



Decoding Mesiodentes: An All-inclusive Guide to Diagnosis and Management

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Abstract

The presence of extra teeth relative to the normal dentition is a characteristic of supernumerary teeth, a rather common developmental aberration. Situated in the premaxilla between the two central incisors, mesiodens is the most prevalent supernumerary in the midline. Multiple mesiodens erupting at once is an uncommon phenomenon known as mesiodentes. Although there are many different and unclear theories as to why it occurs, the dental lamina's hyperactivity is the most well-accepted one. The prevalence falls between 0.15% and 1.9%, is more common in permanent teeth than in primary dentition, and exhibits a male predisposition. Mesiodens can be single or multiple, impacted or erupted, and occasionally even inverted. They can be positioned labially, palatally, or between the maxillary central incisors. They can also be dysmorphic, conical, tuberculate, or molariform. Finally, they can be isolated or associated with syndromes. Mesiodens can cause a number of challenges, such as impaction of permanent teeth, malocclusion that impairs speech, swallowing, and chewing, poor dentofacial aesthetics, and occasionally cyst formation. Usually, a clinical and imaging assessment is performed to make the diagnosis. Early removal is the recommended course of action to prevent complications in the future. This clinical observation highlights two different cases of uncommon double mesiodens in the mixed dentition of non-syndromic children. This will aid clinicians in identifying different kinds of mesiodentes and focus on its implications in deviations of the eruption pattern. Appropriate investigations and timely intervention are essential to reducing complications that may arise in the developing dentition.

Keywords: Extraction, management, mesiodentes, premaxilla, syndrome

Introduction

An additional tooth relative to the normal dentition is known as a supernumerary tooth. It was first documented around AD 23–79.[1] Ancient human skeletal remains from the Lower Pleistocene era have shown the first known instance of supernumerary teeth.

Mesiodens was discovered among the remains of an Australian aboriginal about 13,000 years ago, which is the earliest known proof of its existence until recently.

Additionally, it has been reported that archaeological remains discovered in Germany around the 7th century contained an inverted mesiodens that protruded into the nasal cavity. Balk first used the term mesiodens in 1917 to describe an extra tooth that was positioned between two central incisors.[2] According to Mosby's Medical Dictionary, a mesiodens is an extra tooth that erupts or remains unerupted between two maxillary central incisors. With a male-to-female prevalence ratio of 2:1, the incidence of mesiodens is 0-1.9% for decidu-

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ous teeth and 0.15–3.8% for permanent teeth.[3] The prevalence of mesiodens in mixed dentition varies across different studies, but it is generally reported to be relatively low. In a study involving orthodontic patients, the prevalence of mesiodens in deciduous and mixed dentition was found to be 1.5%.[4] A significant role for genetics may be played in mesiodens occupancy. The cause is still up for debate. Etiologic factors include dental lamina hyperactivity, hereditary and environmental factors, and the proliferation of malassez or Serres cell rests. Mesiodens typically occur as singlets; when they appear in multiples, they are called mesiodentes.[5,6] The incidence of mesiodentes varies from 0.15% to 1.9%, according to Russell and Folwarczna.[6] On the other hand, 3.18% is a higher value reported in other investigations.[2] Although they are uncommon, reports of multiple mesiodens have grown in recent years.[7] It is unknown whether these modifications are the result of better diagnostic techniques or the ethnic composition of the communities under study. The two most frequent side effects of mesiodentes are rotation or displacement of the maxillary permanent incisors (28–60%) and delay or prevention of eruption (26–52%). Crowding, diastema, permanent tooth displacement, cyst formation, and nasal cavity eruptions are very uncommon problems. Mesiodentes can significantly alter both occlusion and appearance by affecting the eruption path and the position of the permanent incisors. They are frequently associated with various craniofacial anomalies, including cleft lip and palate, Gardner's syndrome, and cleidocranial dysostosis.[8] In addition, there have been a few reports of mirror imaging in twins in relation to various unilateral dental abnormalities, such as mesiodens, seen in both monozygotic and dizygotic twins.[9,10] Mesiodens is typically affected, frequently in an inverted position, with a conical crown and a single root.[11] Mesiodens are usually identified during clinical and radiographic investigations using panoramic, occlusal, or periapical radiographs.[6,12] It is crucial to select and create a suitable treatment plan.[13,14] Additionally, depending on the tooth's location and any ensuing issues, different cases require different courses of therapy. Historically, these anomalies were often misunderstood and left untreated, leading to complications. Removal of the mesiodentes, orthodontic alignment, and monitoring are available treatment procedures for such cases. Early detection and immediate management of mesiodentes minimize the treatment required and prevent the development of associated problems. This article aims to report two cases of the rare occurrence of double mesiodens/mesiodentes in children who are non-syndromic patients.

Case Report

Case 1

A 10-year-old female patient reported to the Department of Pediatric and Preventive Dentistry with the chief complaint of forwardly placed upper front teeth, with the primary complaint related to the extra teeth situated at the level of the upper incisors, which caused the smile to appear unattractive (Fig. 1a). A routine clinical examination revealed a normal, healthy individual without any signs of syndromic features. The patient's medical history was unremarkable, and there was no family history of supernumerary or congenitally missing teeth. The patient was in the mixed-dentition period and had yellowish fluorosis stains. Two mesiodens were present on the palatal aspects of 11 and 21 (Fig. 1b), resulting in proclination and rotation of the maxillary central incisors. Additionally, there were occlusal caries in relation to 16, 46, 36, and 85, with pit and fissure caries in relation to 55, and grossly decayed caries in relation to 75 and 64. The radiographic diagnosis included an intraoral periapical (IOPA) radiograph and CBCT (Fig. 2). No other supernumerary teeth or abnormalities were observed in the CBCT. The IOPA radiographs revealed two separate mesiodens, which were conical in shape. Root formation was complete in both teeth. Treatment was planned to extract the mesiodens with parental consent.

The extraction was performed with local anesthesia (lidocaine 2% epinephrine, 1:80,000) using the nasopalatine block and some infiltrations. The patient was seated in a semi-reclined position, and a topical anesthetic was applied to the palatal mucosa adjacent to the incisive papilla for 1-2 minutes. A 27-gauge short needle was used for the injection. The needle was inserted at a 45-degree angle to the palate, just lateral to the incisive papilla. The needle was advanced until bone contact was made, and after negative aspiration, 0.2-0.3 ml of 2% lidocaine with 1:100,000 epinephrine was slowly deposited. The anesthetic effect was confirmed by the numbness of the palatal mucosa from the canine-to-canine region. The patient reported no discomfort during the procedure, and the anesthesia was effective for the duration of the dental treatment (Fig. 3). Proper hemostasis was achieved by applying firm pressure at the site of extraction with a gauze pad, and postoperative instructions were given. A multidisciplinary approach is desirable to manage this type of case, and it was planned to keep the patient under observation until all the permanent teeth erupted into the oral cavity. Afterward, the extent of orthodontic treatment required would be

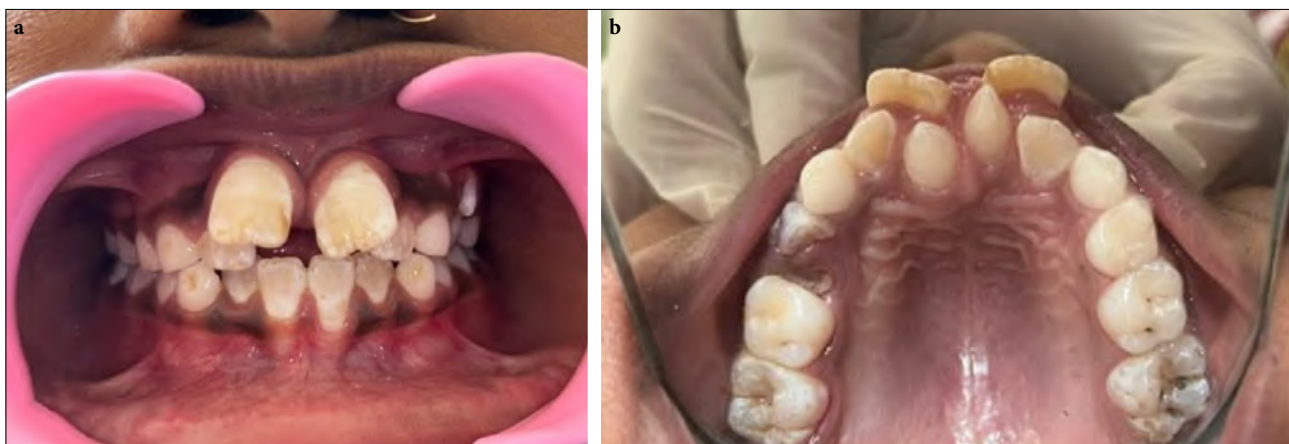


Figure 1. (a) Showing anterior proclination of 11 21 due to mesiodentes. (b) Showing conical shaped mesiodentes on palatal aspect

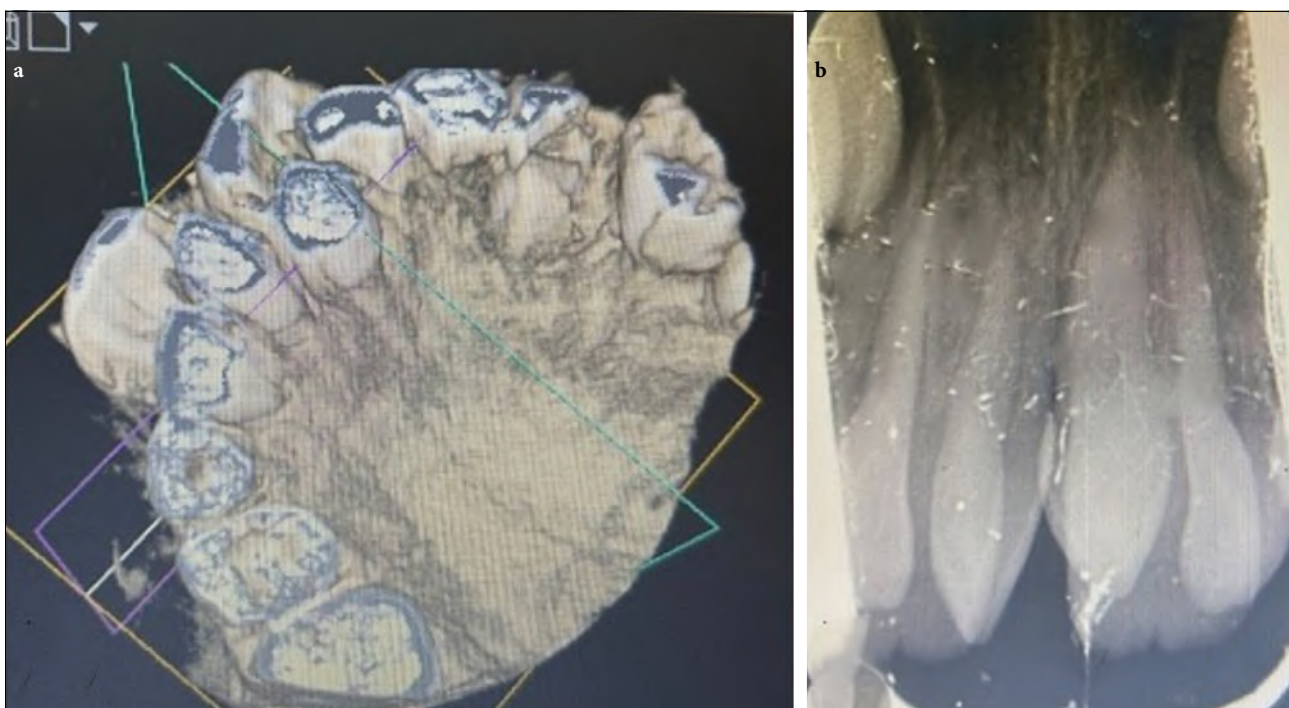


Figure 2. (a) CBCT showing two mesiodentes on palatal aspect. (b) IOPA reveals two mesiodentes with complete root formation

CBCT: Cone-beam computed tomography; IOPA: Included an intraoral periapical

decided. The patient was recalled after 10 days, and uneventful healing was present (Fig. 4). The satisfied patient was referred to undergo orthodontic treatment to address the malocclusion.

Case 2

A 13-year-old female reported to the Department of Pediatric and Preventive Dentistry with the chief complaint of extra teeth in the upper arch, along with an unaesthetic appearance. A routine clinical examination revealed a normal, healthy individual with no signs of any syndromic features. Intraoral examination revealed the presence of two mesiodentes, one palatally to unerupted

11 and the other just behind 21, which had erupted. A CBCT revealed the presence of two mesiodents with incomplete apex formation (Fig. 5). The crown portion resembled the central incisors. The extraction of both mesiodents was planned with parental consent.

Nasopalatine nerve block was administered along with some infiltrations (lidocaine 2% epinephrine 1:80,000) as explained in the first case. The anesthetic effect was confirmed by the numbness of the palatal mucosa from the canine-to-canine region. Initially, the gingival margins were reflected for the mesiodents present anteriorly, and the tooth was extracted. Similarly, for

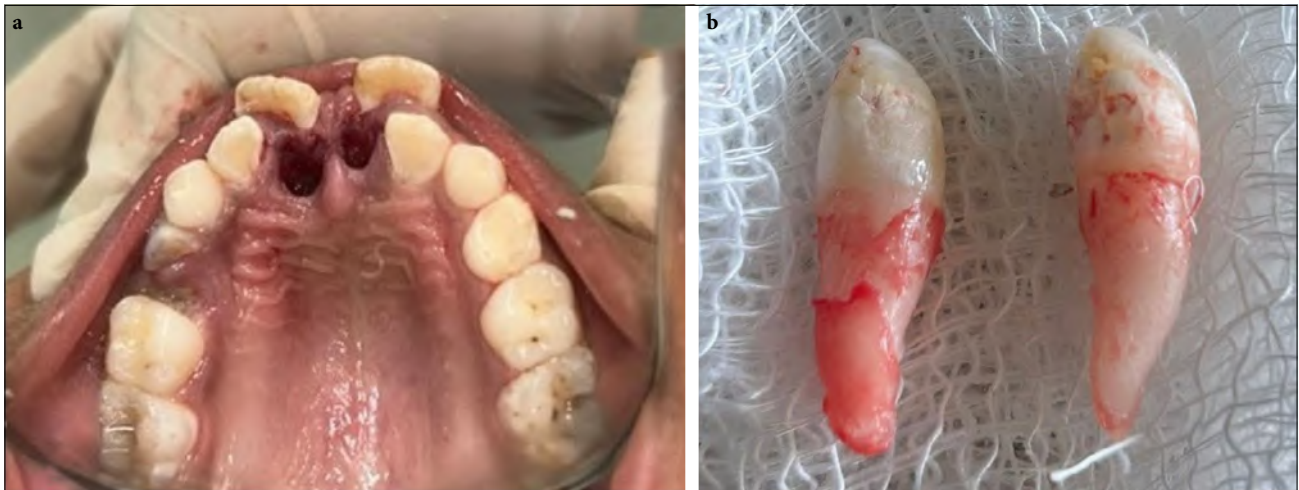


Figure 3. Extracted mesiodentes (conical type)



Figure 4. Uneventful healing after extraction (post operatively after 10 days)

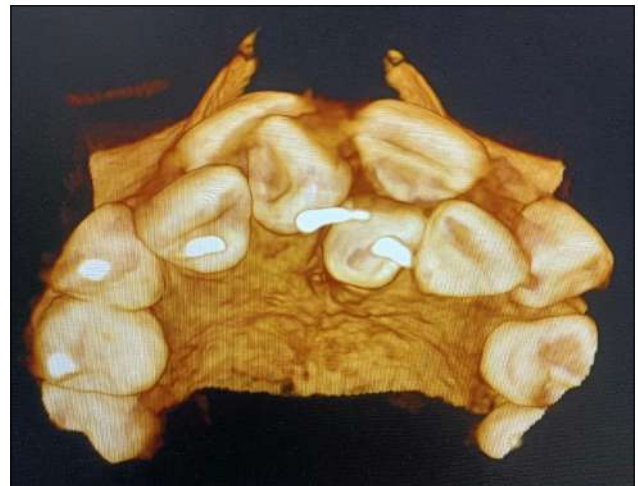


Figure 5. CBCT showing mesiodens causing impaction of 11 also one mesiodens presents palatally to 21

CBCT: Cone-beam computed tomography

the mesiodens present palatally, reflection of the gingiva was done from the palatal aspect so as not to disturb the 11. The extraction forceps were engaged between the 11 and the mesiodens, and the tooth was extracted (Fig. 6). Proper hemostasis was achieved by applying firm pressure at the site of extraction with a gauze pad, and postoperative instructions were given. The patient was recalled after 15 days, and successful healing was achieved (Fig. 7). The satisfied patient was advised and referred to undergo fixed orthodontic treatment to correct the malocclusion.

Discussion

A mesiodens is the most prevalent supernumerary tooth that emerges in the maxillary midline. However, because double supernumerary teeth are uncommon,

there isn't much research on them. Mesiodentes are usually discovered during the first decade when the maxillary central incisors erupt, and radiographic examination helps to identify congenitally missing teeth, supernumerary teeth, cysts, and tumors in cases of delayed eruption or malposition of the maxillary central incisors. Mesiodentes can be categorized based on their shape (conical, tuberculate, or molariform) and whether they occur in the primary dentition (supplementary mesiodentes) or the permanent dentition (rudimentary mesiodentes). Whereas rudimentary mesiodentes have an irregular shape and are smaller in size, supplementary mesiodentes are similar in size and shape to natural teeth. Typically, conical mesiodentes are found solitary. They tend to push out the permanent central incisors that are erupting and are typically peg-shaped and situ-

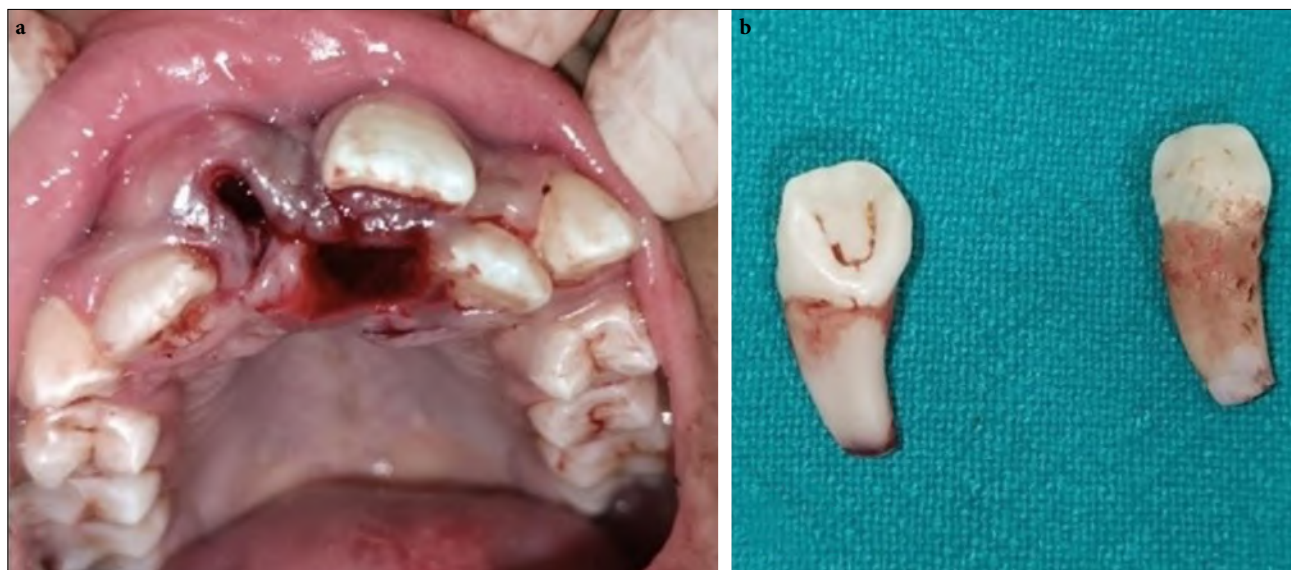


Figure 6. Extraction of mesiodentes (supplemental type)

ated palatally between the maxillary central incisors. A barrel shape, multiple tubercles or cusps, and incomplete or aberrant root formation characterize tuberculate mesiodentes. Tuberculate mesiodentes, in contrast to conical mesiodens, rarely erupt spontaneously; instead, they delay the eruption of the permanent incisors.[6] For improved treatment planning, Albert A. and Mupparapu M. (2018) have presented a new classification method based on mesiodens' angulation to the maxilla's typical eruptive pattern.[15]

According to Asaumi et al[16], the number of supernumerary teeth is one in 73% of cases, two in 26%, and three in 1% of cases. The above-discussed mesiodentes case study is a small sample of potential extra and supernumerary tooth management procedures. Since the eruption status of the supernumerary teeth affects the spontaneous eruption of the permanent incisors, early care is advised. The occlusal harmony was disrupted, and the patients' suffering increased as a result of mesiodentes in the above-reported cases, prompting the treatment plan for rapid extraction.

The atavist theory initially proposed that mesiodens were a phylogenetic remnant of extinct ancestors with three central incisors. According to a second theory called dichotomy, the tooth bud splits to form two teeth, one of them being the mesiodens. However, the most widely accepted explanation is the hyperactivity of the dental lamina. This theory states that extra tooth buds are created by remnants of the dental lamina or palatal offshoots of active dental lamina growing. The mesiodens forms in an incompletely penetrating auto-



Figure 7. Uneventful healing present with eruption of 11

somal dominant manner. Mesiodens may have a familial origin, but they do not follow a straightforward Mendelian pattern. If left untreated, it may result in a number of difficulties, including crowding, spacing, median diastema, rotation, root resorption of neighboring teeth, delayed eruption, malposition, and impaction of permanent incisors, or even the eruption of an incisor into the nasal cavity and the production of cysts. A recent case report depicted bilateral inverted mesiodentes that had migrated to the floor of the nasal cavity in a 21-year-old.[17] Mesiodentes usually cause the rotation of the permanent incisors, as observed in a few case reports.[18,19] In the present cases, the mesiodentes caused labial placement of the incisors in the

first case, along with impaction of the right incisor in the second case. It is possible to assume that mesiodentes are part of the permanent dentition. The majority of them are found during radiographic examination of the upper anterior region, usually during the mixed dentition era or later, although some reports have shown mesiodentes in the primary dentition. The most reliable method of diagnosing the existence of erupted mesiodens is a clinical examination; radiographic evaluation and clinical examination can both be used to diagnose unerupted mesiodens. To aid in the diagnosis of mesiodens, panoramic, CBCT, maxillary occlusal, and periapical radiographs are advised. The parallax technique can be used to identify the buccolingual position of the unerupted mesiodens.[20] Additionally, there have been evolving studies in which deep learning technologies are used for mesiodens diagnosis.[21] In the present case, CBCT was used because its three-dimensional visualization makes it simple to identify the exact shape and detailed location of the impacted mesiodens. The existence of an additional tooth in the space between the central incisors indicates a mesiodens diagnosis. A single median maxillary central incisor, seen in a mild case of holoprosencephaly, or a conical tooth seen in ectodermal dysplasia as hypomelanism of Ito are among the differential diagnoses.

The management of extra teeth depends on their kind and location, but there can be disagreements over whether mesiodens should be surgically removed or left in place and monitored rather than receiving comprehensive care. Clinical intervention is usually required in cases of mesiodentes as they affect the eruption and position of adjacent teeth. Research has indicated a strong correlation between facial appearance and bullying.[22,23] Children who have dental changes that potentially alter their facial features may be targets of bullying and harassment, which makes it difficult for them to communicate with others. Mesiodentes are managed by either conservative methods or extraction. Khatri et al[24] stated that extraction can be of three types: immediate, early (before root formation of permanent incisors), or late (after root formation of the central incisor). Yagüe-García et al[25] favored early extraction to prevent complications, but it was discouraged as it stood a chance of inducing damage to the developing permanent incisors during extraction. The normal eruptive forces of the tooth allow it to spontaneously erupt, help with proper alignment, and can also reduce the extent of orthodontic treatment, which can be achieved if mesiodentes are extracted in the early mixed dentition stage. In the current case,

considering the age of the child, the eruption status of the maxillary central incisor, and the unaesthetic appearance, the extraction of the mesiodentes was carried out. This would help in realigning the malocclusion to some extent and reducing the treatment time for orthodontic therapy. According to Munns, the sooner the extra tooth is extracted, the better the prognosis.[20] Due to its location, mostly palatally related to the maxillary incisors, it has been suggested that the tuberculate form of mesiodens more likely causes a delay in eruption. Hyperdontia was found in 63% of patients with unerupted incisors, according to Bartolo et al[26].

All pairs of mesiodentes and central incisors had erupted into the oral cavity in the first case during our clinical observation, but in the second case, the right central incisor was impacted due to the presence of the mesiodentes, which soon erupted after extraction in the follow-up period. Close monitoring of the dentition is required after the extraction of a mesiodens. Out of the various heterogeneous morphological forms, the conical type is cited as the most prevalent type.[27] In our clinical observation, the first case showed the conical type of mesiodentes, and in the second case, there was the presence of the supplemental type of mesiodentes. There have been a few studies citing the occurrence of mesiodentes. Two cases of double mesiodens, especially in mixed dentition, are highlighted, thus providing evidence for further understanding of this rare phenomenon.

Conclusion

Mesiodentes have been linked to a number of issues, and most experts concur that in order to avoid any unfavorable consequences, they should be removed as soon as they are discovered. The double mesiodens were removed from both of the current examples due to aesthetic issues.

Mesiodentes appear in different locations, orientations, and morphologic traits. CBCT is helpful for the diagnosis and localization of supernumeraries. Early diagnosis and management of such cases of mesiodentes will not only improve the aesthetic component of the pediatric patient but will also increase their self-confidence. By illuminating the uncommon occurrence of double mesiodentes, this clinical observation seeks to advance our understanding.

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References

1. Ray D, Bhattacharya B, Sarkar S, Das G. Erupted maxillary conical mesiodens in deciduous dentition in a Bengali girl - a case report. *J Indian Soc Pedod Prev Dent* 2005;23:153-5.
2. Khandelwal V, Nayak AU, Naveen RB, Ninawe N, Nayak PA, Sai Prasad SV. Prevalence of mesiodens among six-to seventeen-year-old school going children of Indore. *J Indian Soc Pedod Prev Dent* 2011;29:288-93.
3. Rajab L, Hamdan M. Supernumerary teeth: Review of the literature and a survey of 152 cases. *Int J Paediatr Dent* 2002;12:244-54.
4. Lara TS, Lancia M, da Silva Filho OG, Garib DG, Ozawa TO. Prevalence of mesiodens in orthodontic patients with deciduous and mixed dentition and its association with other dental anomalies. *Dental Press J Orthod* 2013;18:93-9.
5. Ferrés Padró E, Prats Armengol J, Ferrés Amat E. A descriptive study of 113 unerupted supernumerary teeth in 79 pediatric patients in Barcelona. *Med Oral Patol Oral Cir Bucal* 2009;14(3):E146-52.
6. Russell KA, Folwarczna MA. Mesiodens-diagnosis and management of a common supernumerary tooth. *J Can Dent Assoc* 2003;69:362-7.
7. Asha ML, Laboni G, Rajarathnam BN, Kumar HM, Lekshmy J, Priyanka LB. Twin mesiodens: A case report. *Int J Adv Health Sci* 2015;2(6):18-21.
8. Gorlin RJ, Cohen MM, Hennekam R. Syndromes of the head and neck. Syndromes with unusual dental findings. Oxford University Press: United Kingdom; 1976.
9. Cassetta M, Altieri F, Giordano A. Mirror imaging of impacted and supernumerary teeth in dizygotic twins: A case report. *J Clin Exp Dent* 2015;7:e167.
10. Seddon R, Johnstone S, Smith P. Mesiodentes in twins: A case report and a review of the literature. *Int J Paediatr Dent* 1997;7:177-84.
11. Tyrologou S, Koch G, Kurol J. Location, complications and treatment of mesiodentes - a retrospective study in children. *Swed Dent J* 2005;29:1-9.
12. Kim SG, Lee SH. Mesiodens: A clinical and radiographic study. *J Dent Child* 2003;70:58-60.
13. Omami M, Chokri A, Hentati H, Selmi J. Cone-beam computed tomography exploration and surgical management of palatal, inverted, and impacted mesiodens. *Contemp Clin Dent* 2015;6:S289.
14. Kim Y, Jeong T, Kim J, Shin J, Kim S. Effects of mesiodens on adjacent permanent teeth: A retrospective study in Korean children based on cone-beam computed tomography. *Int J Paediatr Dent* 2018;28:161-9.
15. Albert A, Mupparapu M. Cone beam computed tomography review and classification of mesiodens: Report of a case in the nasal fossa and nasal septum. *Quintessence Int* 2018;49(5):413-7.
16. Asaumi Ji, Shibata Y, Yanagi Y. Radiographic examination of mesiodens and their associated complications. *Dentomaxillofac Radiol* 2004;33:125-7.
17. Mohan KR, Thangavelu RP, Fenn SM. Bilateral inverted mesiodens: A rare case evaluated by cone-beam computed tomography. *Cureus* 2022;14(7):e26629.
18. Krishnamurthy N, Unnikrishnan S, Thimmegowda U, Thomas J. Fully erupted twin mesiodens: A case report. *Int J Curr Res* 2017;9:52667.
19. Singaraju GS, Reddy BR, Supraja G, Reddy KN. Floral double mesiodentes: A rare case report. *J Nat Sc Biol Med* 2015;6:229.
20. Meighani G, Pakdaman A. Diagnosis and management of supernumerary (mesiodens): A review of the literature. *J Dent* 2010;7:41.
21. Ahn Y, Hwang JJ, Jung YH, Jeong T, Shin J. Automated mesiodens classification system using deep learning on panoramic radiographs of children. *Diagnostics* 2021;11:1477.
22. Al-Omari IK, Al-Bitar ZB, Sonbol HN, Al-Ahmad HT, Cunningham SJ, Al-Omiri M. Impact of bullying due to dentofacial features on oral health-related quality of life. *Am J Orthod Dentofacial Orthop* 2014;146:734-9.
23. Al-Bitar ZB, Al-Omari IK, Sonbol HN, Al-Ahmad HT, Cunningham SJ. Bullying among Jordanian schoolchildren, its effects on school performance, and the contribution of general physical and dentofacial features. *Am J Orthod Dentofacial Orthop* 2013;144:872-8.
24. Khatri M, Samuel A. Overview of mesiodens: A review. *Int J Pharm Bio Sci* 2014;5:526-39.
25. Yagüe-García J, Berini Aytés L, Gay Escoda C. Multiple supernumerary teeth not associated with complex syndromes: A retrospective study. *Med Oral Patol Oral Cir Bucal* 2009;14(7):E331-6.
26. Bartolo A, Camilleri A, Camilleri S. Unerupted incisors - characteristic features and associated anomalies. *Eur J Orthod* 2010;32:297-301.
27. Van Buggenhout G, Bailleul-Forestier I. Mesiodens. *Eur J Med Genet* 2008;51:178-81.