaw, and is divided into panoramic radiography and cephalometry radiography.²

Panoramic radiography is one of the most commonly used extraoral radiographic methods in dentistry, providing a comprehensive image of all dental tissues on a single film with low radiation dosage. This technique is effective in detecting and evaluating conditions such as impacted teeth, as well as various pathologies including cysts and tumors.^{3,4}

Impacted teeth are teeth that cannot erupt to their normal functional position after the development of the roots. It can be caused by bones, teeth, fibrous tissue, or their abnormal position. The mandibular second premolar is the third most impacted after the third molar and the maxillary caninus with the incidence generally varying between 0.2% - 0.3%. Impacted teeth can cause aesthetic, chewing, hygienic, and potentially problematic problems with the teeth and surrounding structures.⁵

The cause of premolar tooth impact can be local factors or systemic factors. Local factors include lack of space in the jaw arch, shifting of the teeth to the mesial due to premature detachment of the first molar teeth, abnormal/ectopic positions of premolar tooth growth, inflammatory or pathological lesions, such as cysts, etc. In addition, systemic factors such as vitamin D and calcium deficiency, endocrinopathy, developmental disorders, dwarfism, and genetic or environmental factors may also play a role.⁶

The development of the second premolar teeth of the mandible begins with coronary calcification between 24 and 30 months of age, and ends with the formation of a complete root that is estimated to occur between 12 and 14 years. Eruptions of the second premolar teeth of the lower jaw usually occur at the age of 11-12 years. Mandibular premolar teeth are susceptible to several anomalies, including: impaction, aplasia, and supplemental (additional premolars that erupt outside the normal sequence of teeth).⁷

CASE REPORT

A 13-year-old male patient came to RSIGMP-UMI escorted by his parents with complaints of the upper front teeth advancing forward and sometimes food was tucked in the right front molars of the lower jaw. The intraoral clinic examination showed that the front teeth had protrusion and an impact (partial eruption) of the second premolar of the right mandibula (Figure 1). The patient was then advised to have a panoramic radiographic examination.



Figure 1. Intraoral anterior view of the mandibula and lingual region

The results of the panoramic radiographic examination were, as follows: in area 1 (teeth-gelding) there was a vertical angulation position at tooth 45, with the crown pointing to the occlusion line between teeth 46 and 44, and the apical part pointing to the border of the mandibular ramus approaching the mandibular canal. Area 2 (Maxilla-Sinus-Nasal) showed tooth seeds 18, 27, 28. Area 3 (mandible) showed tooth seeds 38, 48. Area 4 (temporomandibular joint/TMJ) the

shape of the condyle-fossa-eminence of the right and left condyle head is round, and the position of the right and left condyle head in the glenoid fossa. Area 4 (temporomandibular joint/TMJ): the shape of the condyle-fossa-eminence of the right and left condyle head was round, and the position of the right and left condyle head was in the glenoid fossa. Area 5 (ramus-os vertebrae) was within normal limits (Figure 2).



Figure 2. Panoramic radiographic examination results

DISCUSSION

Radiography examination can be done with intraoral or extraoral radiography; one of the known extraoral radiography is panoramic radiography. Panoramic radiography, also known as panorex or orthopantomography (OPG), provides a broad picture of the structure of the facial bones and teeth.⁸

Panoramic radiography in dentistry is an extraoral radiographic technique that provides two-dimensional (2D) images of the teeth and maxillofacial skeleton. It is a valuable diagnostic tool for treatment planning, as it allows for a single image of all teeth, the mandible, maxilla including most of the maxillary sinus, hard palate, and TMJ.⁹

Panoramic radiography has the advantages of being able to obtain a large area drawn and all tissues including anterior teeth, even when the patient is unable to open the mouth. Its positioning is relatively simple and requires little expertise. The overall image of the jaw allows for a quick assessment of the underlying disease, which may be unexpected, as well as the radiation dose (effective dose) may be lower. However, there are also some disadvantages such as the resulting images represent only a portion of the patient's condition where structures or abnormalities that are not in focus may not be visible, shadows or artifacts may obscure the structure in the focus through, not suitable for children under six years or in some patients with disabilities due to the length of the exposure cycle, and patient movements during exposure can cause difficulties in interpretation.¹⁰

The term impact comes from the term "*impactus*" in Latin. It generally refers to the failure of an organ or structure in reaching its normal position due to abnormal mechanical conditions.¹¹ According to the World Health Organization (WHO), an impacted tooth is a tooth that cannot fully erupt at its normal functional occlusion/location as of the expected age of the eruption, because it is obstructed by soft tissue or bone or other teeth on it.¹² Durbeck WE (1943) defined dental impaction as the cessation of tooth eruption, which is caused by a physical barrier that can be detected by clinical or radiological examination of the eruption path or by the ectopic position of the tooth. Physical obstructions can be nearby teeth, dense bone, fibrous tissue or other pathologies or lack of space, or abnormal eruption paths.¹² According to Archer (1975), an impacted tooth or embedded tooth is a tooth that fails to erupt completely in its normal position on the tooth arch, and the potential for eruption has disappeared.^{11,12}

There are various theories that explain the occurrence of impacted teeth. One of them is the mismatch between the size of the jaw and the size of the teeth. Another theory that supports the occurrence of dental impaction is a change in eating habits that does not stimulate jaw growth enough to cause impact.¹³

Factors that cause tooth impact, such as lack of space, cysts, supernumerary teeth, retention of the first tooth, infection, trauma, anomalies and systemic conditions.^{14,15} The teeth that most often experience impaction are the third molar teeth followed by the upper canine teeth of the premolar teeth ranked third at 0.2-0.3%. The impacted lower premolars are usually located in the mid alveolar and lingual, very rarely located in the buccane. Usually when the premolar teeth are located in the lingual, they will be palpable through palpation. If the tooth palpation is not palpable, it is likely that the tooth is located in the mid alveolar.⁵

The prevalence of premolar impaction has been found to vary with age. Premolar impaction may be caused by local factors such as dental mechanical shifts arising from premature loss of the first molars; ectopic position of developing premolar tooth seeds or pathological conditions such as inflammatory cysts or dentigerous cysts. In addition, it can also be related to the first molar tooth that is over-retained or infraoclusal or with syndromes such as kleidocranial dysostosis.¹⁴ Caninus teeth and premolars are often directed to erupt spontaneously or by using orthodontic traction. However, if this alternative is not suitable, then extraction is often carried out.¹⁶

The premolar of the lower jaw erupts after the first molar of the lower jaw and the canine of the lower jaw, so if the space for the eruption of the premolar teeth is inadequate, one of the premolar teeth usually remains unerupted and may be affected by more impact.¹⁴ Lack of space for mandibular premolar eruption can be caused by differences in the size and length of the tooth arch due to the second premolar tooth being too large. Abnormal shape, or having a lot of cusp, Severe damage/premature loss of the second molar tooth of the first molar that causes the adjacent permanent first molar tooth to shift/tilt to the mesial, and ectopic eruption of the mesial ectopic of the first permanent molar tooth causing the loss of the second molar tooth of the first molar early.⁷

The treatment of choice for impacted teeth includes observation, intervention, relocation, and extraction, depending on the position of the teeth, the depth of the impacted teeth, the relationship with neighboring teeth, and orthodontic treatment. The initial treatment plan for the patient involved orthodontic treatment, which required the extraction of the impacted mandibular premolar. However, the patient's parents have not yet consented to this procedure. Intervention may involve a simple extraction from the tooth, usually a primer. It may be necessary to have a permanent tooth extraction depending on the etiology of the impact and the specific tooth affected by the impact. Interventions may include a short period of orthodontic treatment for impact dental care. Relocation refers to the surgical repositioning of an impacted tooth or, more commonly, an orthodontic eruption of an impacted tooth. Orthodontic relocation, illustrated in patients, may take longer, but fewer long-term complications.¹⁴

The new classification for the impacted mandibular second premolar is shown in Figure 3 and Table 1. The literature specifically for the premolar of the lower jaw is not extensive despite the fact that the second premolar of lower jaw alone accounts for about 24% of all dental impacts. In choosing the right treatment, the underlying etiological factors, space requirements, the need for extraction of the first molar, the degree of impact and the formation of impacted premolar roots should be considered. Factors such as the patient's medical history, dental status, oral hygiene, functional and occlusal relationships as well as attitudes and adherence to treatment will influence the treatment chosen.¹⁴

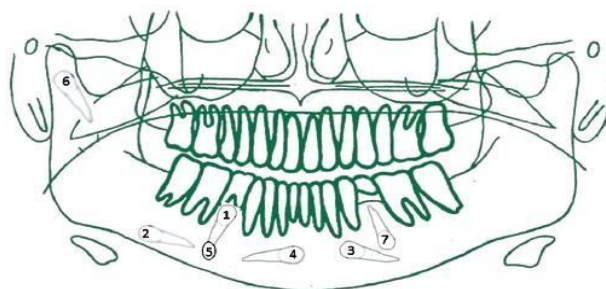


Figure 3. Classification of impacted mandibular premolar¹⁴

Table 1. Classification of impacted mandibular premolar¹⁴

Types	Position	Description	Therapy
Type 1	Inclination 0°	Being on a curved line, the removal of the molars and sufficient space can allow an eruption to occur.	Can be easily maintained.
Type 2	Mesial inclination	It is located in the mandibular body under the apex of the molar teeth.	It is observed that surgery can be performed if the tooth is related to the cyst.
Type 3	Distal inclination	It is below the apex of the canine/ incisivus of the same side but does not cross the center line.	Surgical repositioning can be performed depending on the inclination position and if it is not possible, tooth removal surgery cannot be performed.
Type 4	Mesial inclination	It is transmigrated and positioned under the incisor apex that crosses the centerline.	Tooth removal surgery is recommended.
Type 5	Inclination 90° (horizontal)	It is rare to find and cannot erupt.	Tooth removal surgery is recommended.
Type 6	Position on the ramus ascendens or processus coronoideus or condyles	It is rare to find and treat if there are symptoms or have a pathological condition such as cysts.	It is observed that surgery can be performed if the tooth is related to the cyst.
Type 7	180° inclination, inverted position	It is rarely found and cannot erupt into the oral cavity.	Tooth removal surgery is recommended.

Management of mandibular premolar dental impaction in adults is a challenge meanwhile in asymptomatic patients, strict observation without surgery is highly recommended. Surgical removal of impacted mandibular premolar teeth can be decided if there is patient's complaint or if necessary for rehabilitation reasons.¹⁷

In this case, the patient falls under the classification of type 1, with inclination 0°, located on the curve of the arch. The extraction of the primary molar and the sufficient space will allow for possible eruption. Treatment could be easily performed, however, the patient's parents were hesitant for further treatment.

CONCLUSION

Panoramic radiography is a crucial diagnostic tool in orthodontics. Dentists can use it to evaluate impacted teeth, tooth growth patterns, and detect other abnormalities that may affect the treatment plan. In this case, where the patient initially planned for orthodontic treatment, a panoramic radiograph revealed an impacted mandibular second premolar. Although orthodontic treatment can yield good results, extraction of the impacted tooth is often necessary for optimal outcomes. However, in this case, the patient's parents were hesitant about proceeding the extraction.

Conflict of Interest

No conflict of interest in this study.

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