Case report

LATE DIAGNOSIS OF MESIODENS AND ITS RELATIONSHIP WITH FUNCTIONAL DISORDERS: CASE REPORT

ABSTRACT

Aims: To understand the set of factors leading to functional disturbances in the dental arch due to a late diagnosis of the mesiodens anomaly.
Study Design: Late diagnosis of mesiodens and its relationship with functional disturbances: A case report.
Place and Duration of Study: The study will be conducted as a clinical case report. The patient was treated at the dental clinic of Centro Universitário Univel, located in Cascavel, Paraná. The procedure was performed in September 2023 at the same clinic. Data were collected during the patient's initial consultation, with a scheduled semiannual follow-up.
Methodology: The methodology applied includes clinical evaluation of the patient, including a detailed dental examination to identify the presence of mesiodens and any associated disturbances in the dental arch. Radiographic assessments (periapical and panoramic radiographs) were conducted to better analyze the dental structures and ensure proper diagnosis. Based on the clinical and radiographic findings, a surgical approach was planned and performed. Post-surgical follow-up was established to monitor functional recovery and aesthetic outcomes**.**
Results: The patient presented with a mesiodens in the anterior maxillary region, erupterd in the mixed dentition stage. A thorough evaluation of adjacent dental structures revealed no significant damage. The surgical procedure for mesiodens removal was carried out, and after seven days, the patient showed good healing with no complications. Follow-up after 7 months demonstrated a significant reduction in the diastema, attributed to the patient's stage of mixed dentition with the eruption of permanent teeth. Additionally, there was an observed improvement in the patient's occlusion, with better alignment of the teeth, leading to enhanced aesthetics and functionality.
Conclusion: Early diagnosis and intervention for mesiodens are critical in preventing functional disturbances in the dental arch. The surgical removal of mesiodens can result in significant improvements in both esthetic and functional outcomes. Further studies are needed to explore the long-term effects of mesiodens and the optimal timing for intervention.

Keywords: Dental Abnormalities, Maxilla, Late Diagnosis.

1. INTRODUCTION

Supernumerary teeth are additional dental elements beyond the normal dentition, predominantly located in the midline of the maxilla between the maxillary central incisors, commonly referred to as mesiodens. However, this dental anomaly can occur in both the maxilla and mandible, and its morphological presentation varies considerably. In some cases, supernumerary teeth exhibit a structure similar to normal teeth, with regular size and shape, whereas in others, they are malformed with abnormal characteristics. Their position may also vary, appearing in the correct or inverted orientation, potentially interfering with the development of the dental

arch. Furthermore, supernumerary teeth can occur unilaterally or bilaterally and may appear as isolated anomalies or involve multiple dental elements. These teeth may erupt normally or remain impacted, leading to complications during dental development (Dias et al., 2019; Giovanetti et al., 2016).

The etiology of supernumerary teeth has been explained by several theories. The atavism theory suggests that extra teeth result from the re-emergence of ancestral traits, such as three pairs of incisors seen in extinct primates. However, this theory has been largely dismissed due to insufficient embryological evidence. The dichotomy theory proposes that supernumerary teeth arise from the division of the dental bud into two parts, which may be equal or unequal, resulting in an additional tooth. The most widely accepted explanation is the hyperactivity theory, which attributes the formation of supernumerary teeth to local hyperactivity of the dental lamina, independent of dental bud division. This theory posits the formation of an additional dental bud, leading to the development of extra teeth. Additionally, supernumerary teeth have been associated with various hereditary syndromes, supporting the hypothesis of a significant genetic contribution to their formation (Arandi, Abu-Ali, & Mustafa, 2020).

Mesiodens is the most common form of supernumerary teeth, accounting for 82.5% of cases involving extra teeth and showing a strong male predilection. It predominantly occurs in the maxillary region, between the central incisors. The global prevalence of supernumerary teeth ranges from 0.09% to 2.05%, with a higher incidence in permanent dentition (0.5%–5.3%). Although relatively rare, the presence of supernumerary teeth has clinical significance due to their potential to interfere with the development and alignment of adjacent teeth. Their occurrence in permanent dentition is particularly noteworthy, as it may lead to functional and aesthetic complications, impeding the normal eruption of permanent teeth.

Early detection of mesiodens and appropriate treatment planning are crucial for preventing dental complications in adjacent teeth. Supernumerary teeth can cause delayed eruption, displacement, rotation, and interference with the development of permanent teeth. In severe cases, complications may include abnormal root formation, periapical cyst development, and root resorption of adjacent teeth. Early diagnosis enables intervention during initial stages of development, preventing or minimizing long-term damage. Regular clinical examinations and radiographic imaging are essential to identify supernumerary teeth, with radiography playing a critical role in confirming their location and orientation for proper treatment planning (Jeon et al., 2022; Paashaus et al., 2022).

The therapeutic approach to mesiodens varies depending on the characteristics of the supernumerary tooth and the patient's clinical condition. One approach involves monitoring the mesiodens with regular follow-ups, suitable in cases where it does not significantly impact adjacent teeth or the dental arch alignment. Conversely, when the mesiodens poses risks to permanent teeth—such as displacement or developmental interference—its removal becomes necessary. Extraction may be performed early, at the time of discovery or before the eruption of permanent teeth, to prevent complications. Alternatively, delayed extraction may be planned, allowing adjacent permanent teeth to erupt and ensuring complete root formation before intervention. This approach requires careful planning, considering the mesiodens' position and its impact on dental development (Barham et al., 2022; Thomaidis, Tsoucalas, &Fiska, 2019).

Diagnosing mesiodens can be challenging, particularly when the tooth is impacted or in an unusual position. A systematic diagnostic process, combining clinical and radiographic evaluations, is essential to determine the location, size, and shape of the supernumerary tooth. Panoramic radiography is a valuable tool for assessing the dental arch and identifying clinically hidden supernumerary teeth. In complex cases, additional imaging, such as computed tomography (CT), may be required for a detailed analysis of tooth position and its relationship with adjacent structures, including the incisive canal or maxillary sinus (Jeon et al., 2022).

Therapeutic management of mesiodens extends beyond extraction or monitoring. Post-extraction rehabilitation may involve orthodontic treatment to correct alignment issues caused by the supernumerary tooth. This may include orthodontic appliances to align permanent teeth and address occlusal problems. Follow-up care is essential to ensure optimal dental function and to prevent future complications related to dental alignment (Barham et al., 2022).

In some cases, supernumerary teeth are associated with systemic conditions or genetic syndromes. For example, patients with Gardner's syndrome may present with multiple supernumerary teeth alongside other clinical manifestations, such as skin lesions and skeletal anomalies. Management in such cases requires interdisciplinary coordination with geneticists and medical specialists. Moreover, the coexistence of supernumerary teeth with other dental anomalies, such as hypodontia, should be considered in treatment planning. Genetic investigations and evaluation of systemic conditions provide valuable insights for therapeutic decision-making and long-term patient care (Arandi, Abu-Ali, & Mustafa, 2020).

2. MATERIAL AND METHODS

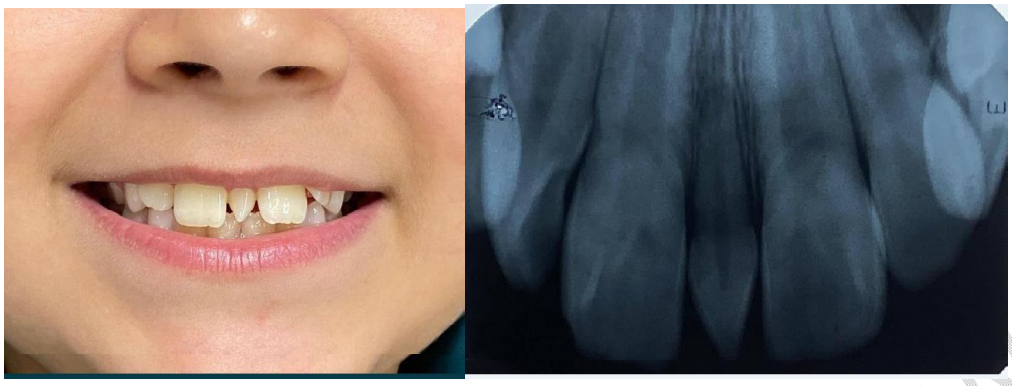
2.1 Subheading Subheading

The present study was conducted as a clinical case report at the dental clinic of Centro Universitário Univel, located in Cascavel, Paraná, Brazil. The procedure was performed in September 2023 at the same clinic. Data were collected during the patient's initial consultation, and semiannual follow-ups have been planned to ensure continuous monitoring of the case.

2.2Subheading Subheading

The patient, an 8-year-old male, presented at the Univel dental clinic with an aesthetic complaint regarding his smile due to the presence of an additional dental element in the region between the upper central incisors. During the anamnesis, the patient's mother reported that he had previously been examined by another professional, who recommended only periodic monitoring. However, seeking a more accurate diagnosis and resolution of the complaint, the mother opted to seek care at the Univel dental clinic.

Fig .1 An 8-year-old male patient seeking treatment for an aesthetic concern



A clinical examination revealed that the patient exhibited normal mixed dentition, with the mesiodens already erupted in the dental arch. To enhance the evaluation of dental structures, a periapical radiograph was obtained, which showed no harmful alterations to the adjacent teeth. However, to provide a more comprehensive view and support case planning, a panoramic radiograph was subsequently requested.

Fig .2 A panoramic radiograph was taken to assess the additional dental element between the upper central incisors

Based on the clinical and radiographic data analysis, and considering the absence of compromise to adjacent structures, a surgical plan was devised to remove the mesiodens, focusing on improving the patient's esthetics. The initial approach to the surgical procedure employed the "tell-show-do" technique to build trust and establish effective communication with the child.

The surgery commenced with the administration of local anesthesia (2% lidocaine with 1:100,000 epinephrine) using a single anesthetic cartridge and employing infiltrative techniques in the vestibular and palatal regions, in addition

to the interpapillary technique. A surgical incision was performed using a 15c scalpel blade (Solidor), followed by flap elevation utilizing appropriate instruments, such as a molt periosteal elevator (Millennium). Luxation of the tooth was achieved using apical and straight elevators (Millennium), which function through wedge, rotational, and lever movements.
Furthermore, a No. 1 forceps (Golgran) was employed to extract the tooth using pendulum and rotational movements, facilitating the release of the periodontal ligament fibers. After the mesiodens was removed, curettage was performed with a Lucas curette, followed by irrigation with 0.9% saline solution. The procedure concluded with two simple interrupted sutures using 5-0 nylon thread (Bioline), and postoperative analgesic medication was prescribed.

Fig .3 A significant reduction in diastema after seven months of the surgical procedure

Seven days after the surgical procedure, the patient returned for suture removal, exhibiting a good healing condition. The caregivers were advised on the necessity of orthodontic treatment to address the functional and esthetic correction of the central maxillary diastema and malocclusion.
After seven months, the patient returned for a follow-up consultation, showing a significant reduction in the diastema. This improvement was attributed to the

mixed dentition phase, during which the eruption of permanent teeth contributed to this process.

3. RESULTS AND DISCUSSION

The presence of a mesiodens, a type of supernumerary tooth, is more prevalent in males and occurs most frequently in the anterior maxillary region, especially in the permanent dentition. This element may be positioned correctly or inverted, unilaterally or bilaterally, and may occur as a single tooth or with additional supernumerary teeth. According to Dias (2019, p. 2), the mesiodens is the most commonly found supernumerary tooth, with its location predominantly in the maxilla. In a specific study, it was observed that the patient, a male, presented with a single mesiodens in the anterior maxillary region in the correct position during the mixed dentition phase. This case exemplifies the variability in the presentation of supernumerary teeth, which can manifest differently in each patient, requiring careful analysis for treatment planning.

The ideal timing for the surgical removal of a mesiodens remains a topic of debate in the dental literature. However, Jeon (2022, p. 4) and Paashaus (2022, p. 4) emphasize the importance of early diagnosis of a mesiodens and adequate treatment planning to prevent dental complications in adjacent teeth, such as delayed eruption, displacement, rotation, and interference. Additionally, more severe complications, such as abnormal root formation, cyst development, and root resorption, can occur if the supernumerary tooth is not adequately treated. To minimize these problems, it is essential to perform an effective diagnosis through clinical and radiographic examinations as part of routine check-ups. This approach enables early detection and minimizes functional and aesthetic impacts. Early diagnosis also allows for treatment to be carried out in a manner that preserves the integrity of the permanent dentition and prevents additional disorders.

In the clinical case presented, the patient had already completed the eruption of the permanent teeth, allowing classification as a late-stage model, according to Barham's approach (2022, p. 2). This strategy recommends waiting for the eruption of the adjacent permanent teeth or until their roots are fully formed before proceeding with the extraction of the mesiodens. This approach aims to avoid damage to developing teeth, ensuring that the intervention is performed with minimal interference with adjacent dental structures. The late-stage model is particularly relevant when the mesiodens is not causing immediate impacts on dental alignment but may potentially interfere with the eruption of permanent teeth in the future.

Based on clinical and radiographic analysis, a specific treatment plan was developed for the patient, considering the observed conditions. The clinical examination revealed that the only complication associated with the mesiodens was the displacement of adjacent teeth, which had led to changes in the patient's occlusion. Radiographic examinations, such as panoramic and periapical radiographs, were fundamental for the diagnosis, allowing the confirmation that the mesiodens did not present significant interference with the anatomy of adjacent teeth. The panoramic radiograph was particularly crucial for

determining the precise location of the mesiodens and evaluating its relationship with other anatomical structures, such as the roots of the permanent teeth and the midline of the arch. These examinations confirmed that extraction of the mesiodens would be the most appropriate approach, without causing additional damage to the developing permanent teeth.

Another important aspect to consider was the initiation of the patient's permanent occlusion establishment, which was in a transitional phase and not yet fully developed. The removal of the mesiodens was performed to ensure that the necessary space would be preserved for the eruption of the permanent teeth, promoting the formation of a correct occlusal relationship in the future. During this transitional phase, it is essential to maintain space for the eruption of permanent teeth and to ensure that the patient's occlusion is appropriate, avoiding long-term functional problems. In this context, the removal of the mesiodens was crucial to ensure the patient could achieve functional and aesthetically appropriate occlusion following the completion of permanent tooth eruption.

Following the removal of the mesiodens, a significant diastema was observed between the adjacent teeth. However, this diastema showed substantial reduction after seven months of post-surgical follow-up, when the patient returned for a control consultation. This decrease in the diastema indicated that the occlusion was adjusting satisfactorily, enabling aesthetic and functional recovery. Postoperative follow-up is essential to monitor treatment progress and ensure that the permanent teeth erupt properly without compromising aesthetics or function. The reduction of the diastema also demonstrated that the space was adequately maintained for the permanent teeth, promoting proper alignment and avoiding the need for additional orthodontic interventions.

4. CONCLUSION

It is concluded that, despite the initial complications associated with the presence of the mesiodens, early diagnosis, combined with a well-structured treatment plan and the proper execution of the surgical intervention, can result in a significant reduction of functional and aesthetic disturbances. The success of the treatment was achieved through a detailed and personalized approach, taking into account the specific needs of the patient. This clinical case highlights the importance of accurate diagnosis, appropriate planning, and timely surgical intervention to address the complications associated with supernumerary teeth, promoting satisfactory functional and aesthetic recovery for the patient. Continuous follow-up is essential to ensure the maintenance of results and long-term oral health.

REFERENCES

ARANDI, Naji Ziad; ABU-ALI, Ameed; MUSTAFA, Chocante. Supernumerary teeth: a retrospective cross-sectional study from Palestine. Brazilian Research in

Pediatric Dentistry and Integrated Clinic, [S.L.], v. 20, n. [ ], p. 50-57, Jan. 2020. FapUNIFESP (SciELO). Available at: http://dx.doi.org/10.1590/pboci.2020.029. Accessed on: Oct. 4, 2023.

BARHAM, Majd; OKADA, Shunsuke; HISATOMI, Miki; KHASAWNEH, Abdullah; TEKIKI, Nouha; TAKESHITA, Yohei; KAWAZU, Toshiyuki; FUJITA, Mariko; YANAGI, Yoshinobu; ASAUMI, Junichi. Influence of the mesiodens on adjacent teeth and the moment of its safe removal. Imaging Science in Dentistry, [S.L.], v. 52, n. 1, p. 67-74, Jan. 2022. Korean Academy of Oral and Maxillofacial Radiology. Available at: http://dx.doi.org/10.5624/isd.20210218. Accessed on: Oct. 4, 2023.

DIAS, Gisele Fernandes; HAGEDORN, Henrique; MAFFEZZOLLI, Murilo della Latta; SILVA, Filipe de Freitas da; ALVES, Fabiana Bucholdz Teixeira. Diagnosis and treatment of supernumerary teeth in the pediatric clinic - case report. Revista Cefac, [S.L.], v. 21, n. 6, p. 16-318, 2019. FapUNIFESP (SciELO). Available at: http://dx.doi.org/10.1590/1982-0216/201921616318. Accessed on: October 4, 2023.

GIOVANETTI, Karina; RODRIGUEZ, Eder Alberto Sigua; PACHECO, Larissa; FIGUEIREDO, Evandro Portela; BARBOSA, José Ricardo Albergaria. Mesiodens: a case report. Journal of Dental Sciences, [S.L.], v. 28, n. 1, p. 442-454, January 2016. University of Antioquia. Available at: http://dx.doi.org/10.17533/udea.rfo.v28n1a12. Accessed on: October 4, 2023.

JEON, KJ.; HA, EG.; CHOI, H.; et al. Performance comparison of three deep learning models for detection of impacted mesiodens in periapical radiographs. Scientific Reports, v. 12, p. 15402, 2022. Available at: https://doi.org/10.1038/s41598-022-19753-w. Accessed on: October 4, 2023.

LYRA, Carolina Viana Vasco; CARVALHO, Ana Beatriz Guaraná de; LIMA, Yamila Rodrigues Vilaça de; ALMEIDA, Híttalo Carlos Rodrigues de; VIEIRA, Sandra Conceição Maria. Mesiodens extraction in a pediatric patient: case report. Archives of Health Investigation, [S.L.], v. 11, n. 2, p. 232-235, November 4, 2023. 2021. Available at: http://dx.doi.org/10.21270/archi.v11i2.5406. Accessed on: October 23, 2023.

MACHADO, André Wilson; MAIA, Luiz Guilherme Martins; VIANNA, Alexandre Protásio; GANDINI JÚNIOR, Luiz Gonzaga. Orthodontic traction of impacted maxillary central incisors associated with the presence of mesiodens. RGO - Revista Gaúcha de Odontologia, [S.L.], v. 63, n. 1, p. 75-80, March 2015. FapUNIFESP (SciELO). Available at: http://dx.doi.org/10.1590/1981-86372015000100001115 48. Accessed on: October 23, 2023. 2023.

PAASHAUS, ACL.; FAZOLI, V.; GISFREDE, TF.; POSSESSIONS, BP.; MOREIRA, KMS.; GIMENEZ, T.; et al. Extraction of supernumerary teeth in a hospital setting: case report in pediatric dentistry. RGO, Revista Gaúcha de Odontologia, v. 70, e20220024, 2022. Available at: http://dx.doi.org/10.1590/1981-86372022002420200208. Accessed on: 23 Oct. 2023.

THOMAIDIS, Vasilios; TSOUCALAS, Gregory; FISKA, Aliki. Rotated mesiodens in children: an immediate surgical removal or active monitoring? Clinical Case Reports, [S.L.], v. 7, no. 12, p. 2577-2578, Oct. 17, 2019. Wiley. Available at: http://dx.doi.org/10.1002/ccr3.2452. Accessed: Oct. 4, 2023.