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Comprehensive Management of Impacted Teeth in a Pediatric Patient: A Case Report

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KEYWORDS

Tooth eruption, Impaction, Primary dentition, Permanent successor, Primary Molar, Unerupted.

ABSTRACT:

Any disruption in the tooth eruption process can lead to various eruptive disturbances, including impaction, ectopic eruption, and delayed eruption. While these issues are more commonly observed in permanent teeth, the incidence of primary tooth impaction and eruption failure is exceptionally rare. Tooth impaction is defined as the failure of a tooth to erupt into its normal functional position, remaining unerupted in the jaw beyond its expected eruption time. In primary dentition, the most commonly impacted teeth are the second primary molars, followed by the central incisors. Impaction of the primary tooth results in displacement of the succedaneous permanent tooth and in turn disturbs the growth of the permanent dental arch, root resorption of permanent teeth, cyst formation and malocclusion. In addition to these, other clinical consequences seen with impacted primary molars are impaction of permanent successors, loss of arch length, alveolar bone defects, and occlusal disturbances. Therefore, it is highly essential for the detection and treatment of impacted primary teeth as early as possible. This report presents a clinical case of a young patient with impacted teeth (Primary second molar 75 and Permanent premolar 35), outlining their management and follow-up.

1. Introduction

Tooth impaction is a pathological condition wherein a tooth fails to erupt into its functional position within the dental arch due to obstructions such as supernumerary teeth, odontomas, dense overlying bone, or insufficient arch length. As a result, the tooth remains retained within the alveolar bone beyond its expected chronological eruption time. Tooth impaction is categorized into primary and secondary types. Primary impaction refers to the failure of a tooth to erupt, remaining embedded within the alveolar bone from the outset. Secondary impaction, also known as infraocclusion or submergence, occurs when a previously erupted primary tooth becomes re-impacted, often due to ankylosis. Various etiological factors may contribute to primary tooth impaction, including odontogenic tumors such as odontomas, ankylosis, agenesis of the permanent successor, periodontal ligament anomalies, traumatic injury to the developing tooth germ or supporting structures, early eruption of the permanent first molar, insufficient eruptive force, or a combination of these factors. In some cases, the cause remains idiopathic and may be linked to genetic predisposition. Secondary impaction typically results from a gradual loss of occlusal function, leading to infraocclusion due to the absence of compensatory vertical growth of the alveolar bone beneath the affected deciduous tooth[1]. Incidences of impaction and eruption disturbances in the primary dentition are uncommon when compared to those observed in the permanent dentition. Among impacted primary teeth, the mandibular and maxillary second primary molars exhibit the highest prevalence, followed by the maxillary and mandibular primary central incisors[2]. Impacted primary teeth can lead to ectopic eruption or displacement of the underlying succedaneous permanent teeth, thereby disrupting the normal development and alignment of the permanent dental arch. In cases involving impaction of primary molars, the successor, typically the second premolar may erupt in an aberrant position, occasionally presenting occlusally to the impacted primary molar[3]. This article presents a case report detailing the surgical extraction of an impacted mandibular second primary molar and its successor, the second premolar, located in close proximity to the mental foramen and inferior alveolar nerve[1].

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2. Case Report

An 11-year-old female patient reported to the Department of Orthodontics with the chief complaint of spacing between her teeth and expressed a desire for correction. Orthodontic treatment was planned to address the space closure. As part of the diagnostic workup, an orthopantomogram (OPG) was obtained, which revealed an impacted mandibular second primary molar (75) along with its succedaneous second premolar (35) **[FIG 1].** Consequently, the patient was referred to the Department of Paedodontics and Preventive Dentistry for further evaluation and management of the impacted teeth. An intraoral periapical radiograph and Cone beam computed tomography (CBCT) was obtained for enhanced visualization of the impacted teeth **[FIG 2, FIG 3]**. Following thorough clinical and radiographic assessment and careful consideration of the available treatment options, it was decided to proceed with a surgical intervention for the extraction of both the impacted deciduous and permanent teeth in this case. After obtaining informed consent from the parent regarding the potential risk of injury to the mental foramen, inferior alveolar nerve and the possibility of postoperative paresthesia, the procedure was carried out under sterile conditions. Local anesthesia was administered using 2% lignocaine with 1:80,000 adrenaline. A crevicular incision along with a vertical releasing incision was made on the mesial aspect of tooth 34 to reflect a full-thickness mucoperiosteal flap using BP Blade no:15 **[FIG 4]**, with caution taken to avoid injury to the mental foramen and its neurovascular contents. Osteotomy was performed using a micromotor handpiece and carbide bur under copious saline irrigation to create a cortical window for access. The impacted deciduous molar (75) was visualized; however, due to limited accessibility from the buccal approach, a secondary space was created on the lingual aspect **[FIG 5]**. Subsequently, the underlying permanent premolar (35) was atraumatically luxated and extracted using an elevator and extraction forceps **[FIG 6]**. Through the buccal approach, the impacted deciduous molar (75) was surgically sectioned and extracted in multiple fragments **[FIG 7, FIG 8].** Hemostasis was achieved by compressing the extraction socket, followed by thorough inspection to ensure complete removal of all root remnants. The surgical flap was then repositioned and secured using black silk sutures [FIG 9]. The patient was placed on postoperative follow-up. At the one-week review, sutures were removed and the site was evaluated, revealing satisfactory healing. At the 3-month follow-up, complete healing of the extraction site was evident both clinically and radiographically **[FIG 10]**. Subsequently, the patient was referred back to the Department of Orthodontics for continued management and to facilitate proper alignment of the teeth within the dental arch.

Figure 1: Pre operative OPG revealing the impacted primary (75) and permanent (35) teeth

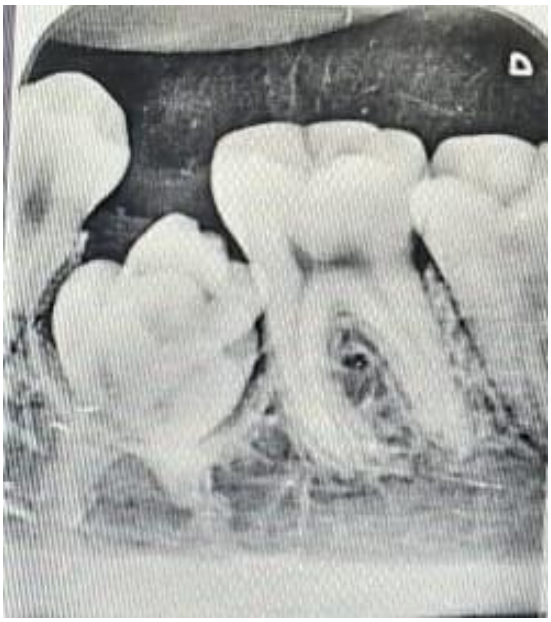

Figure 2: Intraoral periapical radiograph revealing the closer view of the impacted teeth

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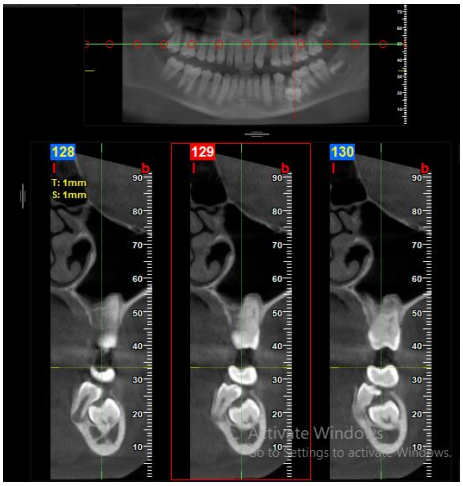

Figure 3: CBCT image revealing the impacted teeth in close proximity to the mental foramen

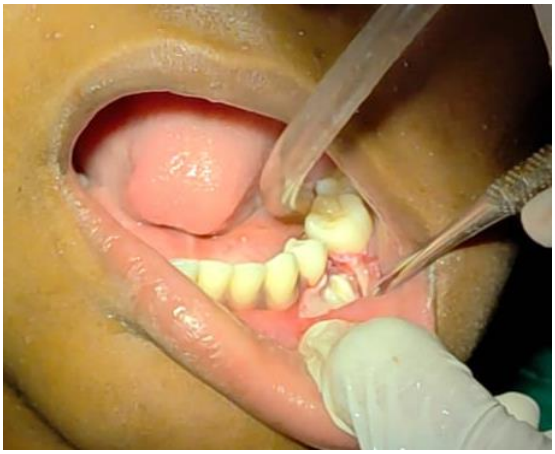

Figure 4: Flap elevated exposing the impacted tooth

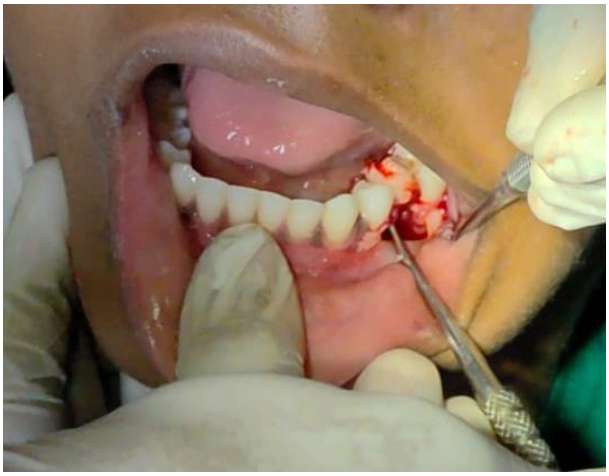

Figure 5: Space created in the lingual aspect for premolar removal

Figure 6: Extracted 35

Figure 7: Removal of 75 in fragments

Figure 8: Sectioned fragments of the impacted deciduous molar and premolar teeth

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Figure 9: Suturing and Soft Tissue Closure

(a)

(b)

Figure 10: Three-Month Follow-Up: Intraoral (a) and OPG Imaging (b)

3. Discussion

Tooth eruption is defined as a movement of a tooth from its intraosseous site to its functional position of occlusion (Massler & Schour, 1941)[4] The exfoliation of primary teeth is a normal physiological phenomenon that occurs through progressive root resorption. This resorptive process is primarily stimulated by the eruptive pressure of the underlying succedaneous tooth. Monocytes present in the periodontal ligament differentiate into odontoclasts, which actively degrade the root structure of the deciduous tooth, functioning similarly to osteoclasts involved in bone remodeling. Remarkably, this mechanism proceeds without eliciting an inflammatory response[1]. Impaction of a primary tooth can alter the eruption path of its underlying succedaneous permanent tooth, potentially resulting in its displacement and disruption of normal arch development. Such disturbances may lead to complications including external root resorption of the permanent successor, formation of odontogenic cysts, and the development of malocclusion. In particular, impacted primary molars may contribute to secondary impaction of premolars, loss of arch length, alveolar bone contour abnormalities, and occlusal discrepancies.

In our case, an impacted mandibular second premolar and second primary molar were identified during orthodontic treatment planning and subsequently confirmed through radiographic evaluation. A panoramic radiograph revealed infraocclusion of the mandibular right second primary molar, along with the developing mandibular right second premolar. Further assessment using three-dimensional cone-beam computed tomography (CBCT) demonstrated impaction of the second primary molar, with the associated permanent successor tooth germ displaced apically beneath the resorbed roots of the primary molar. Concurrent impaction of both a deciduous molar and its corresponding premolar is an uncommon finding, with only a few cases reported in the literature[1].

In certain scenarios, early impaction of a primary molar may result in the developing premolars erupting in a more coronal and buccal position compared to their deciduous counterpart, as documented by Borsatto et al. However, in our case, the impacted primary tooth was located apically to the unerupted premolar. With time, impacted and unerupted teeth may become progressively more submerged within the alveolar bone due to continuous osseous deposition, increasing the risk of complications and highlighting the importance of early diagnosis and intervention[5].

Journal of Chemical Health Risks

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In the present case, the development of tooth 75 appears to have been arrested, while the tooth germ of 35 has initiated its path toward occlusion. The current scenario suggests that tooth 35 is progressing toward eruption into the oral cavity. This condition has been described by the authors as "reverse dentition"[2]. This case report represents a notable example of reverse dentition.

"Nagaveni N.B. (2024) recently introduced a novel classification system for primary mandibular molar impaction, comprising three distinct levels based on the degree of impaction."

Types of Level of Impaction

- Type I **Moderate Impacted primary molar** placed below the level of cervical third of adjacent erupted teeth within the alveolar bone
- Type II **Severe Impacted primary molar placed** within the alveolar bone, with its root apices almost close to the mandibular canal
- Type III **Extremely severe Impacted primary molar** placed within the alveolar bone with its root apices touching the inferior border of the mandible

Based on this classification, our case report falls under **Type III – Extremely Severe Impaction**, where the primary molar is deeply embedded in the jawbone, with its roots in contact with the lower border of the mandible. Managing such cases can be quite challenging**,** and the treatment must be carefully planned and carried out to avoid any injury to nearby structures, such as the developing permanent tooth bud and the inferior alveolar nerve[3].

The standard management for an impacted primary tooth typically involves surgical extraction. However, this procedure carries inherent risks, such as potential injury to the mental foramen or inferior alveolar canal. Anatomical studies have shown that the location of the mental foramen is not fixed; for example, Fishel et al. reported that in approximately 70.4% of cases, it is found between the root apices of the first and second premolars.

Other research highlights the vertical positional variability of the mental foramen within the mandible. As a result, it becomes essential to precisely localize the inferior alveolar canal and mental foramen in relation to the impacted tooth through radiographic or CBCT assessment. A thorough evaluation of the inferior alveolar neurovascular bundle and mental nerve pathway is imperative prior to any surgical intervention to minimize the risk of neurological or vascular complications. This point has been emphasized as our case closely mirrors such a scenario as the root apices of the primary mandibular molar was present in very much close approximity to the mental foramen. The anatomical positioning of the impacted tooth in our patient presents similar considerations, making it essential to take the same precautions regarding the location of vital structures like the mental foramen and inferior alveolar canal[5].

Treatment planning for an impacted tooth must take into account various clinical and radiographic factors, including the tooth’s angulation, spatial orientation, root morphology, presence of root anomalies or resorptive defects, available arch space, associated pathological findings, and proximity to the developing permanent tooth germ.

If the impacted tooth demonstrates favorable parameters such as adequate eruption space, appropriate axial positioning, and absence of developmental or structural abnormalities, a conservative surgical uncovery may be advised. This involves the removal of any obstructive soft tissue, bone, or lesion overlying the crown to facilitate natural eruption. The tooth is then observed for up to three months for signs of spontaneous eruption. If eruption fails to progress within this timeframe, orthodontic traction can be considered to assist eruption into the dental arch[6].

Conversely, if spontaneous eruption is deemed improbable due to factors like ankylosis, altered eruption trajectory, or the presence of pathology with potential for cystic or neoplastic transformation, surgical extraction is indicated. In such cases, placement of a space maintainer is recommended to preserve arch integrity and guide future occlusal development[7].

In our case, surgical extraction of both the impacted primary molar and its associated permanent successor was planned, as it was not feasible to remove the primary tooth without compromising the permanent tooth. Additionally, retaining the premolar for orthodontic purposes was deemed unviable due to its poor prognosis post-repositioning, given its incomplete

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JCHR (2025) 15(5), 3051-3056 | ISSN:2251-6727

root development. Following the extractions, the patient was referred back to the Department of Orthodontics for further evaluation and comprehensive treatment planning.

4. Conclusion

Early detection and timely removal of impacted teeth, which may lead to odontoma formation and cystic lesions, can improve outcomes by promoting optimal occlusion and functionality.

Pediatric dentists must identify impacted primary molars during the primary dentition stage to ensure the proper eruption of permanent teeth and minimize treatment complications.

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Nil.

Conflicts of Interest:

There are no conflicts of interest.

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