

## RESEARCH ARTICLE

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Manuscript received December 10, 2025; revised February 10, 2026; accepted March 15, 2026; date of publication April 30, 2026

Digital Object Identifier (DOI): <https://doi.org/10.35882/ijahst.v6i2.577>

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How to cite: Mouna Ben Salem, Abir Mannai, Yamina Elelmi, Fatma Masmoudi, and Ahlem Baaziz, "A Rare Case Report of Impacted Primary First Molar below the First Premolar", International Journal of Advanced Health Science and Technology, Vol. 6 No. 2, pp. 127-134, April 2026.

# A Rare Case Report of Impacted Primary First Molar below the First Premolar

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**ABSTRACT** Tooth impaction represents a disturbance in the normal eruption process, predominantly affecting permanent dentition, while its occurrence in primary teeth remains exceedingly rare. Such anomalies may lead to complications including delayed eruption of permanent successors, malocclusion, and potential damage to adjacent anatomical structures. However, limited evidence exists regarding the optimal management of impacted primary molars, particularly in atypical cases where the primary tooth is located inferior to its permanent successor. This study aims to report and evaluate the clinical management of a rare case involving an impacted mandibular first primary molar positioned beneath its succedaneous premolar, with emphasis on the outcomes of a conservative treatment approach. A 7-year-old male patient presenting with dental malposition underwent comprehensive clinical and radiographic examination, including panoramic radiography and computed tomography. Due to the close proximity of the impacted tooth to the mandibular canal and mental foramen, a non-invasive strategy consisting of periodic monitoring, space maintenance, and interceptive orthodontic treatment was implemented. Longitudinal follow-up over a five-year period demonstrated delayed but progressive development of the permanent premolar. Clinical and radiographic findings revealed initiation of eruption in 2024, followed by complete eruption in 2025 without surgical intervention or associated complications. These findings indicate that, despite initial developmental delay, spontaneous eruption remained achievable under careful supervision. In conclusion, conservative management with regular follow-up may represent a safe and effective alternative to surgical intervention in selected cases of impacted primary molars, particularly when anatomical risks are significant. This approach supports preservation of surrounding structures while allowing natural eruption processes, highlighting the importance of individualized, risk-based treatment planning in pediatric dentistry.

**INDEX TERMS** Tooth impaction, Primary molar, Conservative management, Delayed eruption, Pediatric dentistry

## I. INTRODUCTION

Tooth impaction is a clinically significant eruption anomaly characterized by the failure of a tooth to emerge into its functional position within the expected developmental timeframe. While impaction is relatively common in permanent dentition, its occurrence in primary teeth is considered rare, with reported prevalence rates below 1% [1], [2]. Despite its rarity, impacted primary teeth particularly molars pose considerable diagnostic and therapeutic challenges due to their potential to disrupt the normal eruption pathway of permanent successors and to induce complications such as space loss, malocclusion, and cystic changes [3], [4]. Therefore, early identification and appropriate management are critical to prevent long-term adverse outcomes in pediatric patients.

Recent advancements in pediatric dentistry emphasize the importance of radiographic imaging modalities, including panoramic radiography and cone-beam computed tomography (CBCT), for accurate diagnosis and treatment planning of impacted teeth [5], [6]. Contemporary management

approaches range from conservative observation to surgical and orthodontic interventions, depending on factors such as tooth position, eruption potential, and proximity to vital anatomical structures [7], [8]. In particular, minimally invasive strategies such as periodic monitoring have gained attention as viable options when spontaneous eruption remains possible and surgical risks are high [9], [10]. These approaches align with the growing trend toward patient-centered and risk-based clinical decision-making in dental practice [19].

However, despite these developments, the current body of literature remains limited in addressing rare positional anomalies involving primary teeth, especially cases in which a primary molar is located inferior to its permanent successor. Most existing studies focus on impaction patterns where the permanent tooth is positioned apically or occlusally relative to the primary tooth [11], [12]. Consequently, there is a lack of comprehensive evidence regarding the etiology, natural progression, and optimal management strategies for such atypical presentations. Furthermore, longitudinal data documenting conservative management outcomes in these

rare cases are scarce, creating uncertainty in clinical decision-making [13], [14].

In addition, several etiological factors have been proposed for tooth impaction, including genetic predisposition, local mechanical obstruction, developmental disturbances, and systemic conditions [15], [17]. Clinical implications of delayed eruption and impaction also extend to functional and esthetic disturbances, highlighting the importance of timely intervention and monitoring [18], [21]. Moreover, impacted teeth may lead to secondary complications such as root resorption, periodontal issues, and pathological lesions if not properly managed [22].

In light of these gaps, this study aims to present and analyze a rare case of an impacted primary mandibular first molar located inferior to its succedaneous premolar, managed through a conservative monitoring approach. The objective is to evaluate the clinical and radiographic progression of the condition and to assess the feasibility of non-invasive management in minimizing surgical risks while preserving normal tooth eruption.

This study contributes to the existing literature in several ways. First, it provides detailed longitudinal evidence on the natural eruption potential of a permanent successor in the presence of an atypically positioned impacted primary tooth. Second, it highlights the clinical decision-making process in selecting conservative management based on anatomical risk assessment. Third, it offers practical insights into the role of regular follow-up and space maintenance in preventing complications during delayed eruption [20]. These contributions are expected to support clinicians in managing similar rare cases with a more evidence-based and individualized approach.

The remainder of this article is structured as follows: Section II presents the case description, including clinical and radiographic findings; Section III discusses the results in relation to existing literature and explores possible etiological and therapeutic considerations; and Section IV concludes the study with key clinical implications and recommendations for future research.

## II. METHOD

This study was designed as a retrospective longitudinal case report aimed at documenting the clinical and radiographic progression of an impacted primary mandibular molar and evaluating the outcomes of a conservative management approach. Case report methodology was selected due to the rarity of the condition and the need for in-depth clinical observation over time, which is consistent with recommendations for reporting uncommon dental anomalies [22], [23].

### A. STUDY SETTING AND ETHICAL CONSIDERATIONS

The study was conducted at the Department of Pediatric and Preventive Dentistry, Faculty of Dental Medicine, University of Monastir, Tunisia. Ethical principles were strictly followed in accordance with the Declaration of Helsinki for research involving human subjects. Written informed consent was obtained from the patient's legal guardians prior to treatment

and for the use of anonymized clinical data and radiographic images for publication purposes. Patient confidentiality and data protection were maintained throughout the study [24].

### B. STUDY SUBJECT AND CLINICAL ASSESSMENT

The study involved a single subject, a 7-year-old male patient referred from the Department of Maxillofacial Surgery with complaints of dental malposition. Inclusion criteria for this report consisted of: (1) presence of an impacted primary tooth confirmed radiographically, (2) absence of systemic conditions influencing tooth eruption, and (3) availability of long-term follow-up data. The patient's medical history revealed a surgically treated unilateral labio-palatal cleft, while dental history showed no prior trauma or infection.

A comprehensive clinical examination was performed, including extraoral and intraoral assessments. Parameters evaluated included occlusal relationships, dental alignment, presence of carious lesions, and eruption status of primary and permanent teeth. The absence of the mandibular left first primary molar (tooth #74) was noted clinically, prompting further radiographic investigation.

### C. RADIOGRAPHIC EXAMINATION AND IMAGING PROTOCOL

Radiographic assessment constituted a critical component of the diagnostic process. Initial imaging included panoramic radiography to evaluate overall dentition development and identify the position of the impacted tooth. Periapical radiographs were subsequently used for detailed visualization of the tooth structure and surrounding tissues. To further assess the spatial relationship between the impacted tooth and adjacent anatomical structures, particularly the mandibular canal and mental foramen, cone-beam computed tomography (CBCT) was performed.

Standard imaging protocols were followed to ensure reproducibility, including patient positioning, exposure settings, and image calibration. Radiographic parameters assessed included tooth position, root development stage, presence of periodontal ligament space, and proximity to vital structures. The use of CBCT is supported by recent evidence for its superior diagnostic accuracy in evaluating impacted teeth and minimizing surgical risks [25], [26].

### D. TREATMENT PLANNING AND INTERVENTION

Treatment planning was based on a risk-benefit analysis considering anatomical, developmental, and behavioral factors. Due to the close proximity of the impacted primary molar to the mandibular canal and mental foramen, surgical extraction was deemed high-risk. Additionally, the presence of a developing premolar with potential eruptive capacity supported a conservative approach.

The selected intervention consisted of non-invasive management, including periodic clinical and radiographic monitoring combined with space maintenance. A fixed space maintainer was placed to preserve arch integrity and prevent mesial drift of adjacent teeth. Additionally, a Crozat appliance was used to correct posterior crossbite, thereby improving occlusal conditions and facilitating normal eruption patterns.

This conservative strategy aligns with current minimally invasive approaches in pediatric dentistry, which emphasize preservation of anatomical structures and avoidance of unnecessary surgical procedures when feasible [27], [28].

### E. FOLLOW UP AND OUTCOME ASSESMENT

The patient was monitored over a five-year follow-up period (2019–2025) with periodic evaluations conducted at approximately 6–12 month intervals. Each follow-up visit included clinical examination and radiographic imaging to assess the progression of the permanent premolar eruption and detect any potential complications.

Outcome measures included: (1) stage of root development of the permanent premolar, (2) evidence of eruptive movement, (3) presence or absence of pathological changes, and (4) maintenance of arch space. Radiographic comparisons were performed longitudinally to evaluate changes in tooth position and development. Clinical success was defined as the spontaneous eruption of the permanent premolar without the need for surgical intervention and absence of complications such as infection, cyst formation, or damage to adjacent structures.

### F. DATA ANALYSIS

Given the descriptive nature of a case report, data analysis was qualitative and observational. Clinical and radiographic findings were systematically documented and compared across different time points to identify patterns of eruption and treatment outcomes. The results were interpreted in the context of existing literature to assess the validity and clinical relevance of conservative management in similar cases [29].

## III. RESULTS

A 7-year-old Tunisian male patient was referred by the Department of Maxillofacial Surgery to the Pediatric and Preventive Dentistry Department, Faculty of Dental Medicine, University of Monastir, Tunisia, with the chief complaint of malocclusion and dental malposition. His medical history revealed a surgically treated complete unilateral labio-palatal cleft. His medical history did not reveal dental trauma or infection, and his family history was non-contributory. Extraoral examination revealed a lip scar and a convex profile **FIGURE 1**.



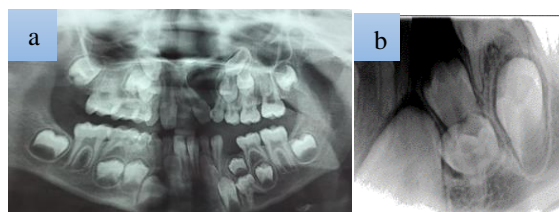
**FIGURE 1.** Extraoral photos

Intraoral examination revealed a carious lesion on the right maxillary canine, midline diastema, malpositioned teeth with posterior cross-bite ranges from the tooth #21 to the tooth #26, and the absence of the left first primary mandibular molar (tooth #74) **FIGURE 2**.



**FIGURE 2.** Intraoral Photos

Periapical and panoramic radiographs were obtained, which revealed that the tooth #74 was impacted **FIGURE 3**. The impacted tooth was located below the succedaneous first premolar, it had complete root development, and its root apices may be in narrow proximity to the mandibular canal. The presence of periodontal space around the roots of tooth #74 eliminated the possibility of ankyloses. In addition, agenesis of the permanent maxillary lateral incisors was observed. To obtain more details about the impacted tooth anatomy and its relationship with the mandibular nerve, a computed tomography scan was performed, which exhibited the proximity between the root apices of the impacted tooth and the mental foramen **FIGURE 4**.



**FIGURE 3.** a: Panoramic Radiograph taken in March 2019. b: Periapical radiograph



**Figure 4.** The Computed Tomography Scan

After comprehensive clinical and radiographic evaluation and considering this risk–benefit analysis, abstention and monitoring were deemed the safest and most appropriate options. However, the parents were explicitly informed that in the case of unsuccessful spontaneous eruption of the premolar, a combined orthodontic–surgical approach might be required. The treatment choice was based on several criteria:

- The close proximity of the root apices to the mandibular canal and the mental foramen, increasing the risk of nerve injury during extraction;

- b. the position of the tooth underneath the developing premolar germ, which raised concerns about potential damage to the succedaneous bud in case of extraction of the impacted primary tooth;
- c. the absence of symptoms, infection, or pathological signs, indicating that immediate intervention was not mandatory;
- d. the possibility of spontaneous eruption of the first premolar.

Written informed consent was obtained for clinical management and publication of the case report. A space maintainer was placed to preserve the arch space until the eruption of the first premolar, and a Crozat appliance was prescribed to correct the posterior crossbite, that ranges from the tooth #21 to the tooth #26 **FIGURE 5**.



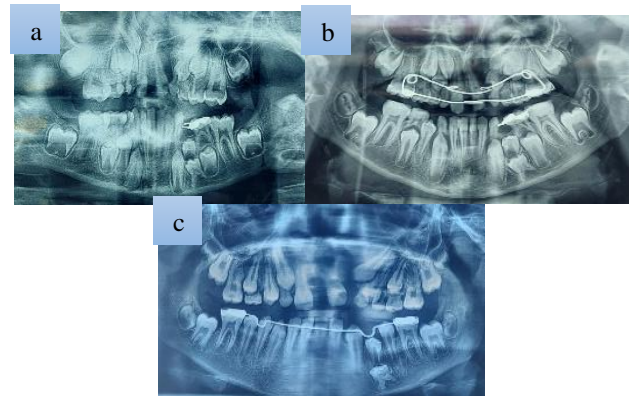
**FIGURE 5.** Intraoral Photo Showing the Space Maintainer and the Crozat Appliance

Periodic clinical and radiographic follow-ups were scheduled to monitor the development of the succedaneous premolar. The findings are summarized in **TABLE 1** as follows:

1. In March 2019, a panoramic radiograph showed normal development of the contiguous and contralateral premolars, whereas the left first mandibular premolar germ appeared to be delayed **FIGURE 6**.
2. In October 2019, November 2020, and October 2023, follow-up radiographs confirmed the persistent delayed development of the left first mandibular premolar (Fig. 6).
3. In June 2024, clinical follow-up revealed the beginning of eruption. Periapical X-ray indicated that

approximately two-thirds of the root was formed **FIGURE 7** dan **FIGURE 8**.

4. In January 2025, The last clinical and radiological examinations confirmed complete eruption of the tooth and a root development at Nolla's stage 9 **FIGURE 9**.



**FIGURE 6.** a: Panoramic Radiograph taken in October 2019. b: Panoramic Radiograph taken in November 2020. c: Panoramic Radiograph taken in October 2023.



**FIGURE 7.** Intraoral Photo Showing the Eruption of the Tooth

#### IV. DISCUSSION

##### A. INTERPRETATION OF CLINICAL AND RADIOGRAPHIC FINDINGS

The present case report describes a rare presentation of an impacted mandibular first primary molar located inferior to its succedaneous premolar, managed successfully through a

**TABLE 1**  
Timeline of Radiographic and Clinical Findings

Date	Clinical / Radiographic Findings	Associated Figures
March 2019	Baseline panoramic radiograph showing the impacted primary molar positioned below the premolar germ	Fig. 3
October 2019 & November 2020	Moderate and delayed development of the premolar germ with insignificant eruptive progress.	Fig. 6
October 2023	Continued delayed maturation and slight crown development were observed.	Fig. 6
June 2024	Clinical signs of eruption were observed, and periapical radiograph showed two-thirds root formation.	Fig. 7, Fig. 8
January 2025	Complete clinical eruption of the permanent first premolar and panoramic radiograph revealed a root development at Nolla's stage 9.	Fig 9



FIGURE 8. The Preapical X-Ray Taken in June 2024



FIGURE 9. a, b: Intraoral photos showing the tooth eruption. c: Panoramic radiograph revealed a root development at Nolla's stage

conservative approach. The longitudinal findings demonstrated that, despite an initial delay in the development and eruption of the permanent premolar, spontaneous eruption was ultimately achieved without the need for surgical intervention. This outcome suggests that the eruptive potential of the permanent successor may remain preserved even in atypical positional anomalies, provided that appropriate clinical conditions are maintained.

From a biological perspective, tooth eruption is a complex and multifactorial process influenced by genetic, local, and environmental factors. In this case, the delayed development of the premolar observed during early follow-up periods may be attributed to mechanical obstruction caused by the impacted primary molar. However, the gradual progression in root formation and eventual eruption indicate that the obstruction was not absolute and that the eruptive pathway remained viable. This finding reinforces the concept that delayed eruption does not necessarily imply eruption failure, particularly in pediatric patients where developmental variability is common [30], [31].

The decision to adopt a conservative management strategy was primarily guided by anatomical considerations, notably the proximity of the impacted tooth to the mandibular canal and mental foramen. Surgical extraction in such cases carries a significant risk of nerve injury and associated complications. The absence of pathological signs, such as infection or cyst formation, further supported the choice of non-intervention. Over the five-year follow-up period, no adverse outcomes were observed, and normal eruption of the premolar was achieved, indicating that careful monitoring can be a safe and effective alternative to invasive procedures in selected cases.

Additionally, the use of a space maintainer played a crucial role in preserving the dental arch integrity and preventing mesial migration of adjacent teeth. This intervention ensured that sufficient space was available for the eruption of the

permanent premolar. The integration of interceptive orthodontic treatment, such as the Crozat appliance, further contributed to optimizing occlusal conditions and facilitating normal eruption patterns. These findings highlight the importance of a multidisciplinary approach in managing complex pediatric dental anomalies.

## B. COMPARISON WITH PREVIOUS STUDIES

The findings of the present study are consistent with recent literature emphasizing the potential benefits of conservative management in cases of impacted teeth, particularly when surgical risks outweigh potential benefits. Several studies have reported successful outcomes with observational approaches in pediatric patients, demonstrating that spontaneous eruption can occur even after prolonged delays [32], [33]. This aligns with the current case, where delayed eruption was followed by complete eruption without intervention.

However, the positional relationship observed in this case where the primary molar is located inferior to the permanent premolar remains exceedingly rare and is sparsely documented in contemporary literature. Most reported cases describe the permanent successor positioned apically or occlusally relative to the impacted primary tooth [34]. This distinction is clinically significant, as the spatial configuration may influence both the likelihood of spontaneous eruption and the choice of treatment strategy.

In contrast to studies advocating early surgical intervention to prevent complications such as cyst formation or root resorption, the present case supports a more conservative, risk-based approach [35]. For instance, some authors recommend extraction of the impacted primary tooth to facilitate eruption of the permanent successor, particularly when eruption appears unlikely [36]. However, such interventions may introduce additional risks, including damage to the developing tooth germ and surrounding structures. The successful outcome observed in this case suggests that, in the absence of pathological findings, conservative monitoring may be preferable.

Furthermore, recent advancements in imaging techniques, particularly CBCT, have enhanced the ability to accurately assess the spatial relationship between impacted teeth and adjacent anatomical structures. This has improved clinical decision-making by enabling more precise risk assessment [37]. In the present case, CBCT imaging was instrumental in identifying the close proximity of the impacted tooth to the mental foramen, thereby influencing the decision to avoid surgical intervention.

Despite these similarities, some discrepancies exist between this case and previously reported studies. Notably, the duration of follow-up in this case (five years) is longer than that reported in many studies, providing more robust evidence of long-term outcomes. Additionally, the absence of complications such as ankylosis or pathological lesions further distinguishes this case and underscores the variability in clinical presentations of impacted primary teeth.

## C. LIMITATIONS AND CLINICAL IMPLICATIONS

While the findings of this case report provide valuable insights, several limitations must be acknowledged. First, as a single-case study, the generalizability of the results is inherently limited. The unique anatomical and developmental characteristics of the patient may not be representative of the broader population. Therefore, caution should be exercised when extrapolating these findings to other cases.

Second, the observational nature of the study precludes the establishment of causal relationships. Although the conservative management approach was associated with a favorable outcome, it cannot be definitively concluded that this approach would yield similar results in all cases. Controlled clinical studies with larger sample sizes are needed to validate these findings and establish standardized treatment protocols [38].

Third, although CBCT imaging provided detailed anatomical information, repeated exposure to radiographic imaging raises concerns regarding radiation dose, particularly in pediatric patients. Efforts were made to minimize exposure by adhering to the ALARA (As Low As Reasonably Achievable) principle; however, this remains an important consideration in long-term follow-up studies.

Despite these limitations, the clinical implications of this study are significant. The findings support the use of conservative management as a viable alternative to surgical intervention in selected cases of impacted primary teeth, particularly when anatomical risks are high and the potential for spontaneous eruption exists. This approach aligns with current trends in minimally invasive dentistry and emphasizes the importance of individualized treatment planning based on comprehensive clinical and radiographic evaluation.

Moreover, the study highlights the critical role of regular follow-up in detecting changes in tooth development and eruption patterns. Clinicians should adopt a proactive monitoring strategy, including periodic clinical and radiographic assessments, to ensure timely identification of any complications. The use of adjunctive measures, such as space maintainers and interceptive orthodontic appliances, can further enhance treatment outcomes by preserving arch space and optimizing occlusion.

In addition, this case underscores the need for increased awareness and documentation of rare dental anomalies. Future research should focus on collecting longitudinal data from similar cases to improve understanding of the etiology, natural history, and optimal management of impacted primary teeth. The development of evidence-based guidelines would greatly assist clinicians in making informed decisions and improving patient outcomes.

## V. CONCLUSION

This study aimed to evaluate the effectiveness of TikTok-based educational media in improving knowledge of oral and dental hygiene among students of SMAN 1 Porong. The findings demonstrate a substantial enhancement in students' knowledge following the intervention. Prior to the educational exposure, the majority of respondents (96%) were categorized as having low knowledge, with only 2% classified as having good knowledge. After the implementation of TikTok-based

education, a significant improvement was observed, with 88% of students achieving a good level of knowledge, while only 4% remained in the low category. Statistical analysis using the Wilcoxon Signed-Rank Test revealed a significant difference between pretest and posttest scores ( $p = 0.000$ ;  $p < 0.05$ ), indicating that the intervention had a meaningful impact on students' understanding of oral and dental hygiene. These results suggest that TikTok, as a digital and interactive platform, is an effective medium for delivering health education to adolescents, particularly due to its engaging format and accessibility. The study highlights the importance of integrating technology-based learning approaches into school health programs to enhance knowledge acquisition and promote preventive health behaviors. However, while the increase in knowledge is evident, this study did not assess long-term behavioral changes or clinical outcomes, which are critical components of oral health improvement. Therefore, future research is recommended to explore the sustainability of knowledge retention and its translation into daily oral hygiene practices. Additionally, further studies should employ more rigorous designs, such as randomized controlled trials, involve larger and more diverse populations, and compare the effectiveness of TikTok with other digital and conventional educational methods. Expanding the scope to include behavioral and clinical indicators will provide a more comprehensive understanding of the impact of digital health education interventions. Overall, this study provides empirical evidence supporting the use of TikTok as an innovative and effective tool for improving adolescent health literacy in the field of oral and dental hygiene.

## ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the staff of the Dental Department at Mokinine Regional Hospital and the Faculty of Dental Medicine of Monastir for their support during the clinical management and follow-up of this case. Special thanks are extended to the patient and his family for their cooperation and consent to publish this report. Their contribution made this study possible.

## FUNDING

This research received no external funding.

## DATA AVAILABILITY

All data generated or analyzed during this study are included in this published article. Additional details are available from the corresponding author upon reasonable request.

## AUTHOR CONTRIBUTION

M.B.S. contributed to case management, data collection, and manuscript drafting. A.M. and Y.E. participated in clinical supervision and interpretation of findings. F.M. contributed to literature review and manuscript revision. A.B. provided critical review, editing, and final approval of the manuscript. All authors read and approved the final version of the manuscript.

## DECLARATIONS

**ETHICAL APPROVAL**

Not applicable for case reports according to institutional guidelines.

**CONSENT FOR PUBLICATION PARTICIPANTS**

Written informed consent was obtained from the patient's legal guardian for publication of this case report and accompanying images.

**COMPETING INTERESTS**

The authors have no competing interests to disclose.

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