

ORIGINAL RESEARCH ARTICLE

Prevalence and Complications of Mesiodens: A Radiographic Study in a Group of Turkish Pediatric Population

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Abstract

Purpose: This study aimed to assess the prevalence of mesiodens in a group of Turkish pediatric population and to radiographically investigate the characteristics of mesiodentes and the complications caused by them.

Materials and Methods: This study examined panoramic radiographs of 8002 patients aged 4–16 years. Patients were evaluated for age, sex, dentition status, the number, shape, and position of mesiodens, and the complications it causes.

Results: A total of 39 mesiodentes were found in 30 of 8002 patients. It was seen twice as often in boys than in girls; the gender ratio was 2:1, but the difference was not statistically significant ($p=0.2$). Mesiodentes were most common in the conical form, followed by the tuberculate and the least supplemental forms. Seventy-seven percent of the mesiodentes are located vertically, 15% horizontally, and 8% inverted; 51% erupted, and 49% impacted. With a rate of 43%, displacement or axial rotation of the permanent central incisors was the most common complication. The delayed eruption was the second most common complication (37%). Diastema was noted in 27%. Cyst formation was noted in 7% of patients. There was a statistically significant relationship between the number of mesiodentes seen simultaneously and the number of complications ($p=0.022$).

Conclusions: The prevalence of mesiodens was determined to be 0.37% in the analyzed population, consistent with the literature. At least one mesiodens-related complication was noted in 80% of patients. Regarding complications, the number of concurrent mesiodentes observed was significant. Complications can be avoided by early diagnosis and timely surgical intervention.

Key words: Complication; Mesiodens; Prevalance; Supernumerary.

Introduction

The mesiodens is the additional tooth between the incisors in the midline of the maxilla.¹ The mesiodens, the most common form of supernumerary teeth, may be single or multiple (mesiodentes) and localized unilaterally or bilaterally.^{2–4} They may be observed as part of a syndrome or in isolation.⁴ The prevalence of mesiodens in the general population is 0.15–1.9%.^{3,5} Mesiodens occurs more frequently in boys than in girls^{5,6} and is more common in permanent dentition than in primary dentition.³ The shapes of the mesiodentes are variable. The most prevalent shape is conical, followed by tuberculate and supplemental.^{7,8} Conical-shaped mesiodentes are usually single, located in the palatal region between the central teeth, and tend to replace the permanent central teeth.⁴ Tuberculate mesiodentes, on the other hand, usually do not complete root development but adversely affect the eruption of the incisors.^{3,4,9} Supplemental mesiodentes resemble the nor-

mal tooth shape and rarely do not erupt.^{10,11} Mesiodentes can be asymptomatic² or cause significant changes in occlusion and appearance by altering the eruption path and position of permanent teeth.⁴ They can lead to complications such as delayed eruption, midline diastema, malposition, impaction, malocclusion, cyst formation, root resorption, dilaceration, and loss of vitality.^{2,6,8} Delayed mesiodens therapy may require more complicated orthodontic and surgical procedures.^{4,8} Therefore, whether or not an immediate intervention is undertaken, early diagnosis of mesiodens is critical.¹² The frequent occurrence of mesiodens in patients presenting to the clinic led to the question, "Is mesiodens more common in this region?" When reviewing the literature to find an answer to this question, no answer was found. It was noticed that there were many studies on the prevalence of mesiodens in different regions of Turkey, but no such data were found for the South-east Anatolian region.^{12–20} In the study most similar to the topic,

Koparal et al. identified a prevalence of 1.5% supernumerary teeth in this region but did not specify how many of them were mesiodentes.²¹ Therefore, one of the objectives of this study is to answer this question. This study aims to investigate the prevalence, characteristics, and complications of mesiodens in a group of pediatric population aged 4–16 in the Southeast Anatolian region of Turkey.

Material and Methods

The decision of the Ethics Committee of Harran University Health Sciences Clinical Research with the number HRU/21.09.13 was taken for the study. This study includes panoramic radiographs from 8002 patients aged 4 to 16 who presented to Harran University, Faculty of Dentistry for various reasons. The study excluded radiographs lacking adequate image quality in the anterior maxillary region, radiographs of patients with cleft lip and palate, or those receiving fixed orthodontic treatment. An extra tooth observed unilaterally or bilaterally between the upper central teeth or at the level of the midline of the maxilla was considered a mesiodens. All panoramic radiographs were obtained in the Department of Oral and Maxillofacial Radiology using the same digital panoramic unit (PCH-2500, Vatech, Gyeonggi-do, Korea at 65–90 kVp and 10 mA with a total aluminum filtering of 2.8 mm).

Patients were evaluated for age, sex, dentition status, number, shape, and position of mesiodens, and complications. After a single researcher (M.B.B) identified the presence of mesiodens, the number, shape, position, and complications of mesiodens were determined by consensus of both researchers (M.B.B and M.T.) an orthodontist and a maxillofacial surgeon, each with at least four years of specialist experience. Mesiodentes were evaluated visually on radiographs in terms of shape and direction of eruption and eruption status. They were classified as conical, tuberculate, and supplemental in shape. The crossing line of the alveolar crest indicated eruption, and behind the line, impaction was accepted. Crown and root angulations and rotations of permanent incisors were visually evaluated while determining complications. For the decision of delay in eruption, a comparison was made with the eruption status of the symmetrical tooth. For the diagnosis of diastema, mesiodens must be located between the permanent central incisors and move the teeth away from each other. Due to the distortion potential of panoramic radiographs, metric measurements were not applied, and they were decided visually.

Statistical analysis

The licensed package program IBM SPSS 21 was used to analyze the data obtained in the present study. Descriptive statistical information is shown for each parameter. Chi-square analysis was applied to determine whether the incidence of mesiodens differed between sexes and to examine the effect of the number of mesiodentes on complications. The significance level was accepted as $p < 0.05$.

Results

The prevalence of mesiodens among patients aged 4–16 years who presented to the clinic for any reason was 0.37%, according to the results of panoramic radiographs of 8002 examined patients (3596 girls, 4406 boys) (Table 1).

Gender, age, and the number of mesiodentes

A total of 39 mesiodens were observed in 30 subjects, including 10 girls (33%) and 20 boys (67%). The age of patients with mesiodens ranged from 6 to 16 years, and the mean age was 9.27 years (Sd: 2.42) (Figure 1). The sex ratio was 2:1. However, there was no

Table 1. Prevalence of Mesiodens by Gender

	N	Mesiodens	Prevalence	χ^2	P
Girls	3596	10	0,28%	1,639	0,2
Boys	4406	20	0,45%		
Total	8002	30	0,37%		

$p > 0.05$

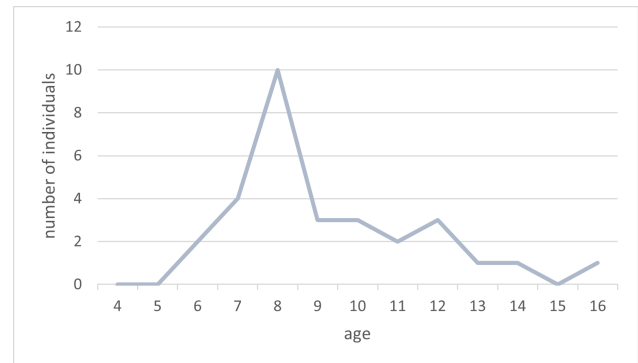


Figure 1. Distribution of individuals with mesiodens by age

statistically significant difference in the incidence of mesiodens according to sex ($p=0.2$) Table 1. A single mesiodens was detected in 21 patients (70%), and two mesiodentes were detected in 9 patients (30%). Three or more mesiodens were not found in the same patient (Table 2). Twenty-two (56%) of the 39 mesiodentes were conical, 9 (23%) were tuberculate, and 8 (23%) were supplemental. Thirty (77%) of the 39 mesiodentes were vertical, 6 (15%) were horizontal, and 3 (8%) were inverted. Twenty (51%) of the 39 mesiodentes erupted, and 19 (49%) were impacted. Twenty-two (73%) of the 30 patients had mixed dentition, 4 (13%) had primary dentition, and the remaining 4 (13%) had permanent dentition. Detailed information is shown in Table 2.

Complications

There was a statistically significant relationship between the number of mesiodentes and the number of complications ($p < 0.05$) (Table 3). The most common complication was "displacement or axial rotation of a permanent incisor." This complication occurred in 13 patients (43%). The second most common complication was a "delay in eruption", which was seen in 11 patients (37%). "Diastema between the incisors" was the third most common complication, with 8 patients experiencing it (27%). "Cyst formation" in mesiodens or in the adjacent teeth was observed in only 2 patients (7%). No resorption in adjacent roots was observed. There were no complications in six patients (20%) (Figure 2). Some examples of complications are shown in Figure 3. Some complications were analyzed separately according to the number of mesiodentes. Complications caused by a single mesiodens: Displacement or axial rotation of a permanent incisor was noted in 7 patients. Six patients had delayed eruption, while 4 had diastema. Cyst formation was observed in 1 patient. Complications related to mesiodens did not occur in 6 patients. Complications caused by two mesiodentes: Displacement or axial rotation of a permanent incisor was noted in 6 patients. Five patients had delayed eruption, while 4 had diastema. Cyst formation was observed in 1 patient. There were no patients with two mesiodentes without complications.

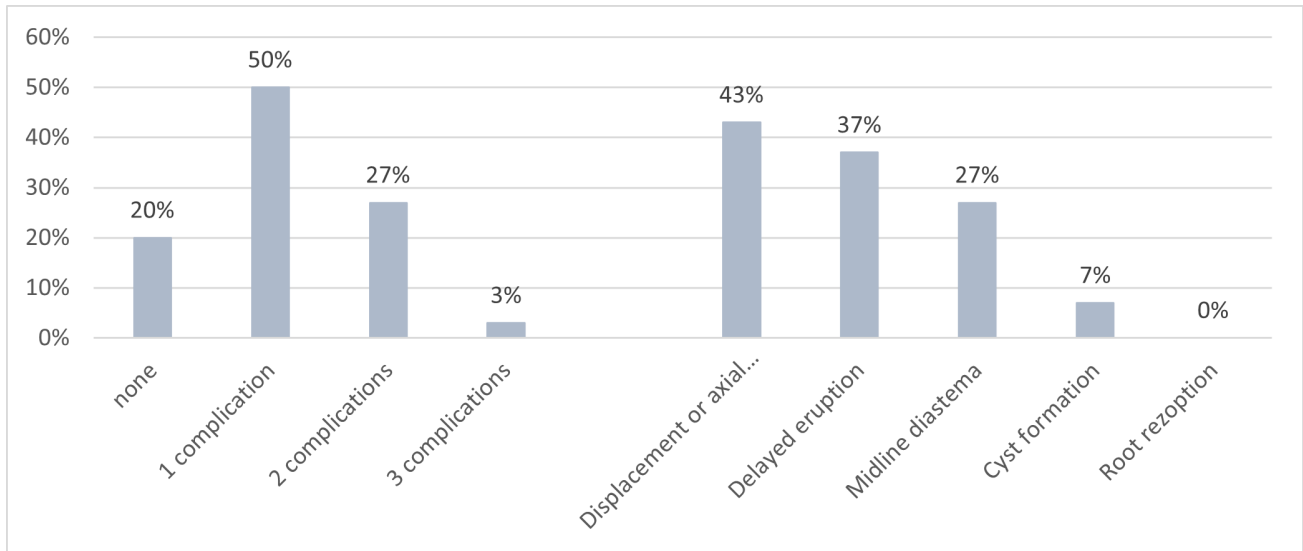


Figure 2. Complications and their incidence in patients with mesiodens

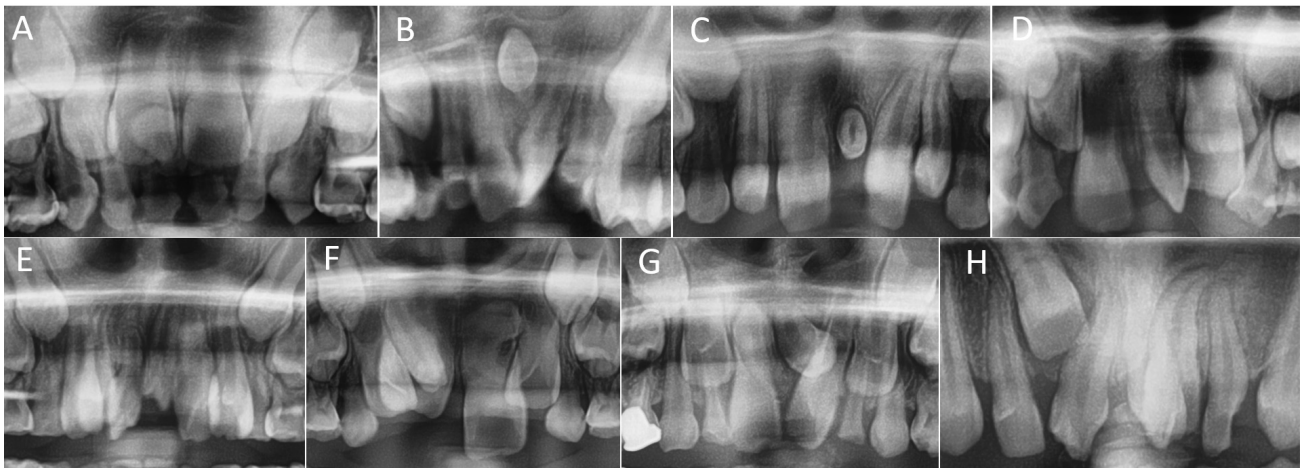


Figure 3. Examples of mesiodens-related complications. A: Asymptomatic mesiodens B: Axial rotation and displacement with inverted mesiodens C: Diastema with horizontally positioned mesiodens D: Delayed eruption and diastema E: Diastema and axial rotation and displacement with double mesiodentes F: Delayed eruption and axial rotation and displacement with double mesiodentes G: Axial rotation and displacement with double mesiodentes (one inverted, one vertical) H: Cyst formation and delayed eruption.

Discussion

The prevalence of mesiodens has been determined using a variety of diagnostic tools. The preferred methods for determining impacted mesiodentes are usually panoramic, occlusal, and periapical radiographs, which are commonly used in dentistry.^{4,6,12,22} However, the lack of clear visualization of the anterior region on panoramic radiographs is a disadvantage.^{4,13,23} Due to the risk of being overlooked, CBCT was found to be more advantageous in this area.^{13,24} However, CBCT uses a higher radiation dose than panoramic radiographs, and children are more sensitive to radiation.²³ Furthermore, while CBCT offers significant advantages in evaluating the shape and location of existing mesiodentes and the complications they cause, it may not be an appropriate diagnostic method for determining the prevalence of mesiodens in studies. This is because the need for CBCTs, even if performed for different reasons, is usually due to an existing or suspected situation. It is also possible that this situation is due to the mesiodens. Therefore, a higher prevalence in archival studies with CBCT is an expected result. For these reasons, to determine the prevalence of mesiodens, panoramic radiographs, which are common imaging methods, were used in the present study. Furthermore, prepandemic data (January 2017–January 2018) were evaluated in the present

study due to the possibility of changes in patients' admission to hospitals during the COVID-19 pandemic.²⁵ Mesiodens can be found in varying proportions among different races.⁸ It is found in 0.15–1.9% of the Caucasian population.^{3,5} In addition, higher rates of 3% or more are observed in Asian populations.⁸ The most important difficulty in comparing the results of studies on the subject is the variability of the examined age range. In studies examining similar age ranges as the present study, Laganà et al. found a result of 0.66% in their study conducted in Rome–Italy between the ages of 8–12.²⁶ Mukhopadhyay found a prevalence of 0.8% in a group of Indian patients aged 4–14 years.¹¹ Aren et al. found a rate of 0.1% in a group of Turkish patients aged 6–14 years.¹⁵ It has been shown that this rate is in the range of 0.1–2.7% in the Turkish population in different geographical regions and different age ranges.^{12,14,15,17,19} The prevalence of mesiodens in a group of pediatric population aged 4 to 16 years in the Southeast Anatolian region of Turkey was 0.37% in the present study, which is consistent with the literature. Mesiodens is observed twice as often in boys as in girls.^{3,4,12,27} In studies conducted in the Turkish population, the gender ratio ranged from 1.5:1–4:1.^{12,14,15,17–19,24} In the present study, a sex ratio of 2:1 was found, which is in full agreement with the literature.^{3,4,12,27} However, this difference was not

Table 2. Characteristics of patients with mesiodens

Variable	N	%
Age		
mean ± sd: 9,27±2,42	30	
median: 8 min-max: 6-16		
Total mesiodens	39	100,0
Total individuals with mesiodens	30	100,0
Individuals with Single mesiodens	21 (f:8,m:13)	70,0
Individuals with Double mesiodentes	9 (f:2,m:7)	30,0
Sex		
Male	20	66,7
Female	10	33,3
Shapes (n=39)		
Conical	22 (f:5,m:17)	56,4
Tuberculate	9 (f:4,m:5)	23,1
Supplemental	8 (f:3,m:5)	20,5
Direction (n=39)		
Vertical	30 (f:9,m:21)	76,9
Horizontal	6 (f:2,m:4)	15,4
Inverted	3 (f:1,m:2)	7,7
Eruption Status (n=39)		
Erupted	20 (f:7, m:13)	51,3
Impacted	19 (f:5, m:14)	48,7
Dentition		
Primary	4	13,3
Mixed	22	73,3
Permanent	4	13,3

f:female, m:male

statistically significant. Many previous studies indicated the sex ratio but did not state its significance statistically.^{11,12,14} While the difference between the sexes was statistically significant in some studies^{17,24}, it was not significant in other studies.^{15,20} In this study, it was understood that mesiodens, which is seen at a rate of 2 times in boys compared to girls, does not exhibit a statistically significant difference between the genders. Mesiodens can be found singly or more than once.³ The percentage of single mesiodens found in the present study (70%) is consistent with the results of 69.2% and 71.38% in the studies by Kim et al. and Hyun et al. respectively.^{2,6} Although the relationship between mesiodentes and complications has been studied, the effect of multiple mesiodens is unknown. Regardless of whether one or more supernumerary teeth were involved, management and treatment were accepted as equivalent⁴. For the first time, this study demonstrated that concurrent mesiodentes influenced the number of complications that might occur. Therefore, clinicians should be more cautious in cases with two mesiodentes. Mesiodentes are usually found to be impacted.^{3,4,11} In some studies performed with panoramic, periapical, or occlusal radiographs in the Turkish population, the rate of impacted mesiodentes ranged from 33.3% to 78.8%.^{12,14-18} In the present study, the incidence of impacted and erupted mesiodens was almost equal, consistent with the literature results. When considering the eruption position, it was clear that the majority of mesiodentes in the present study were vertical, consistent with previous studies.^{11-14,24,27} In terms of shape, mesiodentes were mostly seen as conical, then tuberculate, and then supplemental in the present study, in agreement with the literature.^{7,8} The most important clinical feature of mesiodentes is the complications they can cause. Malocclusion is the most common complication associated with the presence of mesiodens in the premaxilla.⁸ Delayed, ectopic, or asymmetric eruption of the central teeth should alert the clinician to the presence of mesiodens.⁴ In the present study, mesiodens-related complications were found in four-fifths of the patients. This result is consistent with the 76.8% result found by Altan et al.¹⁴ Regarding the complications caused by the mesiodens, it has been shown that the displacement of the adjacent teeth is

between 22-63%.³ In the present study, 43% displacement or axial rotation of permanent central incisors was detected in accordance with this information. However, this rate is much higher than the 2.5%, 16.6%, and 16.4% results of previous studies by Asaumi et al., Hyun E et al., and Gündüz et al., respectively.^{6,12,28} The reason for this situation may be the actual difference between the series studied. There may also be some methodological differences, such as the age group studied and the method of assessment, and the fact that patients were primarily evaluated from an orthodontic perspective in the present study, unlike previous studies, which may have led to this result. The delay in eruption or impaction has been shown to be on the order of 26-52%.⁴ In the present study, the delay in eruption is 37%, which is consistent with these data. Another complication is diastema between the incisors, which is one of the three most prevalent complications.^{2,6,12-14,20,27} It was the third most common complication in the present study, with a rate of 27%, which is consistent with some previous studies. The present study's cyst formation rate of 6% is consistent with 5.29%, 6.25%, and 6.2% found by Hyun et al., Yıldizer Keriş et al., and Akay et al., respectively.^{6,13,20} However, cyst formation in the adjacent teeth was also included in the present study. Treatment of mesiodens is possible only after a thorough examination of the radiographic and clinical findings.¹² One opinion recommends early extraction as soon as it is diagnosed to avoid possible complications, and another one recommends waiting for the root formation of the permanent incisor to avoid iatrogenic damage to it.²⁹ The early period usually refers to the period following the first diagnosis and is defined as occurring before six years. The late period defines the completion of the root formation of the adjacent teeth and is generally understood as 8-10 years.³ The clinical opinion of Thomaidis et al. is that the earlier the mesiodentes are removed, the fewer complications will occur.²⁹ On the other hand, it has also been claimed that early surgery is only indicated when the mesiodentes interfere with eruption, occlusal development, or orthodontic treatment.²⁷ Russell emphasized the studies that do not recommend extraction in the primary dentition and referred to the early period of mixed dentition in the extraction of mesiodens. During this period, extraction was found to facilitate spontaneous eruption and alignment of incisors and may reduce the need for orthodontic treatment.⁴ The early mixed dentition period was the most common age range in which mesiodentes were identified in the present study. Whether the patient is aware of the abnormal image or for some other reason, this age range in which the clinic is applied may be an appropriate period for mesiodens extraction from a general perspective. However, a thorough evaluation of each patient's clinical and radiographic data and planning the proper treatment for each case is essential. After mesiodens extraction, the spontaneous eruption of permanent incisors has been observed in 75% of cases.⁴ A recent meta-analysis reported that more than 65.5% of spontaneous eruptions of impacted teeth were observed at the 36-month follow-up after surgical extraction of supernumerary teeth.³⁰ Close follow-up is recommended after extraction.⁴ Therefore, clinical and radiographic evaluation is required six months after extraction to determine if the tooth has erupted. If the arch length is inadequate, space can be created orthodontically.⁴ Surgical exposure should be performed only if there is inadequate eruption and adequate space despite an appropriate waiting period (6 months) after extraction. In cases where spontaneous eruption is not observed despite surgical exposure, orthodontic pulling force should be performed.³ Diagnostic tools may change with technological development. In fact, the study in which automatic mesiodens classification was performed using deep learning technology in panoramic X-ray is promising for the development of new diagnostic methods in the future, in which errors in the diagnosis of mesiodens will be reduced.²³ The present study has many limitations. First, although the prevalence of mesiodens can be determined with 2D imaging, it is difficult to clearly identify its shape, position, and complications. Therefore, observations should be supported by 3D imaging techniques. Second,

Table 3. The relationship between the number of mesiodentes and the number of complications

		Number of meziodens						Chi-square	
		1		2		Total		Chi-square	P
		N	%	N	%	n	%		
Complications	None	6	28,57	0	0	6	20	*	0,022
	1 complication	12	57,14	3	33,33	15	50		
	2 complications	3	14,29	5	55,56	8	26,67		
	3 complications	0	0	1	11,11	1	3,33		
	Total	21	100	9	100	30	100		

*p<0.05

clinical examination is also required to clearly identify complications, whereas only radiographs were used for determination in the present retrospective study. Finally, no follow-up was performed on the mesiodentes detected in this cross-sectional study. Given the results of the present prevalence study, there is a need for controlled clinical studies in this population in which mesiodentes are imaged in three dimensions and followed clinically.

Conclusion

According to the results of the present study: In a group of pediatric population in the Southeast Anatolian region of Turkey, the prevalence of mesiodens was found to be 0.37%, which is consistent with the literature. Most patients with mesiodens (80%) had at least one mesiodens-related complication. The number of mesiodentes in a patient is important in influencing the number of complications. To avoid problems, early diagnosis and surgical intervention are critical.

Author Contributions

Conception (M.T.) Design (M.T., M.B.B.) Supervision (M.T., M.B.B.) Materials (M.B.B.) Data collection and processing (M.B.B.) Analysis and/or interpretation (M.T., M.B.B.) Literature Review (M.T.) Writing (M.T.) Critical Review (M.T., M.B.B.)

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

- Kim SG, Lee SH. Mesiodens: a clinical and radiographic study. *J Dent Child.* 2003;70(1):58–60.
- 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(2):161–169. doi:<https://doi.org/10.1111/ipd.12317>.
- Primosch RE. Anterior supernumerary teeth—assessment and surgical intervention in children. *Pediatr Dent.* 1981;3(2):204–15.
- Russell KA, Folwarczna MA. Mesiodens—diagnosis and management of a common supernumerary tooth. *J Can Dent Assoc.* 2003;69(6):362–367.
- Van Buggenhout G, Bailleul-Forestier I. Mesiodens. *Eur J Med Genet.* 2008;51(2):178–181. doi:<https://doi.org/10.1016/j.ejmg.2007.12.006>.
- Hyun HK, Lee SJ, Lee SH, Hahn SH, Kim JW. Clinical characteristics and complications associated with mesiodentes. *J Maxillofac Surg.* 2009;67(12):2639–2643. doi:<https://doi.org/10.1016/j.joms.2009.07.041>.
- Mossaz J, Kloukos D, Pandis N, Suter VG, Katsaros C, Bornstein MM. Morphologic characteristics, location, and associated complications of maxillary and mandibular supernumerary teeth as evaluated using cone beam computed tomography. *Eur J Orthod.* 2014;36(6):708–718. doi:<https://doi.org/10.1093/ejo/cjt101>.
- Shih WY, Hsieh CY, Tsai TP. Clinical evaluation of the timing of mesiodens removal. *J Chin Med Assoc.* 2016;79(6):345–350. doi:<https://doi.org/10.1016/j.jcma.2015.10.013>.
- Foster T, Taylor G. Characteristics of supernumerary teeth in the upper central incisor region. *Dent Pract Dent Rec.* 1969;20(1):8–12.
- Garvey MT, Barry HJ, Blake M. Supernumerary teeth—an overview of classification, diagnosis and management. *J Can Dent Assoc.* 1999;65(11):612–616.
- Mukhopadhyay S. Mesiodens: a clinical and radiographic study in children. *J Indian Soc Pedod Prev Dent.* 2011;29(1):34. doi:<https://doi.org/10.4103/0970-4388.79928>.
- Gunduz K, Celenk P, Zengin Z, Sumer P. Mesiodens: a radiographic study in children. *J Oral Sci.* 2008;50(3):287–291. doi:<https://doi.org/10.2334/josnusd.50.287>.
- Akay G, Ozdede M, Gungor K. An evaluation of mesiodentes: A retrospective study with cone-beam computed tomography. *Selcuk Dent J.* 2018;5(3). doi:[10.15311/selcukdentj.359537](https://doi.org/10.15311/selcukdentj.359537).
- Altan H, Akkoc S, Altan A. Radiographic characteristics of mesiodens in a non-syndromic pediatric population in the Black Sea region. *J Investig Clin Dent.* 2019;10(1):e12377. doi:<https://doi.org/10.1111/jicd.12377>.
- Aren G, Erdem AP, Onur Ö D, Ak G. The prevalence of mesiodens in a group of non-syndromic Turkish children: a radiographic study. *Eur Oral Res.* 2018;52(3):162–166. doi:<https://doi.org/10.26650/2Feor.2018.456>.
- Bereket C, Çakır-Ozkan N, Sener I, Bulut E, Bastan A. Analyses of 1100 supernumerary teeth in a nonsyndromic Turkish population: A retrospective multicenter study. *Niger J Clin Pract.* 2015;18(6):731–738. doi:<https://doi.org/10.4103/1119-3077.154213>.
- Colak H, Uzgur R, Tan E, Hamidi M, Turkal M, Colak T. Investigation of prevalence and characteristics of mesiodens in a

- non-syndromic 11256 dental outpatients. *Eur Rev Med Pharmacol Sci.* 2013;17(19):2684–9.
18. Handan O, ilkay UYSAL D, CETINKAYA DM. Meziiodenslerin Değerlendirilmesi: Klinik ve radyografik bir çalışma. *J Dent Fac Atatürk Uni.* 2012;2012(2):120–124.
 19. Kazancı F, Celikoglu M, Miloglu O, Yildirim H, Ceylan I. The frequency and characteristics of mesiodens in a Turkish patient population. *Eur J Dent.* 2011;5(03):361–365.
 20. YILDIZER KERİS E, OZUTURK O. Bir grup Turk populasyonunda meziiodenslerin insidansı, özellikleri ve komplikasyonlarının konik isinli bilgisayarlı tomografi ile incelenmesi. *Ortadoğu Medical Journal.* 2016;8(3).
 21. Koparal M, Ünsal HY, Alan HT, YALCIN M, Bilal E, Gulsun B. Güneydoğu Anadolu Bölgesi'nde dental anomalilerin görülme sıklığı. *Selcuk Dent J.* 2018;5(2):135–141. doi:<https://doi.org/10.15311/selcukdentj.319237>.
 22. Aoun G, Nasseh I. Mesiodens within the nasopalatine canal: an exceptional entity. *Clin Pract.* 2016;6(4):903. doi:<https://doi.org/10.4081%2Fcp.2016.903>.
 23. 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(8):1477. doi:<https://doi.org/10.3390/diagnostics11081477>.
 24. Goksel S, Agirgol E, Karabas HC, Ozcan I. Evaluation of prevalence and positions of mesiodens using cone-beam computed tomography. *J Oral Maxillofac Surg.* 2018;9(4). doi:<https://doi.org/10.5037%2Fjomr.2018.9401>.
 25. González-Olmo MJ, Delgado-Ramos B, Ortega-Martínez AR, Romero-Maroto M, Carrillo-Díaz M. Fear of COVID-19 in Madrid. Will patients avoid dental care? *Int Dent J.* 2022;72(1):76–82. doi:[10.1016/j.identj.2021.01.013](https://doi.org/10.1016/j.identj.2021.01.013).
 26. Laganà G, Venza N, Borzabadi-Farahani A, Fabi F, Danesi C, Cozza P. Dental anomalies: prevalence and associations between them in a large sample of non-orthodontic subjects, a cross-sectional study. *BMC Oral Health.* 2017;17(1):62. doi:[10.1186/s12903-017-0352-y](https://doi.org/10.1186/s12903-017-0352-y).
 27. Tyrologou S, Koch G, Kuro J. Location, complications and treatment of mesiodentes—a retrospective study in children. *Swed Dent J.* 2005;29(1):1–9.
 28. Asaumi JI, Shibata Y, Yanagi Y, Hisatomi M, Matsuzaki H, Konouchi H, et al. Radiographic examination of mesiodens and their associated complications. *Dentomaxillofac Radiol.* 2004;33(2):125–7. doi:[10.1259/dmfr/68039278](https://doi.org/10.1259/dmfr/68039278).
 29. Thomaidis V, Tsoucalas G, Fiska A. Rotated mesiodens in children. An immediate surgical removal or active monitoring? *Clin Case Rep.* 2019;7(12):2577–2578. doi:[10.1002/ccr3.2452](https://doi.org/10.1002/ccr3.2452).
 30. Pescia R, Kiliaridis S, Antonarakis GS. Spontaneous eruption of impacted maxillary incisors after surgical extraction of supernumerary teeth: a systematic review and meta-analysis. *Clin Oral Investig.* 2020;24(11):3749–3759. doi:[10.1007/s00784-020-03369-3](https://doi.org/10.1007/s00784-020-03369-3).