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FROM THE EDITOR

We are very pleased to announce to you that our journal, Eurasian Dental Research, which is a new scientific journal in the field of dentistry, has started its publication life.

Eurasian Dental Research aims to contribute to the literature by publishing manuscripts at the highest scientific level on all fields of dentistry. The journal publishes original articles, and rare case reports that are prepared in accordance with ethical guidelines.

The journal is the official publication of Biruni University and published triannually in April, August, and December. The publication language of the journal is English.

No fees or charges are required for manuscript processing and publishing with Eurasian Dental Research.

We aim to be accepted in the internationally respected indices and discovery services in the coming years.

We will be happy to see your scientific studies and articles in Eurasian Dental Research, the journal of our Faculty.

Prof. Dr. İlknur ÖZCAN
Editor in Chief

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Does the Type of Impacted Third Molar Induce the Formation of Caries on the Distal Surface of the Second Molar? A Different Outcome and Interpretation

Musa Kazım ÜÇÜNCÜ[1] , Raghıb SURADI[2]

Abstract

Aim Investigators have different ideas about whether or not the third molars should be extracted as a preventive measure. The aim of this study is to evaluate the relationship of impacted third molar with the frequency of caries on the distal surface of the second molar.
Material and method In this prospectively designed study, oral examination and panoramic radiographic images of 438 patients were performed. All of the second and third molars on the mandible are classificated by the eruption levels and angulation degrees. The presence of caries on the distal surface of the second molars was determined with the help of ICDAS-II criteria. Pearson Chi-Square and McNemar test was used to compare categorical variables and both segments.
Results The participants in the study ranged in age from 18 to 62, with a mean age of 28.33± 9.2 years. While a total of 1752 teeth were examined and both segments were evaluated for angulation type and level of eruption. The most frequent angulation type was vertical, and the most frequent eruption level was A. Mesioangulation was the most common type of angulation associated with caries in adjacent teeth.There was a statistically significant variation in the prevalence of caries between the two segments ($p<0.001$; $\chi2=0.241$). More caries was seen in adjacent teeth with vertical on the right segment and mesioangulation on the left.
Conclusion Prophylactic extraction of third molars should be considered comprehensively. The fact that different types of angulation increase caries susceptibility in both segments highlights the need to evaluate all caries development factors concurrently.

Keywords Dental caries, Digital radiography, Impacted third molar, Mesioangulation, Prospective study

Introduction

Among teeth that are impacted owing to pathological problems such as another tooth or a cyst, surgery of the third molars is one of the most often done interventional operations in the mouth, jaw, and face region (1). Third molars, which are the most frequently impacted teeth (2), are found to be impacted in various types of positions by clinical and radiographic examination and have caused irreversible pathologies in the surrounding tissues and teeth (3) such as pericoronitis, periodontitis, cystic lesions, mandibular fractures, and dental caries on the distal surface of second molar (4,5).

In the 1990s, preventive excision of the third molar was refuted in a variety of scientific fields (6,7). In recent years, however, researchers have examined whether the eruption level and angulation type of the third molar are connected with caries production in the distal second molar (3,5,8–11).

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Previous studies exploring the relationship between lower third molar angulation degrees and caries frequency were predominantly retrospective (11–13). In addition, it was revealed that there was no research comparing segments and that there were just a few prospective investigations (3,14).

From this perspective, the purpose of this study is to determine if there is a relationship between the impacted type and angulation degrees of the lower third molar and the distal caries of the lower second molar. The following hypotheses are established: 1) The frequency of distal surface caries of the lower second molar tooth is associated with the impacted type and angulation of the lower third molar. 2) The mesioangular lower third molar is the most common source of caries on the distal surface of the second lower molar. 3) According to the segments, the incidence of caries on the distal surface of the lower second molar did not considerably change.

Material and Methods

Ethics approval and sample calculation

After receiving approval from the ethics committee (2022/68-20), the universe sample calculation was conducted using "Cohen's effect size coefficients" (5). Assuming that the assessments will have a small effect size (d=0.20), the power of the study is stated as 1-ß (ß = Type II error probability) to calculate the sample size; a: It was determined that the sample size must be

at least 416 in order to reach a power of 95% at the 0.01 level.

Design of study

Patients who applied to the Biruni University Faculty of Dentistry between April and November 2022 comprised the research group. Initially, oral and radiographic examination was performed by two clinicians. Before beginning the trial, two clinicians with at least five years of dental experience were calibrated for caries diagnosis (15) and identification of the third molar tooth (16). Self-calibrated clinicians examined 30 patients twice with a 1-week delay between examinations to identify caries. Moreover, the interclass coefficients of the two clinicians were calculated (Table I). In the study, clinical and radiographic data of the mandibular second and third molars were conducted on subjects older than 18 years. The investigation comprised 438 participants older than the age of 18 whose panoramic radiographic images (Orthophos XG Sirona, Dentsply, Bensheim, Germany) and dental anamnesis were complete. Patients under the age of 18, those undergoing orthodontic treatment, those with a systemic disease or condition, and those with pathology in the alveolar bone were excluded from the research. Those whose radiographic data were faulty for an assortment of reasons were also excluded. Exclusion criteria include a history of dental treatment, a periapical lesion, or abnormalities in any of the teeth to be examined (4.7, 4.8; 3.7, 3.8). The intraoral eruption types and angulation degrees of teeth 4.8 and 3.8 were determined. The distal surfaces of teeth 4.7 and 3.7, as well as the mesial surfaces of teeth 4.8 and 3.8, were evaluated for the presence of caries.

Table 1: Intraclass and Interclass Correlation Coefficient

Intraclass Correlation Coefficient	Cronbach's Alpha	%95 Confidence Interval		Kappa	
		Lower Bound	Upper Bound	Value	Approx T.
XXX	0.972	0.943	0.987	0.874	9.746
XX	0.947	0.879	0.972		

Detection of dental caries and classification impact third molar

Archer's and Shiller's methods were used to determine the impact type and angulations of the impact third molars. While determining the type of impacted lower third molars by Archer's classification (17) (Figure 1a-1c), the angulation degree was determined with the help of Shiller's (18) method (Figure 2a-2d). Levels of eruption according to Archer's classification A: The occlusal surface of the lower wisdom tooth is at or above the other teeth; B: The occlusal surface of the lower wisdom tooth is above the occlusal level of the second molar but below the occlusal level; C: The occlusal surface of the lower wisdom tooth is the below the level of the cementoenamel junction. Rare angulation forms such as buccolingual, mesoinversion, distoinversion, and distohorizontal were categorized as "others" and excluded from the study.

By using software (Paint 96 DPI, Windows 10 Pro 64 Bit, Microsoft, Redmond Washington, USA), the panoramic radiographic images were processed in a digital environment, and drawings were created to assess the categorization. The angle of angulation was formed by intersecting lines drawn parallel to the occlusal surfaces of the lower second and third molars. The "online protractor" was utilized to calculate the angulation angle (Figure 3a-3b). Thanks to that, using a protractor on the picture, the angulations were determined. 110 to 790 degrees were classified as mesioangular; -100 to 100 degrees as vertical; horizontal values between 800 and 1000 degrees were classified as distoangular.

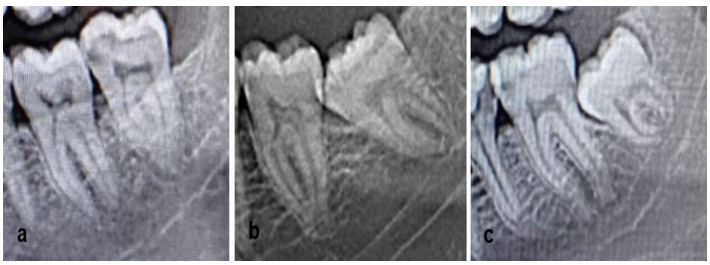

Figure 1: The level of impacted third molar by Archer's Classification. a: the eruption level is "A", b: the eruption level is "B", c: the eruption level is "C"

In the study, the ICDAS-II scale was employed to diagnose caries in the second lower molar. In the first stage of the ICDAS-II scale's two-stage coding process, the kind of restorative material on the affected tooth is specified. In this study, the initial value was considered to be 0 since untreated teeth were evaluated. In the second phase, a numerical definition of caries ranging from 0 to 6 was created based on the depth and characteristic of caries. Teeth having values of 0, 1, 2, and 3 were considered to have "no caries," whereas those with values of 4.5 and 6 were considered to have "caries." (15). The crown surfaces of the teeth categorized as A and B by Archer classification were evaluated and their ICDAS scores were established. Due to the inability to do an oral examination on class C teeth, caries was diagnosed using panoramic radiography. Teeth having D1, D2, and D3 levels were described as having "caries," but teeth with a D0 value were described as having "no caries."(19).

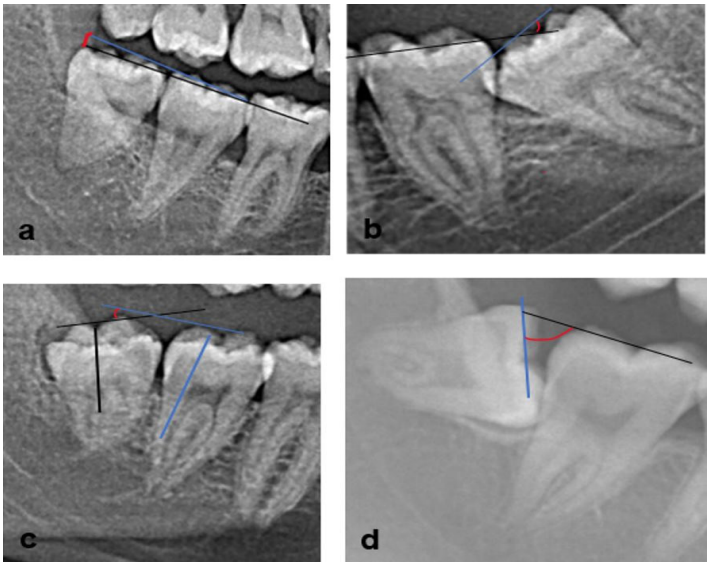

Figure 2: Determining the type of angulation by Schiller's Method. a: Verical, b: Mesioangular, c: Distoangular, d: Horizontal

Statistical methods (mean, standard deviation, median, frequency, and ratio) were used while evaluating the study data, and the SPSS (version 22, IBM Corporation, New York, USA) package program was used. Pearson Chi-Square test was used to compare categorical variables, and the data were analyzed statisti-

cally. McNemar test was used when comparing both segments. The statistical significance level was accepted as p<0.05.

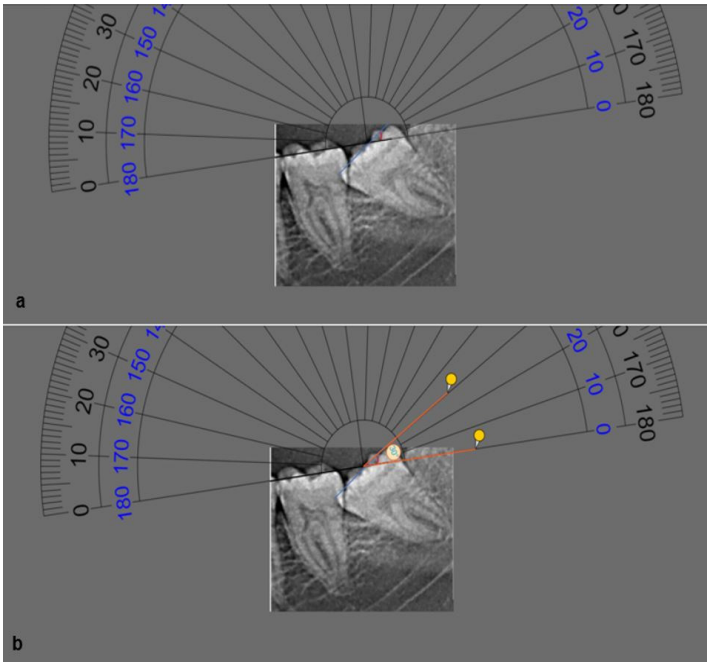

Figure 3: A line parallel to the occlusal surface of both teeth was drawn, and then the online protractor was placed by digital cursor. Fig. 3b: The angle formed at the intersection of the lines was measured digitally with the online protractor.

Results

The research comprised individuals between the ages of 18 and 62, with a mean age of 28.33± 9.2 years. While a total of 1752 teeth were investigated and both segments were assessed combined as angulation type, the most prevalent angulation type was vertical (55.1%), followed by mesioangular (38.2%). Distoangular and horizontal were quite uncommon, accounting for 2.7% and 3.9%, respectively (Table II). While the type of A was the most common type of impacted in both segments (71.1%), the type of C was the least (8%). Caries were observed in 31.3% (n=137) of the lower left second molars; on the right, this rate was 18.5% (n=81). Caries are seen in 18.5% of the lower left third molars; on the right, this rate was found to be 19.2% (n=84). Angulation types, eruption levels, and the presence of caries in all of the examined teeth are shown in Tables III and IV, according to age and gender.

There was a relationship between the angulation and impaction type of the lower right third molar and the frequency of caries in the lower right second molar (p=0.039; p=0.025), respectively. There was no relationship between the prevalence of caries in both teeth (p=0.306) (Table II). In addition, there was no link between the type of angulation of the third molar and the frequency of caries in the third molar (p=0.977) (Table V); the degree of impacted type had a statistically significant effect on the frequency of caries (p<0.05). There was no statistically significant relationship between caries occurrence around both teeth at right segment (p= 0.625) (Table VI).

There was a strong association between the angulation and level of impaction of the lower left third molar and the prevalence of caries in the lower left second molar (p<0.001; p=0.004). In addition, a statistically significant relationship was found between the occurrence of caries around both teeth (p<0.001) (Table VI).

Table 2: Relationship of all the examined teeth with each other

	(4.8) impacted level and angulation degree n (%)	(4.7) prevalence of caries on distal surface n (%)		(3.7) prevalence of caries on distal surface n (%)		(3.8) impacted level and angulation degree n (%)
		Caries (-)	Caries (+)	Caries (-)	Caries (+)	
Mesioangular	163 (37.2%)	131 (30%)	32 (7%)	92 (21%)	80 (18%)	172(39.3%)
Vertical	246 (56.2%)	212 (48%)	34 (7%)	195 (44%)	42 (9%)	237(54.1%)
Distoangular	17 (3.9%)	17 (3%)	0 (0%)	7 (1%)	0 (0%)	7(1.6%)
Horizontal	12 (2.7%)	10 (2%)	2 (1%)	7 (1%)	15 (3%)	22(5%)
p	a: p=0.039* (χ2=4.261)			b: p<0.001** (χ2=44.472)		
A	311(71%)	271 (62%)	40 (9%)	229 (53%)	83 (18%)	312(71.2%)
B	94(21.5%)	71 (17%)	23 (5%)	49 (12%)	36 (8%)	85(19.4%)
C	33(7.5%)	28 (6%)	5 (1%)	23 (5%)	18 (4%)	41(9.4%)
	c: p=0.025* (χ2=7.418)			d: p=0.04* (χ2=11.063)		

a: the relationship between the type of angulation (4.8) and the frequency of dental caries on distal surface (4.7);
b: the relationship between the type of angulation (3.8) and the frequency of dental caries on distal surface (3.7);
c: the relationship between the impacted level (4.8) and the frequency of dental caries on distal surface (4.7);
d: the relationship between the impacted level (3.8) and the frequency of dental caries on distal surface (3.7);

*Pearson Chi-Square Test *p<0.05 **p<0.001*

Table 3: The relationship of angulation and impacted level with caries frequency in both segments according to gender

Segmentation	Angulation and impacted level	Female n(%)	Male (n%)	p
Fourth segment	Mesioangular	94 (22%)	69 (15%)	0.520 (χ2=2.264)
	Vertical	154 (36%)	92 (22%)	
	Distoangular	8 (1%)	9 (2%)	
	Horizontal	7(1%)	5(1%)	
	A	188 (43%)	123 (27%)	0.945 (χ2=0.114)
	B	56 (13%)	38 (9%)	
	C	19 (4%)	14 (3%)	
	No caries (4.7)	220	150	0.328 (χ2=0.341)
	Caries (4.7)	43	25	
Third segment	Mesioangular	98 (23%)	74 (17%)	0.530 (χ2=1.270)
	Vertical	148 (34%)	89 (21%)	
	Distoangular	4 (1%)	3 (1%)	
	Horizontal	13 (2%)	9 (2%)	
	A	183 (41%)	129 (29%)	0.596 (χ2=1.036)
	B	55 (13%)	30 (7%)	
	C	25 (6%)	16 (4%)	
	No caries (3.7)	169 (38%)	132 (31%)	0.009 (χ2=6.099)
	Caries (3.7)	94 (22%)	43 (9%)	

*Pearson Chi-Square Test *p<0.05 **p<0.001*

There was no relationship between the angulation type of the third molar and the frequency of caries in the third molar (p=0.196). In contrast, the impacted level of the lower left third molar considerably increases the prevalence of caries on the distal surface of the lower left second molar (p<0.001) (Table V). In

addition, there was a statistically significant difference in the occurrence of caries in the lower second molars between the two segments ($\chi2$=5,187, p<0.001) (Table VII).

Table 4: The relationship of angulation and impacted level with caries frequency in both segments according to age

	Angulation and impacted level	18-30 n(%)	31-40 n(%)	41< n(%)	p
Fourth segment	Mesioangular	128 (30%)	23 (5%)	12 (2%)	0.008* ($\chi2$=13.734)
	Vertical	152 (35%)	66 (16%)	28 (6%)	
	Distoangular	10 (2%)	5 (1%)	2 (1%)	
	Horizontal	12 (2%)	0	0	
	A	208 (48%)	75 (18%)	28 (6%)	<0.001** ($\chi2$=20.060)
	B	78 (18%)	10 (2%)	6 (1%)	
	C	16 (3%)	9 (2%)	8 (2%)	
Third segment	Mesioangular	137 (33%)	18 (4%)	17 (3%)	<0.001** ($\chi2$=41.344)
	Vertical	143 (33%)	76 (17%)	18 (4%)	
	Distoangular	5 (1%)	0	2 (1%)	
	Horizontal	17 (3%)	0	5 (1%)	
	A	200 (46%)	81 (18%)	31 (7%)	<0.001** ($\chi2$=23.972)
	B	75 (18%)	7 (1%)	3 (1%)	
	C	27 (6%)	6 (1%)	8 (2%)	

*Pearson Chi-Square Test *p<0.05 **p<0.001*

Table 5: The relationship between the third molars in both segments

	(4.8) impacted level and angulation degree n (%)	(4.8) prevalence of caries on distal surface n (%)		(3.8) prevalence of caries on distal surface n (%)		(3.8) impacted level and angulation degree n (%)
		Caries (-)	Caries (+)	Caries (-)	Caries (+)	
Mesioangular	163(37.2%)	132 (30%)	31 (7%)	147 (33%)	25 (5%)	172(39.3%)
Vertical	246(56.2%)	199 (45%)	47 (10%)	186 (42%)	51 (11%)	237(54.1%)
Distoangular	17(3.9%)	11(2%)	6 (1%)	7(1%)	0 (0%)	7(1.6%)
Horizontal	12(2.7%)	12 (2%)	0 (0%)	17 (3%)	5 (1%)	22(5%)
p	a: p=0.977 ($\chi2$=0.046)			b: 0.196 ($\chi2$=3.258)		
A	311(71%)	241 (55%)	70 (15%)	236(53%)	76(17%)	312(71.2%)
B	94(21.5%)	86 (20%)	8(1%)	85(19%)	0 (0%)	85(19.4%)
C	33(7.5%)	27 (6%)	6 (1%)	36(8%)	5(1%)	41(9.4%)
	c: p=0.01* ($\chi2$= 9.147)			d: p<0.001** ($\chi2$=27.487)		

a: the relationship between the type of angulation (4.8) and the frequency of dental caries on (4.7); b: the relationship between the type of angulation (3.8) and the frequency of dental caries on (3.8); c: the relationship between the impacted level (4.8) and the frequency of dental caries on (4.8); d: the relationship between the impacted level (3.8) and the frequency of dental caries on distal surface (3.8)

*Pearson Chi-Square Test *p<0.05 **p<0.001*

Table 6: Frequency of dental caries in all examined teeth

The prevalence of dental caries (4.8) n	The prevalence of dental caries (4.7) n		The prevalence of dental caries (3.7) n		The prevalence of dental caries (3.8) n
	Caries (-)	Caries (+)	Caries (-)	Caries (+)	
No caries	301	53	264	93	No caries
Caries	69	15	37	44	Caries
p	0.625a ($\chi2$=0.239)		<0.001b** ($\chi2$=24.548)		

[a]The minimum expected count is 13.04 (Continuity Correction)

*[b] The minimum expected count is 25.34 (Pearson Chi-Square) ** p<0.001*

Table 7: Calculating the difference between the two segments

The prevalence of dental caries (4.7) n	The prevalence of dental caries (4.7) n	
	Caries (-)	Caries (+)
No caries	272	98
Caries	29	39
p	<0.001a** ($\chi2$=0.241)	

[a]Binomial distribution used (McNemar) ** p<0.001

Discussion

The first and second hypotheses were verified in light of the facts gathered; however, the third hypothesis was rejected. In this study, it was discovered that there was a statistically significant difference between the 3rd segment and the 4th segment in terms of caries incidence ($\chi2$=5.187, p<0.001). In the light of existing knowledge, it is impossible to declare if this difference is clinically relevant, as there is not enough research on this subject.

In the previous researches, retrospective (5,11–13) and prospective (3,14,20) designs are employed. A cohort consists of a group of patients who were observed over time; it is classified as retrospective, prospective, or ambidirectional. In the retrospective approach, which is a study design that extends beyond a set point in time, researchers examine historical records based on a specific year range (21). In retrospective research, the utilization of records from 2-6 years prior to the inquiry date (5,12) cannot offer insight on the present. For instance, caries was not detectable in the distal region of the second molar close to the mesioangulate-impacted third molar six years ago. However, this does not indicate whether or not mesioangulation would produce caries in subsequent years. It is unknown what occurred in the procedure beyond that point. It should not be forgotten that caries development is a complicated process influenced by several variables (22). It is inappropriate to draw conclusions about the future from historical data. In such instances, prospective research on similar patients should be performed based on retrospective data in order to acquire more reliable results.

It has been established that there is a significant relationship between the ICDAS criteria and the histology of caries (23). ICDAS-II criteria may be utilized as the gold standard in research assessing laser fluorescence for the diagnosis of occlusal caries because of this substantial association (24). Moreover, when the radiography findings of the ICDAS-II criteria were examined, it was shown that the sensitivity of ICDAS-II was higher and its specificity was lower than radiography. Consequently, radiography recommends the use of ICDAS-II for caries diagnosis in people with a high caries risk (25). Considering the caries risk of our country, although it is observed that DMFT values plummeted to moderately low levels from 2004 to 2018, in between the age group of 35-44 in our society (DMFT=8.8) (26), this value is extremely close to the moderate cut-off (DMFT=9) and an increase in DMFT values is observed in individuals aged 15 years. In the 35-44 age bracket in industrialized nations, high DMFT values (>13.9) have been found when global caries severity indicators are evaluated (27). In view of such information (26), it was believed that it would be more accurate to diagnose caries in mandibular second and third molars

using ICDAS-II criteria.

It was discovered that the prevalence of caries in lower third molars in both segments was connected with the eruption level, with the majority of dental caries occurring at level A in both segments. According to the literature, the frequency of caries increases with age as a result of the length of time teeth remain in the mouth (28). Since the formation of dental caries is a consequence of biofilm-induced demineralization and remineralization in the tooth's hard tissue, the caries process may be said to begin when the dental crown begins to emerge in the mouth (22). This can be explained by the fact that our study identified more cavities at the "A" eruption level of the third molar (29). Considering the previous studies on angulation types, vertical (10,30,31) and mesioangulation (9,32,33) were found to be the most prevalent kinds of angulation. In addition, earlier research that assessed the prevalence of caries in the second molar based on the third molar reported varied numbers (3,11,20,34,35). According to Lysell et al., the proportion of caries in the lower second molars was 17% (34) however, a research indicated that only 5% of caries were identified on the distal surface of those molars (20). From a study conducted in Jordan, this value was 7.9%, and the third molars had a higher frequency of caries than the second molars (35). In retrospective research done in our nation, the value of the lower second molars was determined to be 18.9% (11). According to Punwitikorn et al., the incidence of caries in unerupted third molars was 12.9% (36). In our research, these percentages were greater and comparable in both sectors (3.8% = 18.5%; 4.8% = 19.2%). In addition, it was noted, concurrently with our study, that incompletely erupted third lower molars were more prevalent in the 18-30 age group than in other age groups (36). In contrast, Knuttson et al. discovered 31% dental caries in third molars that had not fully erupted (20). In the formation of such variances, it is possible that geographical and racial characteristics, as well as the nature of the research population, are distinct.

In our investigation, the right segment housed the vertical that generated the highest frequency of caries in the second lower molar. Dental caries, on the other hand, was more prevalent near the mesioangulate lower third molar on the left. According to research conducted in terms of angulation degree (3,5,9,37), the most prevalent angulation degrees that induce caries differ from one another, such as 46^{0}-60^{0} (3), 11^{0}-70^{0} (37), 30^{0}-70^{0} (9). In our study, the mesioangular group was not divided into subgroups in itself and was determined as 11^{0}-79^{0}. This is one of the limitations of the study. The mesioangulate third molar is the angulation type that causes the most caries on the distal surface of the lower second molar (80/438; 18.2%) on the left segment. On the contrary, it was determined that the vertical third molar (34/438; 7%) was the most prevalent cause of caries on the right segment. This circumstance and the statistical difference between the two segments ($\chi 2=5.187$, $p<0.001$) are unprecedented in the scientific literature. The socioeconomic status of the location where the study was done and the varying significance patients place on dental hygiene may have contributed to this disparity. This result highlights an additional drawback of the study. The study did not determine the oral hygiene behaviors of the participants, the oral hygiene equipment they use, how they wash their teeth, or which hand they use more frequently (38). There is a presumption that this difference is connected to hand use. Numerous studies have evaluated the occurrence of impacted lower third molars in our nation. According to Etoz et al., B was the most prevalent eruption level (76%). Goksu et al. (46%), Yuce et al. (57.6%), and Yildirim et al. (67.3%) identified type "A" as the most frequent (11,39,40). In our analysis, the third molar with an "A" eruption level of more than 70% was discovered in both segments. It should be noted that the aforementioned studies were conducted using a retrospective design, and that the use of classifications in some studies other than those we used, as well as the determination of eruption status based on the ramus or the cement-enamel junction of the lower second and lower third molars, may have resulted in several values.

All of these findings raise the question of whether wisdom teeth should be extracted prophylactically or not. In several studies (41,42), pericoronitis and dental caries are the indications for the extraction of the lower third molar. However, there is no consensus on prophylactic withdrawal in the indication guidelines (43,44). The increase in morbidity associated with the lower third molar, as shown by age-related research, indicates that the extraction of these teeth has risen to the forefront as a means of maintaining oral and dental health over the long term (45). Due to the continuous discussion around the extraction of impacted third molars, a document titled NICE outlining the extraction indications for these teeth has been released in England and Wales (46). However, it was stated that the lack of evidence-based studies in the guideline was felt (47). Due to the mesioangular position of the lower third molars, adverse effects such as nutrient embedding and plaque retention may be observed, particularly on the distal surface of the lower second molar (5). In cases where there is no indication for extraction but there is a need for preventive measures to prevent decay formation in second molars, patients' oral hygiene status can be measured through various plaque indices. In preventive dentistry, various scales are used to effectively measure oral hygiene status, and new scales are also emerging in the literature (48). API (49) and various PI scales have been used for evaluating oral hygiene status for many years (50). API is a two-stage scale, but it lacks flexibility. Therefore, it can be challenging to achieve low API values even in patients with excellent oral hygiene (48,51). The selection of the index to be used in plaque indices generally varies depending on sample size, study method, study duration, expected objectives, and hypotheses (50). Additionally, most used indices have a non-linear structure (52). Since indices calculate plaque quantity based on the area covered by plaque or the thickness of the plaque, relying solely on the plaque index for interpretation in patients without extraction decisions may be insufficient for preventive purposes. If plaque is the sole concern, individual oral hygiene education is provided to the patient to minimize plaque levels. However, apart from that, a caries risk assessment scale, which is a synthesis of many concepts for evaluating the patient's caries risk, classifying the risk, and determining how to manage it, can be used (53). After the patient's risk analysis, if the patient is in the low-risk group: Fluoridated toothpaste (twice a day; at least 1000 ppm), regular oral care, access to fluoridated water; if the patient is in the high-risk group: Oral care with 1450-1500 ppm fluoride toothpaste (twice a day), motivational intervention to reduce sugar intake in the diet, use of fissure sealants on high-risk surfaces, and other preventive measures can be taken (53).

In relation to the position of the lower third molar, the emergence of inflammatory mediators (54) and microbial species (55), which may be effective in the development of both second and third molar caries and periodontitis, has been proven by various studies. Although it has been reported that the lower third molar may harm the lower second molar, the research did not account for other factors that may raise the risk factor. It has been argued that it is not feasible to talk about a prevalence based on the general population, since such studies were done in a hospital context, and the dental caries found on the distal surface of the second molars is truly a global phenomenon (56). When dental caries development is analyzed in terms of epidemiology and the caries process, it is evident that it is influenced by several factors (22).

Although the frequency of caries in the distal lower second molar is six times greater in the vicinity of mesioangular and horizontally angulated third molars (56), our investigation found that the vertically positioned third molars also generated significant levels of caries. In our study, the odds ratio value was not computed since various types of angulated teeth in both segments produced caries. The removal of third molars for preventive purposes may carry additional risks and be costly. The prevalence of caries should be assessed from a larger viewpoint, taking into consideration all the elements that might induce caries, rather than focusing on a single component (one tooth impacts the other). The present cannot be adequately reflected in retrospective investigations. In this regard, firstly, retrospective screening should be performed, followed by the adoption of prospective studies and the abandonment of only retrospective investigations. According to the records obtained in the retrospective scan, the examined individuals should be contacted once more, and this should be deemed the starting point. At least six months following the initial assessment, the individuals should be undergone a second oral and digital examination of the pertinent teeth. To achieve standardization, individuals with similar ages and levels of oral hygiene should be included in the study as much as possible. For instance, if one of two individuals with a similar mesioangulated third lower molar uses an instrument for the interproximal cleaning of the second and third molars and provides more effective interproximal hygiene, this individual is expected to have a lower incidence of caries on the distal surface of lower second molar. Obviously, the value of the odds ratio in relation to caries avoidance may differ for this individual.

In present study, an examination of patients' oral hygiene habits was not conducted, and the potential effects of oral hygiene habits, oral hygiene awareness, and socioeconomic factors on distal second molar were overlooked. Dental caries formation is a process, and this study does not encompass the entire process; rather, interpretations were made based on the data and observations obtained at that moment. Furthermore, dental caries classification was performed using the ICDAS-II, which is a visual examination method, without utilizing caries detection agents or devices with features such as quantitative light-induced fluorescence, fiber-optic illumination, or laser fluorescence. Additionally, when determining the eruption level and angulation of third molars, only panoramic radiographic images were utilized, and no additional images (such as bite-wings) or more advanced three-dimensional imaging were employed. All of these factors constitute the limitations of the study.

Conclusion

In retrospective studies, only the radiographic examination is insufficient to determine if third molars can be extracted prophylactically. All new studies in this field should be designed with forward-looking methods, hereby standardization in terms of oral hygiene and oral hygiene practices among individuals may lead to the most accurate result. In addition, doing these investigations as population-wide multicenter research will yield more reliable data.

Declarations

Author Contributions: *Conception/Design of Study- M.K.Ü., R.S.; Data Acquisition- M.K.Ü., R.S.; Data Analysis/Interpretation- M.K.Ü., R.S.; Drafting Manuscript- M.K.Ü., R.S.; Critical Revision of Manuscript- M.K.Ü., R.S.; Final Approval and Accountability- M.K.Ü., R.S.; Material and Technical Support- M.K.Ü., R.S.; Supervision- M.K.Ü.*

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REFERENCES

1. Padhye MN, Dabir A, Girotra CS, Pandhi VH. Pattern of mandibular third molar impaction in the Indian population: A retrospective clinico-radiographic survey. Oral Surg Oral Med Oral Pathol Oral Radiol. 2013;116(3):161–6.

2. Hashemipour MA, Tahmasbi-Arashlow M, Fahimi-Hanzaei F. Incidence of impacted mandibular and maxillary third molars: a radiographic study in a southeast iran population. Med Oral Patol Oral Cir Bucal. 2013;18(1):140–5.

3. Allen RT, Witherow H, Collyer J, Roper-Hall R, Nazir MA, Mathew G. The mesioangular third molar - to extract or not to extract? analysis of 776 consecutive third molars. Br Dent J. 2009;206(11):586–7.

4. Almendros-Marqués N, Alaejos-Algarra E, Quinteros-Borgarello M, Berini-Aytés L, Gay-Escoda C. Factors influencing the prophylactic removal of asymptomatic impacted lower third molars. Int J Oral Maxillofac Surg. 2008;37(1):29–35.

5. Chang SW, Shin SY, Kum KY, Hong J. Correlation study between distal caries in the mandibular second molar and the eruption status of the mandibular third molar in the korean population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009;108(6):838–43.

6. Stephens R, Kogon SL, Reid JA. The unerupted or impacted third molar--a critical appraisal of its pathologic potential. J Can Dent Assoc. 1989;55(3):201–7.

7. Bramante MA. Controversies in Orthodontics. Dent Clin North Am. 1990;34(1):91–102.

8. Pepper T, Grimshaw P, Konarzewski T, Combes J. Retrospective analysis of the prevalence and incidence of caries in the

distal surface of mandibular second molars in british military personnel. Br J Oral Maxillofac Surg. 2017;55(2):160–3.

9. Srivastava N, Shetty A, Goswami R, Apparaju V, Bagga V, Kale S. Incidence of distal caries in mandibular second molars due to impacted third molars: nonintervention strategy of asymptomatic third molars causes harm? a retrospective study. Int J Appl Basic Med Res. 2017;7(1):15–9.

10. Venu Gopal Reddy K. Distribution of third molar impactions among rural and urban dwellers in the age group of 22–30 years in south india: a comparative study. J Maxillofac Oral Surg. 2012;11(3):271–5.

11. Yıldırım H, Büyükgöze-Dindar M. Investigation of the prevalence of impacted third molars and the effects of eruption level and angulation on caries development by panoramic radiographs. Med Oral Patol Oral Cir Bucal. 2022;27(2):e106–12.

12. Chu FCS, Li TKL, Lui VKB, Newsome PRH, Chow RLK, Cheung LK. Prevalence of impacted teeth and associated pathologies - a radiographic study of the hong kong chinese population. Hong Kong Med J. 2003;9(3):158–63.

13. Özeç I, Hergüner Siso Ş, Taşdemir U, Ezirganli Ş, Göktolga G. Prevalence and factors affecting the formation of second molar distal caries in a turkish population. Int J Oral Maxillofac Surg. 2009;38(12):1279–82.

14. Toedtling V, Coulthard P, Thackray G. Distal caries of the second molar in the presence of a mandibular third molar–a prevention protocol. Br Dent J. 2016;221(6):297–302.

15. Braga MM, Oliveira LB, Bonini G, Bönecker M, Mendes FM. Feasibility of the International Caries Detection and Assessment System (ICDAS-II) in epidemiological surveys and comparability with standard World Health Organization criteria. Caries Res. 2009;43(4):245–9.

16. WHO. Oral health surveys: basic methods. World Health Organization; 2013.

17. Archer WH. Oral and maxillofacial surgery. WB Saunders. 1975;1045–87.

18. Shiller WR. Positional changes in mesio-angular impacted mandibular third molars during a year. J Am Dent Assoc. 1979;99(3):460–4.

19. Lian L, Zhu T, Zhu F, Zhu H. Deep learning for caries detection and classification. Diagnostics (Basel). 2021;11(9):1672.

20. Knutsson K, Brehmer B, Lysell L, Rohlin M. Pathoses associated with mandibular third molars subjected to removal. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1996;82(1):10–7.

21. Euser AM, Zoccali C, Jager KJ, Dekker FW. Cohort studies: prospective versus retrospective. Nephron Clin Prac. 2009 Aug 18;113(3):c214–7.

22. Pitts NB, Zero DT, Marsh PD, et.al. Dental caries. Nat Rev Dis Primers. 2017;3(1):1–16.

23. Neuhaus KW, Rodrigues JA, Hug I, Stich H, Lussi A. Performance of laser fluorescence devices, visual and radiographic examination for the detection of occlusal caries in primary molars. Clin Oral Investig. 2011;15(5):635–41.

24. Rechmann P, Rechmann BM, Featherstone JD, Charland D. Performance of laser fluorescence devices and visual examination for the detection of occlusal caries in permanent molars. J Biomed Opt. 2012;17(3):036006.

25. Mitropoulos P, Rahiotis C, Stamatakis H, Kakaboura A. Diagnostic performance of the visual caries classification system ICDAS II versus radiography and micro-computed tomography for proximal caries detection: an in vitro study. J Dent. 2010;38(11):859–67.

26. Tezel A, Alkan A, Orhan AI, Orhan K. Türkiye Ağız Diş Sağlığı Profili Araştırma Raporu 2018 [Internet]. Ankara; 2021 [cited 2022 Dec 9]. Available from: https://shgm.saglik.gov.tr/Eklenti/42552/0/tadsppdf.pdf?_tag1=398CC88DDD02EA-768C966A034ACC5F05F6CEB732

27. Petersen PE, Baez RJ, Ogawa H. Global application of oral disease prevention and health promotion as measured 10 years after the 2007 world health assembly statement on oral health. Community Dent Oral Epidemiol. 2020;48(4):338–48.

28. Bruce RA, Frederickson GC, Small GS. Age of patients and morbidity associated with mandibular third molar surgery. J Am Dent Assoc. 1980;101(2):240–5.

29. Sheiham A, James WPT. Diet and dental caries: the pivotal role of free sugars reemphasized. J Dent Res. 2015;94(10):1341–7.

30. Scherstén E, Lysell L, Rohlin M. Prevalence of impacted third molars in dental students. Swed Dent J. 1989;13(1–2):7–13.

31. Haidar Z, Shalhoub SY. The incidence of impacted wisdom teeth in a saudi community. Int J Oral Maxillofac Surg. 1986;15(5):569–71.

32. Tudsri S. Incidence of impacted wisdom teeth and complication in thai community. J Dent Assoc Thai. 1988;38(4):163–9.

33. Rajdan D. A study of third molar teeth. J of Indian Dental Association. 1996;67:6–11.

34. Lysell L, Brehmer B, Knutsson K, Rohlin M. Judgement on removal of asymptomatic mandibular third molars: influence of the perceived likelihood of pathology. Dentomaxillofac Radiol. 1993;22(4):173–7.

35. Al-Khateeb TH, Bataineh AB. Pathology associated with impacted mandibular third molars in a group of jordanians. J Oral Maxillofac Surg. 2006;64(11):1598–602.

36. Punwutikorn J, Waikakul A, Ochareon P. Symptoms of unerupted mandibular third molars. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1999;87(3):305–10.

37. Polat HB, Özan F, Kara I, Özdemir H, Ay S. Prevalence of commonly found pathoses associated with mandibular impacted third molars based on panoramic radiographs in turkish population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008;105(6):e41-47.

38. Çakur B, Yildiz M, Dane Ş, Zorba YO. The effect of right or left handedness on caries experience and oral hygiene. J Neurosci Rural Pract. 2011;2(1):40–2.

39. Etöz M, Şekerci AE, Şişman Y. Türk Toplumunda üçüncü molar dişlerin retrospektif radyografik analizi. Ata Üni Diş Hek Fak Derg. 2011;2011(3):170–4.

40. Göksu VC, Ersoy HE, Eberliköse H, Yücel E. Gömülü mandibular üçüncü molar diş pozisyonlarının demografik olarak incelenmesi: retrospektif çalışma. ADO Klinik Bilimler Dergisi. 2021;10(3):165–71.

41. Akadiri OA, Okoje VN, Fasola AO, Olusanya AA, Aladelusi TO. Indications for the removal of impacted mandible third molars at Ibadan--any compliance with established guidelines? Afr J Med Med Sci. 2007;36(4):359–63.

42. Torres MAF, Albiol JG, Aytes LB, Escoda CG. Evaluation of the indication for surgical extraction of third molars according to the oral surgeon and the primary care dentist. Experience in the master of oral surgery and implantology at barcelona university dental school. Med Oral Patol Oral Cir Bucal. 2008;13(8):E499-504.

43. Jasinevicius TR, Pyle MA, Kohrs KJ, Majors JD, Wanosky LA. Prophylactic third molar extractions: US dental school departments' recommendations from 1998/99 to 2004/05. Quintessence Int. 2008;39(2):165–76.

44. Lysell L, Rohlin M. A study of indications used for removal of the mandibular third molar. Int J Oral Maxillofac Surg. 1988;17(3):161–4.

45. Haug RH, Abdul-Majid J, Blakey GH, White RP. Evidenced-based decision making: the third molar. Dent Clin North Am. 2009;53(1):77–96.

46. NICE 2000. Guidance on the extraction of wisdom teeth. Published date [Internet]. 2000 [cited 2023 Jan 15];27:1–17. Available from: https://www.nice.org.uk/guidance/ta1/resources/guidance-on-the-extraction-of-wisdom-teeth-pdf-63732983749

47. Mansoor J, Jowett A, Coulthard P. NICE or not so NICE? Br Dent J. 2013;215(5):209–12.

48. Rosenauer T, Wagenschwanz C, Kuhn M, Kensche A, Stiehl S, Hannig C. The Bleeding on Brushing Index: a novel index in preventive dentistry. Int Dent J. 2017;67(5):299–307.

49. Lange DE, Plagmann HC, Eenboom A, Promesberger A. Clinical methods for the objective evaluation of oral hygiene. Dtsch Zahnarztl Z. 1977;32(1):44–7.

50. Pretty IA, Edgar WM, Smith PW, Higham SM. Quantification of dental plaque in the research environment. J Dent. 2005;33(3):193–207.

51. Aarabi G, Reissmann DR, Seedorf U, Becher H, Heydecke G, Kofahl C. Oral health and access to dental care–a comparison of elderly migrants and non-migrants in Germany. Ethn Health. 2018;23(7):703–17.

52. Fischman SL. Current status of indices of plaque. J Clin Periodontol. 1986;13(5):371–4.

53. Martignon S, Pitts NB, Goffin G, Mazevet M, Douglas GVA, Newton JT, et al. CariesCare practice guide: consensus on evidence into practice. Br Dent J. 2019;227(5):353–62.

54. White RP, Offenbacher S, Phillips C, Haug RH, Blakey GH, Marciani RD. Inflammatory mediators and periodontitis in patients with asymptomatic third molars. J Oral Maxillofac Surg. 2002;60(11):1241–5.

55. White RP, Madianos PN, Offenbacher S, Phillips C, Blakey GH, Haug RH, et al. Microbial complexes detected in the second/third molar region in patients with asymptomatic third molars. J Oral Maxillofac Surg. 2002;60(11):1234–40.

56. Toedtling V, Devlin H, Tickle M, O'Malley L. Prevalence of distal surface caries in the second molar among referrals for assessment of third molars: a systematic review and meta-analysis. Br J Oral Maxillofac Surg. 2019;57(6):505–14.

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The Oral-Dental Findıngs of Patients Treated with Antineoplastic Treatments Targeting Non-Head and Neck Tumors in Childhood

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Abstract

Aim This study investigates oral complications in pediatric oncology patients undergoing antineoplastic treatments for non-head and neck tumors, with a focus on their impact on tooth development.
Material and method Twenty pediatric patients (aged 3 to 14) undergoing chemotherapy for non-head and neck tumors were examined clinically. Oral and perioral tissues were assessed, and specific complications were documented. Patient records were retrospectively reviewed to identify pre-existing oral issues.
Results The study revealed significant oral complications associated with antineoplastic treatments, including enamel defects (60%), gingivitis (60%), delayed apexification (55%), and mucositis (30%). Additional complications such as lymphadenopathy, delayed eruption, and herpes simplex infection were also observed.
Conclusion Antineoplastic treatments for non-head and neck tumors in pediatric patients can significantly affect tooth development, leading to various oral complications. Early detection and management of these complications are vital for treatment continuity and enhancing the quality of life for pediatric oncology patients.

Keywords Antineoplastic treatments, Chemotherapy effects, Childhood cancer, Oral complications, Tooth development

Introduction

Cancer is the second leading cause of death in children under the age of 14 (1,2). While the survival rate for childhood cancers was around 58% in the mid-1970s, advancements in multidisciplinary treatment approaches have significantly improved this rate to approximately 85% for children and 86% for teens (1-3). As we continue to make strides in multidisciplinary research, the role of dentists in diagnosing and treating oral manifestations in patients has become increasingly significant (4,5).

The complications of cancer chemotherapy are often more visibly apparent in the oral cavity than in other parts of the body (6). These complications can manifest as infection, bleeding, cytotoxicity, neurological symptoms of toxicity, and alterations in the color, nature, and continuity of the oral mucosa (6). Most of these reactions persist for an extended period even after the completion of treatment. The occurrence of these reactions varies based on the dosage of drugs, the combination of drugs, the duration of treatment, and individual patient characteristics (6-9).

Pediatric cancer patients often experience a range of oral complications directly related to chemotherapy. These complications include disturbances in tooth development, poorer oral hygiene, oral lesions, and hyposalivation. Additionally, there is an increased prevalence of dental caries compared to healthy children. These adverse effects can significantly impact the overall well-being of young patients undergoing cancer treatment (10). Recognizing and addressing these oral issues are crucial for maintaining their quality of life.

Given the high prevalence of dental and oral problems in pediatric oncology patients, a proactive approach to dental care is essential. Dentists play a vital role not only in pretreatment assessments but also in ongoing care during and after cancer therapy. By closely monitoring oral health, identifying early signs of complications, and providing timely interventions, dental professionals contribute significantly to the overall management of pediatric cancer patients. Collaborative efforts between oncologists and dentists can enhance the well-being of these young individuals (11,12).

Despite the prevalence of these complications, there is a limited number of studies that retrospectively and prospectively examine orodental complications in pediatric oncology patients (7-9). Therefore, investigating the incidence of oral problems in children undergoing chemotherapy for cancer is the objective of our study.

Material and Methods

Our study included 20 children aged between 3 and 14, who sought care at the Pediatric Oncology Department. The criteria for inclusion in this study were as follows: Tumor localization outside the head and neck region, Age ranging from 3 to 14 years,

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Scheduled chemotherapy, No application of radiotherapy to the head and neck region, Absence of any other systemic disease that could affect the teeth (such as diabetes type I).

In this study involving 20 patients, there were 9 cases of Rhabdomyosarcoma, 4 cases of Wilms Tumor (Nephroblastoma), 3 cases of Burkitt Lymphoma, 1 case of Osteosarcoma, and 3 cases of Ewing sarcoma.

The initial clinical examination encompassed an assessment of oral and perioral tissues. Extraorally, an inspection of submental, submandibular, cervical, and pre- and post-auricular lymph nodes was carried out, along with an evaluation of perioral skin. The intraoral examination involved assessing the condition of existing teeth, considering factors like luxations, color changes, and eruption timing. Additionally, examinations of the buccal mucosa, tongue, floor of the mouth, hard and soft palate, and gums were conducted. In cases where necessary, panoramic and periapical radiographs were taken. A retrospective review of forms completed during the patient's initial visit was performed to ascertain the presence of any oral issues at the time of the initial diagnosis.

Specific complications among pediatric oncology patients undergoing antineoplastic treatments for non-head and neck tumors were identified. These included a range of oral manifestations such as ulcerations, petechiae, mucositis, erythema, ecchymosis, painful dryness of the lips, oral mucosal pallor, lymphadenopathy, severe gingivitis, herpes simplex infection, candidiasis, sore throat, white patches on the tongue, delayed eruption of teeth, delayed apexification, taurodontism, enamel opacities, hypocalcifications, increased caries index, shortened and thin roots, hypoplasias, and root agenesis.

Results

In our study, we examined a cohort of 20 patients, aged between 3 and 14, consisting of 11 boys and 9 girls. The mean age within this group was 8.5 years. Various oral conditions were observed among pediatric oncology patients undergoing antineoplastic treatments for non-head and neck tumors. Enamel defects were prevalent, affecting 60% of the patients, alongside gingivitis and lymphadenopathy, also each presenting at a rate of 60%. Delayed apexification was noted in 55% of cases, followed by decreased enamel thickness at 40%. Mucositis was reported in 30% of patients, while enamel opacities and ulcerations were observed in 20% of cases each. Delayed eruption occurred in 15% of patients, while root agenesis, herpes simplex infection, and candidiasis were each documented in 10% of cases. Taurodontism was not observed in any of the patients in this cohort.

Due to thrombocytopenia-related complications in these patients, petechiae in the oral region were observed in 35% of cases. A pronounced intraoral ecchymosis developed in the 12th patient. Spontaneous bleeding occurred in the intraoral region, with the most common site being the gums. Along with bleeding, lip fissures, and, additionally, erythema, oral mucosal pallor, sore throat, and a coated tongue were observed in patients undergoing chemotherapy.

Discussion

Epidemiological Context and Treatment Advancements

Examining the broader context, the incidence of childhood cancer in Finland is reported at about 150 new cases annually. This positions cancer as the second most common cause of death among children under 14, following traffic accidents in the United States. The survival rates have witnessed a notable surge, primarily attributed to intensified multidisciplinary treatment protocols. Advanced chemotherapeutic agents play a pivotal role, not only in halting malignant cell growth but also in extending patients' lifespans, thereby enhancing their overall quality of life (10-12).

Antineoplastic Agents and Reproductive Cycle Dynamics

The effects of antineoplastic agents hinge on their ability to impede the metabolism or reproductive cycle of tumor cells (13). This cycle comprises distinct phases- G1, S, G2, and M- with cells entering from the G0 phase. The complexity arises from the varying selectivity of antineoplastic agents. Some are cycle-dependent, acting exclusively in specific mitotic phases, while others, like alkylating agents, operate in both reproductive cycles and resting phases (14,15). Alkylating agents work by adding an alkyl group to the guanine base of the DNA molecule, preventing the strands of the double helix from linking as they should. This causes breakage of the DNA strands, affecting the ability of the cancer cell to multiply (16).

Challenges in Chemotherapy and Oral Complications

An overarching challenge in antineoplastic treatments is the lack of selectivity between tumor and normal tissues (17), leading to complications, notably in the orodental region (18). Of particular concern are complications stemming from plant alkaloids (19), with vincristine alkaloids manifesting as severe side effects (20). As survival rates increase, addressing these orodental complications gains specific significance. A study by Ludwig et al. focuses deliberately on childhood tumors situated outside the head and neck region (21), excluding patients with primary head and neck tumors or recurrent cases.

Collaborative Care for Anticipating Complications

Mitigating complications, such as soft tissue discomfort and oral infections, becomes imperative during antineoplastic treatments (22). Collaboration between medical oncologists and dentists becomes a cornerstone in developing shared procedures integral to implementing the patient's oncological program (23). Stomatitis, a common side effect, was observed in our study, aligning with literature experiences and manifesting within varying timelines based on drug administration specifics (22,24).

Impact on Soft Tissues, Dental Structures; Hemorrhages, Dental Caries, and Structural Changes

Chemotherapy can indeed lead to a variety of oral complications, which can affect the patient's quality of life and the continuity of treatment as follows:

- Mucosal Discomfort: Chemotherapy can cause oral mucositis, a condition characterized by inflammation and ulceration of the mucous membranes in the mouth (25,26). This can lead to discomfort, pain, and difficulties in eating and speaking (25).
- Pseudo-Toothache: While specific information on pseudo-toothache related to chemotherapy is limited, it's known that chemotherapy can cause various oral and dental problems, including toothaches and increased sensitivity (27).
- Altered Taste: Changes in taste, also known as dysgeusia, are common during chemotherapy. Patients may experience a metallic or bitter taste, or other changes in their sense of taste (28,29).
- Gingivitis: Chemotherapy can lead to oral complications such as gingivitis, an inflammation of the gums. This can cause symptoms like swollen, red, or bleeding gums (30).
- Mucositis: This is a common side effect of chemotherapy, causing painful inflammation and ulceration of the mucous membranes lining the digestive tract (26,31).
- Herpes Simplex: Patients undergoing chemotherapy are at a higher risk of viral infections, including herpes simplex. This is due to the immunosuppressive effects of the treatment (32).
- Ulcers in the Gingival Mucosa: Ulcers can form on the gums as a result of chemotherapy-induced mucositis (33,34).

It's important for patients undergoing chemotherapy to maintain good oral hygiene and have regular dental check-ups to manage these potential side effects. If any oral complications arise, they should be addressed promptly to ensure the continuity of chemotherapy (35).

Oral Hemorrhages: Chemotherapy can cause thrombocytopenia, a condition characterized by low platelet counts, which can lead to bleeding issues, including oral hemorrhages. In our study, this was observed in a quarter of the patients (36,37).

Dental Caries: Despite care, dental caries were present in 60% of the patients at the onset and developed post-chemotherapy. This could be due to various factors, including changes in oral flora and decreased salivary flow caused by chemotherapy (38,39).

Structural Changes in Teeth: Chemotherapy can cause structural changes in the teeth, including enamel damage. Enamel hypoplasia (underdevelopment or incomplete development of the tooth enamel) and opacity were observed, which can have diagnostic value (40,41).

Dental Development Implications and Animal Studies Correlation

Chemotherapy has a multifaceted impact on dental development, leading to various changes in dental structures. These effects include delays in apexification, eruption, root agenesis, and thinning. Interestingly, taurodontism (an elongated pulp chamber) was not observed in this context. These alterations, particularly affecting enamel and dentin, are closely associated with specific drug combinations. The study underscores the importance of personalized interventions to address these dental complications. Furthermore, correlations with animal studies, especially those involving cyclophosphamide and doxorubicin, reinforce the findings and highlight the intricate effects of cytotoxic drugs on dental tissues (42,43).

Family Awareness and Comprehensive Care

Families play a crucial role in managing oral complications during chemotherapy. Specific recommendations include post-vomiting oral care and dietary considerations. Given the child's vulnerability to chronic fatigue, it is advisable to keep dental procedures brief. Additionally, healthcare providers should consider the impact of chemotherapy-induced photosensitivity on melanocytes, which may be compromised (44,45).

Conclusion

In conclusion, our study highlights the significant oral complications faced by pediatric oncology patients undergoing chemotherapy for non-head and neck tumors. From enamel defects to mucositis and delayed dental development, these complications underscore the need for proactive dental care within multidisciplinary treatment approaches.

Collaborative efforts between oncologists and dentists are important in early detection, timely intervention, and individualized dental care for pediatric cancer patients. Additionally, future research should focus on understanding the mechanisms behind chemotherapy-induced oral complications and developing effective preventive and therapeutic strategies to improve the quality of life and treatment outcomes for these vulnerable individuals.

Declarations

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REFERENCES

1.American Cancer Society. Cancer Facts & Figures 2024. Atlanta: American Cancer Society, 2024.

2- American Cancer Society. Cancer Facts & Figures 2020. Special Section: Cancer in Adolescents and Young Adults. American Cancer Society. Atlanta, Ga. 2020.

3- Siegel RL, Miller KD, Wagle NS, Jemal A. Cancer statistics, 2023. CA Cancer J Clin. 2023; 73(1): 17-48. DOI:10.3322/caac.21763

4- Samim, F., Epstein, J.B., Zumsteg, Z.S. et al. Oral and dental health in head and neck cancer survivors. Cancers Head Neck 1, 14 (2016). DOI:10.1186/s41199-016-0015-8

5- Lopes, Geovana & Mazza, Grazieli & Nogueira, Carolina & Kassis, Elias. (2022). Major considerations of the dentist in the diagnosis and treatment of oral cancer in hospitals: a systematic review. MedNEXT Journal of Medical and Health Sciences. 3. DOI:10.54448/mdnt22S303.

6- PDQ® Supportive and Palliative Care Editorial Board. PDQ

Oral Complications of Chemotherapy and Head/Neck Radiation. Bethesda, MD: National Cancer Institute. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/mouth-throat/oral-complications-hp-pdq. Accessed <03/09/2024>. [PMID: 26389320]

7- Ritwik, P., Chrisentery-Singleton, T.E. Oral and dental considerations in pediatric cancers. Cancer Metastasis Rev 39, 43–53 (2020). DOI:10.1007/s10555-020-09842-5

8- Eugenia Garza-Avilés, Juan Eduardo Arizpe Coronado, Jorge Arturo Gutierrez Longoria, Rosendo Carrasco Gutierrez, Gabriel Muñoz Quintana, Sergio Eduardo Nakagoshi Cepeda, Juan Manuel Solis-Soto. Dental management of the childhood cancer patient. Int J Appl Dent Sci 2021;7(3):44-47. DOI:10.22271/oral.2021.v7.i3a.1280

9- Sasada INV, Gregianin LJ, Munerato MC (2016) Oral health and stomatological complications in pediatric cancer patients. Oral Health Care 1: DOI:10.15761/OHC.1000102.

10-) Alves AS, Kizi G, Barata AR, Mascarenhas P, Ventura I. Oral Complications of Chemotherapy on Paediatric Patients with Cancer: A Systematic Review and Meta-Analysis. Medical Sciences Forum. 2021; 5(1):25. https://doi.org/10.3390/msf2021005025

11-) Fayle SA, Curzon ME. Oral complications in pediatric oncology patients. Pediatr Dent. 1991;13(5):289-295.

12-) Eugenia Garza-Avilés, Juan Eduardo Arizpe Coronado, Jorge Arturo Gutierrez Longoria, Rosendo Carrasco Gutierrez, Gabriel Muñoz Quintana, Sergio Eduardo Nakagoshi Cepeda, Juan Manuel Solis-Soto. Dental management of the childhood cancer patient. Int J Appl Dent Sci 2021;7(3):44-47. doi: https://doi.org/10.22271/oral.2021.v7.i3a.1280

13- Abuhamed, J., Nikkilä, A., Raitanen, J. et al. Incidence trends of childhood central nervous system tumors in Finland 1990–2017. BMC Cancer 22, 784 (2022). https://doi.org/10.1186/s12885-022-09862-0

14- https://www.cdc.gov/injury/features/child-injury/index.html

15- https://www.cancersociety.fi/publications/reports/cancer-in-finland-2016/cancer-in-children-and-adolescents/

16- Yue Y, Li F, Li Y, Wang Y, Guo X, Cheng Z, Li N, Ma X, Nie G, Zhao X. Biomimetic Nanoparticles Carrying a Repolarization Agent of Tumor-Associated Macrophages for Remodeling of the Inflammatory Microenvironment Following Photothermal Therapy. ACS Nano. 2021 Sep 28;15(9):15166-15179. doi: 10.1021/acsnano.1c05618. Epub 2021 Sep 1. PMID: 34469109.

17- Eide T, Coghlan V, Orstavik S, Holsve C, Solberg R, Skålhegg BS, Lamb NJ, Langeberg L, Fernandez A, Scott JD, Jahnsen T, Taskén K. Molecular cloning, chromosomal localization, and cell cycle-dependent subcellular distribution of the A-kinase anchoring protein, AKAP95. Exp Cell Res. 1998 Feb 1;238(2):305-16. doi: 10.1006/excr.1997.3855. PMID: 9473338.

18- Chen X, Müller GA, Quaas M, Fischer M, Han N, Stutchbury B, Sharrocks AD, Engeland K. The forkhead transcription factor FOXM1 controls cell cycle-dependent gene expression through an atypical chromatin binding mechanism. Mol Cell Biol. 2013 Jan;33(2):227-36. doi: 10.1128/MCB.00881-12. Epub 2012 Oct 29. PMID: 23109430; PMCID: PMC3554121.

19- Alnaim L. Therapeutic drug monitoring of cancer chemotherapy. J Oncol Pharm Pract. 2007 Dec;13(4):207-21. doi: 10.1177/1078155207081133. PMID: 18045780.

20- Raj L, Ide T, Gurkar AU, Foley M, Schenone M, Li X, Tolliday NJ, Golub TR, Carr SA, Shamji AF, Stern AM, Mandinova A, Schreiber SL, Lee SW. Selective killing of cancer cells by a small molecule targeting the stress response to ROS. Nature. 2011 Jul 13;475(7355):231-4. doi: 10.1038/nature10167. Retraction in: Nature. 2018 Sep;561(7723):420. Erratum in: Nature. 2012 Jan 26;481(7382):534. Erratum in: Nature. 2015 Oct 22;526(7574):596. PMID: 21753854; PMCID: PMC3316487.

21- Bozzetti F. Forcing the vicious circle: sarcopenia increases toxicity, decreases response to chemotherapy and worsens with chemotherapy. Ann Oncol. 2017 Sep 1;28(9):2107-2118. doi: 10.1093/annonc/mdx271. PMID: 28911059.

22- Jirschitzka J, Schmidt GW, Reichelt M, Schneider B, Gershenzon J, D'Auria JC. Plant tropane alkaloid biosynthesis evolved independently in the Solanaceae and Erythroxylaceae. Proc Natl Acad Sci U S A. 2012 Jun 26;109(26):10304-9. doi: 10.1073/pnas.1200473109. Epub 2012 Jun 4. PMID: 22665766; PMCID: PMC3387132.

23- Nelson RL. The comparative clinical pharmacology and pharmacokinetics of vindesine, vincristine, and vinblastine in human patients with cancer. Med Pediatr Oncol. 1982;10(2):115-27. doi: 10.1002/mpo.2950100202. PMID: 7070351.

24- Ludwig S, Sharma P, Wise P, Sposto R, Hollingshead D, Lamb J, Lang S, Fabbri M, Whiteside TL. mRNA and miRNA Profiles of Exosomes from Cultured Tumor Cells Reveal Biomarkers Specific for HPV16-Positive and HPV16-Negative Head and Neck Cancer. Int J Mol Sci. 2020 Nov 13;21(22):8570. doi: 10.3390/ijms21228570. PMID: 33202950; PMCID: PMC7698015.

25- Jiang N, Chen XC, Zhao Y. Analysis of the risk factors for myelosuppression after concurrent chemoradiotherapy for patients with advanced non-small cell lung cancer. Support Care Cancer. 2013 Mar;21(3):785-91. doi: 10.1007/s00520-012-1580-y. Epub 2012 Aug 31. PMID: 22936496.

26- John K, Becker K, Mattejat F. Brustkrebskranke Mütter und ihre Kinder: Erste Ergebnisse zur Effektivität der familienorientierten onkologischen Rehabilitationsmassnahme, gemeinsam gesund werden" [Mothers with breast cancer and their children: initial results regarding the effectiveness of the family oriented oncological rehabilitation program "gemeinsam gesund werden"]. Prax Kinderpsychol Kinderpsychiatr. 2010;59(5):333-58. German. doi: 10.13109/prkk.2010.59.5.333. PMID: 20545294.

27- Elshaer N. Adverse health effects among nurses and clinical pharmacists handling antineoplastic drugs: Adherence to exposure control methods. J Egypt Public Health Assoc. 2017 Sep 1;92(3):144-155. PMID: 30341993.

28- Ueno, T., Yatsuoka, W., Ishiki, H. et al. Effects of an oral mucosa protective formulation on chemotherapy- and/or radiotherapy-induced oral mucositis: a prospective study. BMC Cancer 22, 90 (2022). https://doi.org/10.1186/s12885-021-09107-6

29- Pulito, C., Cristaudo, A., Porta, C.L. et al. Oral mucositis: the hidden side of cancer therapy. J Exp Clin Cancer Res 39, 210 (2020). https://doi.org/10.1186/s13046-020-01715-7

30- Thomas Vanhoutte, Ben Sprangers, Pseudo-AKI associated with targeted anti-cancer agents—the truth is in the eye of the filtration marker, Clinical Kidney Journal, Volume 16, Issue 4, April 2023, Pages 603–610, https://doi.org/10.1093/ckj/sfad011

31- Larsen, A.K., Thomsen, C., Sanden, M. et al. Taste alterations

and oral discomfort in patients receiving chemotherapy. Support Care Cancer 29, 7431–7439 (2021). https://doi.org/10.1007/s00520-021-06316-4

32- Obayashi, N., Sugita, M., Shintani, T. et al. Taste–taste associations in chemotherapy-induced subjective taste alterations: findings from a questionnaire survey in an outpatient clinic. Support Care Cancer 31, 552 (2023). https://doi.org/10.1007/s00520-023-08013-w

33- Sabancı, A., Karasu, B., Sabancı, H.I. et al. Impact of periodontal status on the oral mucositis in patients receiving high-dose chemotherapy. Clin Oral Invest 26, 6341–6346 (2022). https://doi.org/10.1007/s00784-022-04588-6

34- Timothy J. Brown et al., Management of Cancer Therapy–Associated Oral Mucositis. JCO Oncol Pract 16, 103-109(2020). DOI:10.1200/JOP.19.00652

35- Hersh, N., Steiner, I., Siegal, T. et al. Herpes simplex encephalitis in patients receiving chemotherapy and whole-brain radiation therapy. J. Neurovirol. 27, 774–781 (2021). https://doi.org/10.1007/s13365-021-01018-3

36- Güneri, P., Epstein, J.B., Bolukbasi, G. et al. Neutropenic ulcers in oncology: terminology, diagnosis, and management. Support Care Cancer 31, 716 (2023). https://doi.org/10.1007/s00520-023-08187-3

37- Stoufi, E. Radiation and Chemotherapy-Induced Gingival Lesions. In: Periodontal Manifestations of Local and Systemic Diseases. Springer, Cham. 2023. https://doi.org/10.1007/978-3-031-10828-0_17

38- M Carrozzo, J Grau Eriksen, R -J Bensadoun, C B Boers-Doets, R V Lalla, D E Peterson, Oral Mucosal Injury Caused by Targeted Cancer Therapies, JNCI Monographs, Volume 2019, Issue 53, August 2019, lgz012, https://doi.org/10.1093/jncimonographs/lgz012

39- Weycker, D., Hatfield, M., Grossman, A. et al. Risk and consequences of chemotherapy-induced thrombocytopenia in US clinical practice. BMC Cancer 19, 151 (2019). https://doi.org/10.1186/s12885-019-5354-5

40- Soff, G.A., Ray-Coquard, I., Rivera, L.J.M., Fryzek, J., Mullins, M., Bylsma, L.C., et al. Systematic literature review and meta-analysis on use of Thrombopoietic agents for chemotherapy-induced thrombocytopenia. PLoS ONE 17(6): e0257673. (2022) https://doi.org/10.1371/journal.pone.0257673

41- Teixeira, A.B.V., Aguiar, H.C., Tardelli, J.D.C., Dos Reis, A.C. Prevention of Caries in Cancer Patients: A Systematic Review on the Effectiveness of Dental Materials. The European Journal of Prosthodontics and Restorative Dentistry. 2023 Aug;31(3):224-233. DOI: 10.1922/ejprd_2445teixeira10. PMID: 37067356.

42- Hong, C.H.L., Hu, S., Haverman, T. et al. A systematic review of dental disease management in cancer patients. Support Care Cancer 26, 155–174 (2018). https://doi.org/10.1007/s00520-017-3829-y

43- Pombo Lopes J, Rodrigues I, Machado V, Botelho J, Bandeira Lopes L. Chemotherapy and Radiotherapy Long-Term Adverse Effects on Oral Health of Childhood Cancer Survivors: A Systematic Review and Meta-Analysis. Cancers. 2024; 16(1):110. https://doi.org/10.3390/cancers16010110

44- Patni, T., Lee, CT., Li, Y. et al. Factors for poor oral health in long-term childhood cancer survivors. BMC Oral Health 23, 73 (2023). https://doi.org/10.1186/s12903-023-02762-0

45- Sabharwal, A., Stellrecht, E. & Scannapieco, F.A. Associations between dental caries and systemic diseases: a scoping review. BMC Oral Health 21, 472 (2021). https://doi.org/10.1186/s12903-021-01803-w

46- Nokhbatolfoghahaei, H., Paknejad, Z., Bohlouli, M., Rezai Rad, M., Khojasteh, A. (2020). Animal Models in Dental Research. In: Tayebi, L. (eds) Applications of Biomedical Engineering in Dentistry. Springer, Cham. https://doi.org/10.1007/978-3-030-21583-5_18

47- Carlos Flores-Mir, Franco Raul Mauricio, Maria Fernanda Orellana, Paul William Major; Association between Growth Stunting with Dental Development and Skeletal Maturation Stage. Angle Orthod 1 November 2005; 75 (6): 935–940. doi: https://doi.org/10.1043/0003-3219(2005)75[935:ABGSWD]2.0.CO;2

Evaluation of the Peri-implantitis Videos on YouTube

Egemen TAYAN[1]

Abstract

Aim This study aims to evaluate the general quality and educational value of YouTube peri-implantitis videos.
Material and method The keyword peri-implantitis was utilized to perform a search on YouTube. The top 120 results listed by relevance on YouTube were saved. The inclusion criteria in the final list was determined as the video being English, running at least two minutes or longer and with 720p or higher quality. The remaining 68 videos were evaluated. Descriptive data of views, likes, dislikes, duration (minutes), days passed since upload, comments, viewing rate, and interaction index were created. The videos were divided into the following categories: source, content, and target audience. The videos were evaluated using the video information and quality index (VIQI) for general quality and the global quality scale (GQS) for educational value. VIQI and GQS values were compared according to the created categories. Kruskal Wallis and Spearman tests were applied in statistical evaluations.
Results Statistically significant difference was observed between GQS and source ($p<0.001$) and content ($p=0.038$). There was also a significantly statistical difference between VIQI and both source ($p<0.001$) and content ($p=0.048$). There was a strong correlation between GQS and VIQI using Spearman correlation analysis ($r=0.946$; $p<0.001$).
Conclusion The source and content of YouTube videos are correlated with general information quality and educational value. Although YouTube is not completely reliable, in the event that the videos are uploaded by professionals, it is possible to reach the public with videos of higher quality and higher educational value.

Keywords GQS, Peri-implantitis, Peri-implant mucositis, VIQI, YouTube

Introduction

Dental implants are a very popular treatment option that has been used for many years to treat patients who have lost teeth (1). Although dental implants are considered the first treatment options to replace missing teeth, it is noteworthy that the incidence of diseases that can affect the surrounding supportive tissues of the implant and lead to treatment failure is increasing (2). Peri-implant disease is defined as an inflammatory condition that occurs in the tissues surrounding the dental implants. Peri-implant mucositis is a condition where the soft tissues surrounding dental implants become inflamed, without causing any damage to the bone tissue. It is possible to reverse the current condition when the cause is eliminated. Inflammation of the soft tissues and loss of supporting bone tissue are characteristic of an irreversible condition known as peri-implantitis (3, 4). Peri-implant lesions are often asymptomatic and are usually detected by bleeding on probing at follow-up appointments. Other clinical signs include mucosal recession, increased probing depth, and abscess formation around the implant. If not diagnosed and managed effectively, peri-implantitis can lead to loss of the implant after tissue destruction (5). Even though peri-implantitis has a complex etiology, the severity of the disease varies considerably among individuals. Bacterial biofilm resulting from inadequate oral hygiene is the primary cause of peri-implantitis development (6). Additionally, peri-implantitis may develop due to reasons such as tobacco use, history of periodontitis, systemic diseases (diabetes, cardiovascular diseases, immunosuppression, etc.), insufficient keratinized tissue surrounding the dental implant, inappropriate restoration margins and residual cement (2, 7-11).

Peri-implant mucositis is a leading cause of peri-implantitis in the same way that gingivitis leads to periodontitis. Inflammation in the soft tissues surrounding the implant affects the bone tissue over time, causing the transition to peri-implantitis. However, as the disease progresses from mucositis to peri-implantitis, it is very difficult to distinguish between these transitional conditions (12). Most of the time, the inflammatory condition around the dental implant is ignored or unnoticed by patients when it is in the mucositis stage, and when they apply to the clinic, it is seen that the inflammatory condition turns into peri-implantitis, which is characterized by bone destruction.

Social media sharing platforms highly practical means of obtaining information on any subject (13). YouTube is a widely recognized sharing platform that receives an average of two billion daily views. It is a fact that a new video is uploaded every minute on this platform, and a normal user spends at least fifteen minutes per day on the site (14). Madathil et al. (14) found that 75% of individuals with chronic diseases base their treatment decisions on information obtained from YouTube. It is important to note that this information may not always be reliable or accurate, and individuals should consult with their healthcare provider before making any treatment decisions. This suggests that YouTube is an affective platform for disseminating health-related information to a wide audiences. Although there are many methods in the literature for the preventing and treating peri-implantitis, which

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is a chronic disease, they can be difficult for patients to understand due to complex terminology. While visiting a dentist for accurate information and treatment is necessary, patients should also have access to understandable information. For this reason, patients may seek information about peri-implantitis and other dental issues before visiting the dentist. Moreover, YouTube allows people to share their knowledge and experiences by joining the communication network (15). Because people want to interact with people who have had similar experiences to them in order to get support (16).

YouTube videos, which contain a wide range of health-related information, are not peer-reviewed and may contain inaccurate or misleading content. Although YouTube provides easy and fast information, the real concern is that potential misinformation can spread very quickly. Therefore, there have been numerous studies evaluating the information quality of YouTube videos and their effectiveness to improving health (17-21). In addition to information on many health disciplines, YouTube contains content on almost every subject in the field of dentistry. However, there are few studies evaluating videos about peri-implantitis on YouTube (13, 22, 23). Therefore, this study aims to evaluate the educational value and general information quality of peri-implantitis videos available on YouTube.

Material and Methods

The search term was chosen as 'peri-implantitis' among the popular words searched with the "worldwide" setting using the Google Trends website. On February 24, 2024, YouTube search was performed with using the keyword "peri-implantitis". The first 120 video URL's were saved for later viewing after the results had been filtered according to relevance. Cookies and search history were deleted before the search was made to prevent the videos from being affected by cookies and ad preferences. Additionally, the YouTube platform was accessed by opening an incognito window in the Google Chrome search engine. Inclusion criteria; English videos, videos that were at least 2 minutes of duration, video quality of 720p and videos related to peri-implantitis. Exclusion criteria were; Non-English videos, videos less than 2 minutes long, videos with quality lower than 720p, videos unrelated to peri-implantitis, and repetitive videos. 68 videos that met the inclusion criteria were watched carefully and completely. The video's descriptive data, including views, likes, dislikes, duration (minutes), days passed since upload, comments, interaction index and viewing rate were recorded. Descriptive data from the YouTube videos was used to calculate interaction index and viewing rate. (17) YouTube videos were categorized as source; dentist, scientific and commercial, as content; treatment, definition and testimonial, as target audience; professional, layperson and both. The educational value and general quality of the YouTube videos were assessed by one researcher (E.T.). The videos' general quality was assessed using the video information and quality index (VIQI), and each video was scored between 1 to 20 points. Global quality scale (GQS) was used to identify educational value of the videos and each video was scored on a five-point Likert-type scale. The same researcher (E.T.) reevaluated the videos after three weeks. According to Cohen's kappa statistics, the GQS score, which evaluates general quality content between two assessment times, was 0.696. Similarly, the VIQI score, which evaluates the educational value of videos between two assessment times, was 0.748 according to Cohen's kappa statistics. Since only publicly available data was used in this study, ethic approval was not required.

The data obtained after evaluating the videos was collected in the Microsoft Excel program. SPSS software was used to perform statistical analysis (SPSS version 26.0). Views, duration (minutes), likes, dislikes, day since upload, comments, interaction index and viewing rate data were used to create descriptive statistics of the videos. The videos have been categorized according to their source, content, and target audience. Kolmogorov-Smirnov and Shapiro-Wilk tests were performed to evaluate the distribution of normality of the values obtained from the descriptive data of each category. Since the values were not normally distributed, non-parametric tests were used. Kruskal Wallis test was performed to compare descriptive data with categorized groups. Additionally, potential relationships between the interaction index, viewing rate, GQS and VIQI scores of YouTube videos were examined with the Spearman correlation test. Statistical significance level was accepted as $p<0.05$.

Results

Mean, standard deviation, maximum and minimum of the descriptive information of the videos, consisting of views, likes, dislikes, days since upload, comments, interaction index, viewing rate, GQS and VIQI are shown in Table 1. Mean, minimum, maximum and standard deviations of GQS, VIQI, viewing rate and interaction index according to the source, content and target audience of the videos are shown in table 2. The GQS mean was found to be 3.00 and the VIQI mean was found to be 11.63.

Table 1: Descriptive statistic of the videos

Video characteristic	N	Minimum	Maximum	Mean	SD
View	68	56	65000	6136.76	12077.199
Duration	68	2	70	10.25	15.35
Like	68	0	458	52.29	96.783
Dislike	68	0	0	0	0
Upload day	68	120	3700	1657.46	1032.618
Comment	68	0	95	4,60	13,136
Interaction Index	68	0	6	1.12	1.118
Viewing Rate	68	0	142	6.31	18.454
GQS	68	1	5	3	1,327
VIQI	68	4	20	11.63	4.998

Abbreviations: SD, standart deviation; GQS, global quality scale; VIQI, video information quality index

The videos that match with the inclusion criteria were classified as sources; commercial (%45, n=31), dentist (%40, n=27), and scientific (%15, n=10), as content; treatment (%44, n=30), de-

scription (%46, n=31) and testimonial (%10, n=7), as target audience; professional (%40, n=27), layperson (%43, n=29) and both (%17, n=12).

Table 2: Comparison of GQS, VIQI, interaction index and viewing rate according to source, content and target audience

			GQS		VIQI		Interaction index		Viewing rate	
		N	Mean SD	Min Max	Mean SD	Min Max	Mean SD	Min Max	Mean SD	Min Max
SOURCE	Dentist	27	3.48	1	13.03	4	1.10	0	9.90	0.03
			1.156	5	4.476	20	1.186	5.36	27.439	141.66
	Scientific	10	4.30	3	16.60	12	1.42	0.48	2.72	0.12
			0.823	5	2.796	19	0.704	2.63	2.336	7.00
	Commercial	31	2.16	1	8.80	4	1.02	0	4.33	0.064
			1.036	5	4.222	17	1.176	5.71	9.297	45.139
CONTENT	Treatment	30	3.00	1	12.33	5	0.87	0	5.78	0.15
			1.231	5	4.780	20	0.680	2.63	10.544	45.139
	Definition	31	3.26	1	12.00	4	1.34	0	7.52	0.031
			1.413	5	5.215	19	1.388	5.71	25.408	141.667
	Testimonial	7	1.857	1	7.00	4	1.158	0	3.14	0.137
			0.690	3	2.081	10	1.232	3.03	4.113	9.898
TARGET AUDENCE	Professional	27	3.148	1	12.44	5	1.141	0	2.37	0.069
			1.406	5	5.117	19	0.801	3.00	3.04	12.632
	Layperson	29	2.655	1	10.03	4	0.80	0	11.32	0.031
			1.203	5	4.709	19	0.731	2.59	27.503	141.667
	Both	12	3.50	1	13.666	5	1.837	0	3.02	0.056
			1.314	5	4.579	20	1.975	5.71	3.330	9.898

Abbreviations: SD, standart deviation; GQS, global quality scale; VIQI, video information quality index

Statistical comparison of descriptive data of the videos according to source, content and target audience is shown in table 3. There was not a difference between views, likes, dislikes, day since upload, comments, interaction index and viewing rate in terms of source, content and target audience categories. A statistical difference was found between the duration, source (p = 0.025) and target audience (p = 0.005) of the videos. There was a significant difference between GQS and source (p<0.001) and content (p=0.038). Also, there was a statistically significant difference between VIQI and source (p<0.001) and content (p=0.048).

Table 3: Statistical comparison descriptive data according to video categories

p value*	Source	Content	Target Audience
Descriptive data			
View	0.910	.516	.592
Duration	.025*	1	.005*
Like	.687	.791	.853
Dislike	1	1	1
Upload day	.158	.896	.751
Comment	.218	.413	.627
Interaction Index	.132	.477	.181
Viewing Rate	.776	.592	.673
GQS	<0.001	.038	.149
VIQI	<0.001	.048	.051

*Abbreviations: GQS, global quality scale; VIQI, video information quality index *Kruskal Wallis test*

Possible correlation between viewing rate, interaction index, GQS and VIQI is shown in table 4. Strong relationship was found using Spearman correlation analysis between GQS and VIQI (r=0.946; p<0.001). The VIQI values of the videos showed positive correlation with both viewing rate (r=0.358, p<0.01) and interaction index (r=0.254, p<0.05). Also, GQS showed positive correlation with both the viewing rate (r=0.245, p<0.05) and the interaction index (r=0.297, p<0.05).

Table 4: Correlation interaction index, viewing rate, GQS and VIQI

	Interaction Index	Viewing Rate	GQS	VIQI
Interaction Index	1	.121	.297*	.254*
Viewing Rate	.121	1	.245*	.358**
GQS	.297*	.245*	1	.946***
VIQI	.254*	.358**	.946***	1

Abbreviations: GQS, global quality scale; VIQI, video information quality index
**p<0.05, **p<0.01, ***p<0.001, GQS indicates global quality score, VIQI indicates video information quality index*

Discussion

The rapidly increasing use of the social media in recent years has spread to the field of health, causing health professionals to attach more importance to this issue. Especially YouTube attracts people's attention with its video content in almost every field. Although YouTube offers many advantages such as fast access to information, the reliability of its video content is questionable. Videos containing misinformation have the potential to negatively affect patients and doctors by causing unnecessary treatment or treatment seeking in people unsuited to their disease. On the other hand, it should also be noted that, due to the problems experienced by patients with dental implants, the tendency for people to obtain information through YouTube videos is increasing. Therefore, the aim of this study is evaluate the informative and educational value of peri-implantitis videos presented in YouTube.

Some dental studies have concluded that information quality of YouTube is insufficient or misleading (19, 20, 23-25). On the other hand, some studies have concluded that the general information quality of YouTube videos is sufficient (17, 21). Di Spirito et al. (23) evaluated peri-implantitis videos on YouTube and stated the mean educational value (GQS) of the videos as 2.0 and the VIQI value, which measures the quality of information, as 12.0. They also stated that the educational value of the videos was low to medium. In this study, the general information quality of YouTube videos was evaluated with the VIQI scale and the educational value with the GQS scale, and the mean values were found to be 11.63 and 3.0, respectively. We also observed that videos with dentists and scientific sources had higher GQS and VIQI values. This result is consistent with some studies (13, 17, 26, 27) that investigated the relevance between the upload source of videos and their quality. These findings demonstrate that the level of information and professional interest in the sources providing the videos influence quality. Therefore, when watching videos, patients need to consider their source and be aware that the videos may not contain accurate information.

The present study's video contents generally consisted of treatment and descriptive content. Only 10% of the videos were described as testimonial. There was a statistically significant difference between the GQS and VIQI scores and the video content, based on the study findings. Accordingly, both treatment and description contents showed higher GQS and VIQI values than testimonial content. It was observed that testimonial videos consisted of video content in which patients who received treatment expressed their positive opinions about the treatment. Testimonial contents were associated with low GQS and VIQI values because they contained subjective comments and were far from addressing scientific and educational information for peri-implantitis.

Although the GQS and VIQI mean values of the videos addressing to the layperson were lower than those of the videos addressing to the professional and both audiences, there was no observable statistically significant difference between the target audience of the videos and GQS and VIQI. It was observed that the videos about the peri-implantitis uploaded for the layperson did not contain important information such as strategies for preventing peri-implantitis. Additionally, the causes of peri-implantitis were not fully explained.

Previous studies have revealed that YouTube videos with low information (low value of VIQI) and quality (low value of GQS) are generally more popular among users and receive more interaction (22, 24). Because it is easier for people with limited medical knowledge to understand videos of insufficient quality, these videos are likely to receive more views and likes. This means that videos with low quality content are associated with higher interaction index and viewing rate. However, in this study, there was a positive correlation between the interaction index and viewing rate and the videos GQS and VIQI values. This result may be related to the fact that the majority of the target audience is dentists. Therefore, videos with high educational value and general quality may have received more attention from professionals.

In this study examining peri-implantitis videos, an extremely high positive correlation ($r=.946$, $p<0.001$) was detected between the VIQI score and GQS scores, as in the study of Di Spirito et. al. (23) Additionally, another study (28) evaluating the information content and educational value of peri-implantitis videos is compatible with the results of this study. This result reveals that the increase in general quality increases educational value. As in some previous studies (29, 30), in this study, a positive correlation was observed between the VIQI values of the videos and viewing rate and interaction index. Also, a positive correlation was found between GQS and interaction index and viewing rate. This result is similar to that reported by Göller et al. (22) who evaluated peri-implantitis videos. These results show that videos with higher general quality and educational value are more popular and receive more views and likes, resulting in more interaction.

There are some important limitations to this study. The most important limitation is that search results on YouTube, which is a dynamic sharing platform, can change instantly. Therefore, the same keyword can give different results at different times, making it difficult for the current study to reach a generalizable conclusion. Additionally, videos about peri-implantitis do not explain all aspects of the subject. New information about peri-implantitis may make previously uploaded YouTube videos obsolete. Another limitation is that although two different times were used to evaluate the videos, they were evaluated by a single observer. Since only one observer evaluated the videos in both of the evaluation sessions, this creates a reliability problem. Furthermore, the data on peri-implantitis-related videos in this study were evaluated using GQS and VIQI. However, it is important to note that YouTube videos can be evaluated using different tools and from various perspectives. This presents a potential area for future research.

Conclusion

There are many videos about peri-implantitis on YouTube and new ones are added every day. Although the content has moderate quality and educational value, watching YouTube content with prejudice will protect patients from possible misinformation. The uploader source and YouTube videos content have a significant impact on general quality and educational utility. Therefore, it is clear that if the videos are uploaded by dentists, the society will be informed more accurately with videos of higher quality and higher educational value. Furthermore, dentists should guide their patients to reliable YouTube channels that provide accurate information on peri-implantitis.

Declarations

Author Contributions: *Conception/Design of Study- E.T.; Data Acquisition- E.T.; Data Analysis/Interpretation- E.T.; Drafting Manuscript- E.T.; Critical Revision of Manuscript- E.T.; Final Approval and Accountability- E.T.; Material and Technical Support- E.T.; Supervision- E.T.*

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REFERENCES

1.Fransson C, Wennström J, Tomasi C, Berglundh T. Extent of peri-implantitis-associated bone loss. J Clin Periodontol. 2009;36(4):357-63.

2. Smeets R, Henningsen A, Jung O, Heiland M, Hammächer C, Stein JM. Definition, etiology, prevention and treatment of peri-implantitis--a review. Head Face Med. 2014;10:34.

3. Lindhe J, Meyle J. Peri-implant diseases: Consensus Report of the Sixth European Workshop on Periodontology. J Clin Periodontol. 2008;35(8 Suppl):282-5.

4. Zitzmann NU, Berglundh T. Definition and prevalence of peri-implant diseases. J Clin Periodontol. 2008;35(8 Suppl):286-91.

5. Klinge B, Hultin M, Berglundh T. Peri-implantitis. Dent Clin North Am. 2005;49(3):661-76, vii-viii.

6. Schwarz F, Derks J, Monje A, Wang HL. Peri-implantitis. J Periodontol. 2018;89 Suppl 1:S267-s90.

7. Heitz-Mayfield LJ. Peri-implant diseases: diagnosis and risk indicators. J Clin Periodontol. 2008;35(8 Suppl):292-304.

8. Algraffee H, Borumandi F, Cascarini L. Peri-implantitis. Br J Oral Maxillofac Surg. 2012;50(8):689-94.

9. Linkevicius T, Puisys A, Vindasiute E, Linkeviciene L, Apse P. Does residual cement around implant-supported restorations cause peri-implant disease? A retrospective case analysis. Clin Oral Implants Res. 2013;24(11):1179-84.
10. Vervaeke S, Collaert B, Cosyn J, Deschepper E, De Bruyn H. A multifactorial analysis to identify predictors of implant failure and peri-implant bone loss. Clin Implant Dent Relat Res. 2015;17 Suppl 1:e298-307.
11. Sgolastra F, Petrucci A, Severino M, Gatto R, Monaco A. Smoking and the risk of peri-implantitis. A systematic review and meta-analysis. Clin Oral Implants Res. 2015;26(4):e62-e7.
12. Jepsen S, Berglundh T, Genco R, Aass AM, Demirel K, Derks J, et al. Primary prevention of peri-implantitis: managing peri-implant mucositis. J Clin Periodontol. 2015;42 Suppl 16:S152-7.
13. Erdem MN, Karaca S. Evaluating the Accuracy and Quality of the Information in Kyphosis Videos Shared on YouTube. Spine (Phila Pa 1976). 2018;43(22):E1334-e9.
14. Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare information on YouTube: A systematic review. Health Informatics J. 2015;21(3):173-94.
15. Ventola CL. Social media and health care professionals: benefits, risks, and best practices. P t. 2014;39(7):491-520.
16. Farmer AD, Bruckner Holt CE, Cook MJ, Hearing SD. Social networking sites: a novel portal for communication. Postgrad Med J. 2009;85(1007):455-9.
17. Hassona Y, Taimeh D, Marahleh A, Scully C. YouTube as a source of information on mouth (oral) cancer. Oral Dis. 2016;22(3):202-8.
18. Yilmaz Ferhatoglu S, Kudsioglu T. Evaluation of the reliability, utility, and quality of the information in cardiopulmonary resuscitation videos shared on Open access video sharing platform YouTube. Australas Emerg Care. 2020;23(3):211-6.
19. Abukaraky A, Hamdan AA, Ameera MN, Nasief M, Hassona Y. Quality of YouTube TM videos on dental implants. Med Oral Patol Oral Cir Bucal. 2018;23(4):e463-e8.
20. Gaş S, Zincir Ö, Bozkurt AP. Are YouTube Videos Useful for Patients Interested in Botulinum Toxin for Bruxism? J Oral Maxillofac Surg. 2019;77(9):1776-83.
21. Delli K, Livas C, Vissink A, Spijkervet FK. Is YouTube useful as a source of information for Sjögren's syndrome? Oral Dis. 2016;22(3):196-201.
22. Göller Bulut D, Paksoy T, Ustaoğlu G. Is Online Video a Suitable Source to Obtain Sufficient and Useful Information About Peri-Implantitis? J Oral Maxillofac Surg. 2023;81(1):56-64.
23. Di Spirito F, Giordano F, Di Palo MP, Cannatà D, Orio M, Coppola N, et al. Reliability and Accuracy of YouTube Peri-Implantitis Videos as an Educational Source for Patients in Population-Based Prevention Strategies. Healthcare (Basel). 2023;11(14).
24. Fortuna G, Schiavo JH, Aria M, Mignogna MD, Klasser GD. The usefulness of YouTube™ videos as a source of information on burning mouth syndrome. J Oral Rehabil. 2019;46(7):657-65.
25. Menziletoglu D, Guler AY, Isik BK. Are YouTube videos related to dental implant useful for patient education? J Stomatol Oral Maxillofac Surg. 2020;121(6):661-4.
26. Tamošiūnaitė I, Vasiliauskas A, Dindaroğlu F. Does YouTube provide adequate information about orthodontic pain? Angle Orthod. 2023;93(4):403-8.
27. Pons-Fuster E, Ruiz Roca J, Tvarijonaviciute A, López-Jornet P. YouTube information about diabetes and oral healthcare. Odontology. 2020;108(1):84-90.
28. Bariş K, Karşiyaka Hendek M, Olgun E. Evaluation of the Quality of Peri-implantitis Videos on YouTube. J Craniofac Surg. 2023;34(6):1813-6.
29. Hatipoğlu Ş, Gaş S. Is Information for Surgically Assisted Rapid Palatal Expansion Available on YouTube Reliable? J Oral Maxillofac Surg. 2020;78(6):1017.e1-.e10.
30. Lena Y, Dindaroğlu F. Lingual orthodontic treatment: A YouTube™ video analysis. Angle Orthod. 2018;88(2):208-14.

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Surveying Oral Cancer Awaraness Among Dental Students: Identifiying Educational Needs

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Abstract

Aim Oral cancer poses a significant global health challenge, characterized by rising incidence rates and substantial morbidity and mortality. Given the pivotal role of dental professionals in early detection and prevention, it is imperative to ensure heightened awareness among dental students. This survey aims to assess the level of knowledge among Near East University Faculty of Dentistry students regarding oral cancers, determine their educational approach, and identify opportunities for enhancing oral cancer education.

Material and method A structured questionnaire assessed students' knowledge, perceptions, and preferences regarding oral cancer education. Data were collected electronically and analyzed descriptively.

Results A total of 330 students attended to the survey, including 64 1st grade, 38 2nd grade, 65 3rd grade, 74 4th grade, and 89 5th grade students. 167 students stated that they are not well informed about oral cancers while 102 students stated that they are partially informed. 55 students said that they have no idea about oral cancers. While 257 of 330 students stated that there should be a new course under the name of oral cancers, 73 students stated that they did not need such a course.

Conclusion The study highlights deficiencies in oral cancer awareness among dental students, emphasizing the urgent need for targeted educational interventions. By addressing these gaps, future dental professionals can effectively contribute to oral cancer prevention and management.

Keywords Dentistry, Dentistry students, Oral cancer, Oral cancer awareness, Oral diagnosis

Introduction

Oral cancer remains a persistent global health concern, with its incidence gradually rising. In the United States alone, 58,450 new cases of oral or oropharyngeal cancer are expected in 2024. These cancers generally affect men with an average age of 64 at diagnosis. Unfortunately, approximately 12,230 deaths are projected from these cancers in the same year. The mortality rate has seen a gradual increase, emphasizing the urgency of early detection and prevention efforts. Worldwide, 476,125 people were diagnosed with oral or oropharyngeal cancer in 2020. Oral cancer's impact extends beyond physical health, affecting individuals' quality of life and imposing a substantial economic burden on healthcare systems. Dental professionals, as key players in oral health promotion, play a pivotal role in raising awareness and educating future healthcare providers to combat this challenging disease (1-3).

However, the effectiveness of these efforts' pivots on the level of awareness and preparation among dentistry students, who represent the future frontline healthcare providers in this field. Recognizing the importance of addressing this gap, this study aims to assess the oral cancer awareness among students enrolled in the Faculty of Dentistry at Near East University. By assessing students' perceptions and preferences regarding oral cancer education, we can identify areas for improvement and develop targeted educational strategies. Ultimately, equipping future dental professionals with comprehensive knowledge and skills in oral cancer prevention and early detection can significantly reduce the burden of this disease and enhance global public health outcomes.

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Material and Methods

Study Design and Participants

This survey study was conducted among dentistry students enrolled at the Faculty of Dentistry of Near East University during the academic years of 2019-2020. Participants were selected from various academic years to ensure a diverse representation.

Survey Instrument

A structured questionnaire was developed to assess the participants' knowledge and perceptions regarding oral cancer. The questionnaire consisted of sections covering demographic information, including gender, year of birth, and current grade level, along with questions on current knowledge about oral cancers, preferred methods of learning about oral cancers, and previous experience with oral mucosa examination.

Data Collection

The survey was administered electronically to all participants. Participants were briefed about the study objectives and assured of anonymity and confidentiality of their responses. Completion of the survey implied consent. Subgroup analyses were performed to compare responses among different academic years.

Assessment of Knowledge and Perceptions

Participants were asked to rate their level of knowledge about oral cancers as 'well-informed,' 'partially informed,' or 'no idea.' Additionally, they were questioned about the necessity of a dedicated course on oral cancers and their preferred method of learning about the topic.

Assessment of Clinical Experience

Participants were queried about their clinical experience and practices, including whether they routinely screen for risk factors of oral cancers during examinations, provide information to patients regarding oral cancers, and conduct examinations related to oral lesions. They were also asked about the clinical presentation of oral cancers, the warnings they frequently check for on the oral mucosa regarding oral cancers, and whom they consult if presented with a suspicious lesion resembling oral cancer. Additionally, participants were asked to evaluate their perceived sufficiency of knowledge about oral cancers and whether they believe it would be effective to have a new course specifically dedicated to oral cancers. Finally, they were questioned about alternative approaches they would prefer to acquire knowledge about oral cancers, in addition to traditional methods.

Results

A total of 330 students participated in the survey, representing various academic years: 64 students were in their 1st year, 38 in their 2nd year, 65 in their 3rd year, 74 in their 4th year, and 89 in their 5th year.

Regarding their level of knowledge about oral cancers, 167 students reported that they were not well informed, while 102 students stated they were partially informed. Additionally, 55 students admitted to having no knowledge about oral cancers. A majority of the participants, 257 out of 330 students, expressed the need for a new course dedicated to oral cancers. However, 73 students indicated that they did not feel the necessity for such a course. When asked about their preferred method of obtaining more information about oral cancers, only 16 out of 330 students preferred informational brochures, while a larger proportion, 114 students, favored regular seminars. Furthermore, 104 students indicated a preference for a new lecture specifically focused on oral cancers.

In terms of self-assessment of knowledge about identifying and preventing oral cancers, only 21 out of 163 students in their 4th and 5th years reported feeling adequately informed. Regarding clinical experience, 111 students in their 4th and 5th years reported having previously performed an oral mucosa examination. However, 52 students indicated that they had not previously conducted such an examination.

Discussion

Although oral cancer education and preventive efforts are widely recognized as significant, our investigation has unveiled substantial gaps in knowledge and practices concerning early detection and preventive strategies. These findings highlight the necessity for targeted educational interventions aimed at bridging these gaps and teaching future dental practitioners with the requisite skills.

The study findings indicate that while a majority of participants expressed the need for a dedicated course on oral cancers, a significant proportion felt inadequately informed about the disease. Only 21 out of 163 students in their 4th and 5th years reported feeling adequately informed about identifying and preventing oral cancers. Furthermore, although many students recognized the importance of oral cancer education, their preferred learning methods varied. These methods included encompassing seminars, informational brochures and focused lectures.

These findings are in correlation with previous research in the field. Shadid et al. conducted a study on oral cancer prevention among dental students and interns in Palestine, revealing significant deficiencies in knowledge and practices related to early detection and prevention, despite favorable attitudes toward prevention. Interns showed better knowledge and attitudes compared to undergraduate students, with identified barriers to screening including lack of training and confidence (4). Similarly, Chan et al. assessed oral cancer knowledge, attitudes, and practices among undergraduate students in Malaysian dental schools, finding that students from private universities exhibited higher levels of awareness and knowledge compared to those from public universities. The study emphasized the need to reinforce curriculum and training to improve diagnostic skills among dental undergraduates (5). Moreover, Jafer et al. explored the perspectives of dentists and dental students on oral cancer and its prevention strategies in Saudi Arabia, highlighting the lack of focus on local risk factors in formal dental education and the absence of organized efforts toward prevention. The study underscored the need for improved dental education targeting community-specific oral health issues and risk factors (6). Similarly, Shrestha et al. evaluated the awareness of undergraduate dental and medical students towards oral cancer in Nepal, emphasizing the prevalence of tobacco as a recognized risk factor but noting deficiencies in overall awareness among students. The study stressed the importance of enhancing knowledge among health professionals for early diagnosis and reduction of oral cancer statistics (7).

However, it is essential to acknowledge the limitations of our study, including the reliance on self-reported data and the specificity of the study population. Self-reported responses are susceptible to recall bias, wherein participants may inaccurately recall information, and social desirability bias, where respondents may provide answers that they perceive as more socially acceptable (5,8). This could potentially influence the validity and reliability of the findings, leading to an overestimation or underestimation of certain attitudes or behaviors related to oral cancer awareness and prevention. Moreover, it's important to recognize that the results of this study might not apply universally beyond the specific group of participants enrolled at the Faculty of Dentistry where the research was carried out. The characteristics and educational backgrounds of students at this institution may differ from those at other dental schools or universities, thereby limiting the external validity of the results. Future research involving more diverse and representative samples from multiple institutions could help improve the generalizability of findings in similar contexts.

To enhance oral cancer awareness among dental students and the broader population, targeted educational interventions are crucial.

These interventions should include comprehensive health education sessions covering essential topics such as oral cancer risk factors, signs, symptoms, and preventive measures. Engaging experts, clinicians, and educators to deliver evidence-based content can maximize the impact of these sessions. Additionally, multimedia tools such as videos, infographics, and mobile apps can be utilized to enhance understanding and retention. For instance, interactive apps can simulate self-examinations and provide real-time feedback. Printed materials such as pamphlets, brochures, and leaflets can also be strategically distributed in various settings including waiting areas, clinics, and community centers to ensure accessibility and comprehension. Furthermore, personalized counseling sessions with dental students can significantly reinforce knowledge by addressing misconceptions, clarifying doubts, and emphasizing the importance of early detection. Collaboration with local organizations to conduct community-based campaigns through mass media channels, community events, workshops, and health fairs can effectively disseminate information to a wider audience (4-14). Ensuring the persistence of educational efforts over time is critical for sustained impact. Strategies to monitor the long-term efficacy of awareness campaigns include conducting follow-up assessments to evaluate knowledge retention and behavior change post-intervention. Establishing surveillance systems to track oral cancer awareness, monitoring changes in knowledge levels, screening rates, and self-examination practices enable researchers and policymakers to adapt strategies as needed. Designing longitudinal studies that extend beyond the initial intervention phase is essential to investigate whether awareness remains intact or diminishes over time. Collaboration with public health agencies to integrate awareness campaigns into their long-term strategies ensures continuity and adaptability based on evolving evidence. Additionally, engaging dental professionals to play an active role in reinforcing awareness during routine patient visits can encourage regular screenings, and address patient concerns. By implementing these multifaceted strategies and rigorously monitoring their long-term impact, sustained and enhanced oral cancer awareness can be achieved, ultimately leading to better health outcomes for individuals and communities (4-14).

Conclusion

In conclusion, this study emphasizes the critical importance of improving oral cancer education among dental students. The findings reveal significant gaps in knowledge and readiness for early detection and prevention strategies, underscoring the urgent need for targeted educational interventions. Addressing these deficiencies can better equip future dental professionals to play a proactive role in combating oral cancer and improving public health globally.

Declarations

Author Contributions: *Conception/Design of Study- G.Ü.; Data Acquisition- G.Ü.; Data Analysis/Interpretation- G.Ü., I.M.K., S.C.D.; Drafting Manuscript- G.Ü., I.M.K., S.C.D.; Critical Revision of Manuscript- G.Ü.; Final Approval and Accountability- G.Ü.; Material and Technical Support- G.Ü.; Supervision- G.Ü.*

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REFERENCES

1.American Cancer Society. 2024 January, Key Statistics for Oral Cavity and Oropharyngeal Cancers. https://www.cancer.org/cancer/types/oral-cavity-and-oropharyngeal-cancer/about/key-statistics.html

2. American Society of Clinical Oncology. 2023 February, Oral and Oropharyngeal Cancer: Statistics. https://www.cancer.net/cancer-types/oral-and-oropharyngeal-cancer/statistics

3. National Institute of Dental and Craniofacial Research. 2023 April, Oral Cancer. https://www.nidcr.nih.gov/research/data-statistics/oral-cancer

4. Shadid, R.M., Abu Ali, M.A. & Kujan, O. Knowledge, attitudes, and practices of oral cancer prevention among dental students and interns: an online cross-sectional questionnaire in Palestine. BMC Oral Health. 2022;22:381. https://doi.org/10.1186/s12903-022-02415-8

5. Chan, ZW., Phuan, YF., Ooi, PY. et al. An assessment of oral cancer knowledge, attitudes, and practices among undergraduate students in Malaysian dental schools. BMC Oral Health. 2023;23:617. https://doi.org/10.1186/s12903-023-03354-8

6. Jafer, M., Crutzen, R., Moafa, I. et al. What Do Dentists and Dental Students Think of Oral Cancer and Its Control and Prevention Strategies? A Qualitative Study in Jazan Dental School. J Canc Educ. 2021;36:134–142. https://doi.org/10.1007/s13187-019-01609-z

7. Shrestha, A., Marla, V., Shrestha, S. et al. Awareness of Undergraduate Dental and Medical Students Towards Oral Cancer. J Canc Educ. 2017;32:778–783. https://doi.org/10.1007/s13187-016-1023-4

8. Shimpi, N., Jethwani, M., Bharatkumar, A. et al. Patient awareness/knowledge towards oral cancer: a cross-sectional survey. BMC Oral Health. 2018;18:86. https://doi.org/10.1186/s12903-018-0539-x

9. Ahuja NA, Kedia SK, Ward KD, et al. Effectiveness of Interventions to Improve Oral Cancer Knowledge: a Systematic Review. J Cancer Educ. 2022;37(3):479-498. https://doi.org/10.1007/s13187-021-01963-x

10. Shubayr, M.A., Bokhari, A.M., Essa, A.A. et al. Knowledge, attitudes, and practices of oral cancer prevention among students, interns, and faculty members at the college of dentistry of Jazan University. BMC Oral Health. 2021;21:612. https://doi.org/10.1186/s12903-021-01973-7

11. Macpherson LMD. Raising awareness of oral cancer from a public and health professional perspective. Br Dent J. 2018;225(9):809-814. https://doi.org/10.1038/sj.bdj.2018.919

12. Rupel K, Biasotto M, Gobbo M, Poropat A, Bogdan Preda MT, Borruso G, Torelli L, Di Lenarda R and Ottaviani G. Knowledge and awareness of oral cancer: A cross-sectional survey in Trieste, Italy. Front. Oral. Health 2023; 4:1056900. https://doi.org/10.3389/froh.2023.1056900

13. Wei, X., Jing, M., Zhang, X. et al. Nurses' practice and educational needs in oral care for postoperative patients with oral cancer in ICUs: a multicenter cross-sectional study. BMC Oral Health. 2022;22:389. https://doi.org/10.1186/s12903-022-02426-5

14. Ghasemian, A., Sargeran, K., Khami, M.R. et al. Effects of educational interventions based on the theory of planned behavior on oral cancer-related knowledge and tobacco smoking in adults: a cluster randomized controlled trial. BMC Cancer. 2024;24:45. https://doi.org/10.1186/s12885-024-11845-2

A Rare Case Report of Heterotopic Ossification at Maxilla Anterior

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ABSTRACT

Aim To report a rare case of heterotopic ossification (HO) between the maxillary right central incisor (tooth #11) and lateral incisor in a 47-year-old male patient

Case Report A 47-year-old male patient presented with a painless, progressive-growing swelling in the anterior region involving the maxillary right central and lateral incisors for the past 6 months. The patient's medical history was unremarkable. Intraoral examination revealed periodontal loss with prosthetic restorations in the affected region for over 10 years. Radiographs and cone-beam computed tomography (CBCT) images confirmed the presence of HO between the maxillary teeth.

Discussion HO is a rare condition characterized by the formation of bone in soft tissues. It is most commonly seen after trauma or surgery, but it can also occur spontaneously. The exact cause of HO is unknown, but it is thought to be due to a combination of factors, including inflammation, injury, and genetic predisposition. In this case, the patient's history of trauma may have contributed to the development of HO. The patient reported that he had sustained a blow to the anterior region of his mouth 10 years prior to the onset of the swelling. This trauma may have damaged the periodontal ligament, which may have led to the formation of HO.

Conclusion This case report highlights the importance of considering HO in the differential diagnosis of painless, progressive-growing swellings in the maxillary region, especially in patients with a history of trauma.

Keywords Heterotopic ossification, Lesion, Maxilla, Oral cavity, Osteosarcoma

Introduction

Heterotopic ossification (HO) is defined as the formation of lamellar bone in tissues devoid of native bone. The biological process underpinning heterotopic ossification is associated with the presence of osteoprogenitor cells within the ectopic region (1,2). Heterotopic ossification is categorized into hereditary and acquired forms. The acquired form is frequently observed to manifest following trauma or hip surgery. The prevalence of the hereditary form is reported to be exceedingly low(3).

The majority of HO documented in the literature are connected to orthopedic surgeries, particularly total hip arthroplasty. Cases involving the maxillofacial region are infrequent and typically associated with the facial muscles, although a limited number of reports have described HO occurring in the maxillary sinuses (4).

Heterotopic ossification in the oral region can arise from a variety of factors. Incidents such as direct injury to oral tissues, trauma, or surgical procedures can precipitate its occurrence. Additionally, certain medical conditions, including chronic inflammation, genetic predisposition, and fibrodysplasia ossificans progressiva (FOP), may also contribute to the formation of heterotopic ossification in the oral region (4).

The diagnosis of heterotopic ossification in the oral cavity necessitates a comprehensive examination and thorough evaluation. Common symptoms encompass limited mouth opening, pain, swelling, or palpable bone protrusions. Employing both conventional and advanced imaging techniques aids in delineating the boundaries and localization of the lesion. A definitive diagnosis is achieved through histopathological examination, confirming the presence of ectopic bone formation (4).

Case Report

A 47-year-old male patient underwent examination at a dental clinic for evaluation of a painless, progressively enlarging swelling localized in the anterior region encompassing the maxillary right incisor and right lateral teeth. The patient reported a gradual increase in size over the last few years. Following the initial assessment, the patient was referred to our hospital for further examination and assessment.

Upon reviewing the patient's medical history, no systemic conditions were reported. During the intraoral examination, it was noted that the patient had prosthetic restorations covering the teeth in the affected area for over 10 years, along with evidence of periodontal loss. Notably, a fixed tissue growth was observed between teeth number 11 and 12, situated in the papillary region between the two teeth. The growth exhibited an expansive character, measuring approximately 2 cm in diameter, and demonstrated firm consistency upon palpation. Importantly, there was no observed mobility in the teeth within the relevant area (Figure 1).

No specific abnormalities were identified on the patient's panoramic radiography (Figure 2). However, upon further eval-

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uation using cone beam computed tomography (CBCT), a hyperdense focus with well-defined borders was discernible within the relevant region, specifically within the soft tissue (Figure 3).

Figure 1: Location of lesion at maxilla anterior.

An excisional biopsy was scheduled for the patient, with a preliminary diagnosis of a local peripheral osseofibroma. The procedure was conducted under local anesthesia, and subsequent histopathological examination was carried out.

Figure 2: Panoramic radiography of patient.

During the operation, alveoloplasty was performed on the bone tissue in the affected region, along with contour adjustments. The objective was to preserve the aesthetic appearance in the anterior region, achieved by utilizing a connective tissue graft harvested from the palatal region (Figure 4).

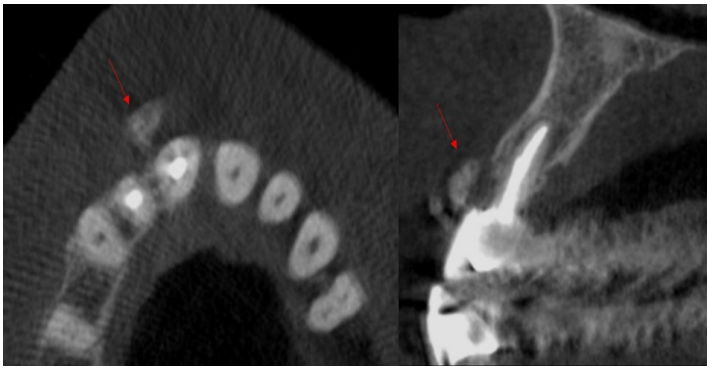

Figure 3: In CBCT axial (left) and sagittal (right) sections, a curved, prominent hyperdense focus (indicated by a red arrow) is observed within the soft tissue, bone density

In the histopathological examination, the evaluated sections revealed a covering of multilayered squamous epithelium over the tissue specimens. Beneath the epithelial tissue, a lesion rich in collagen fibers was observed, composed of triangular or spindle-shaped cells. Notably, collagen fibers exhibited configurations such as swirl-shaped structures and short-course areas that intersected at various points. Additionally, a mineralized region resembling compact bone tissue was identified over a broad area in between. Based on these observations, a diagnosis of 'heterotopic ossification' was established.

Figure 4: Operation stages: excision, bone arrangement stages, connective tissue removal and wound closure

Discussion

Hyperplastic growths within the maxilla are a commonly encountered phenomenon. These growths typically arise as a response to a stimulus or injury, such as tartar accumulation, ill-fitting dentures, or the presence of foreign materials. Reactive hyperplastic lesions represent non-neoplastic, tumor-like hyperplasias that develop in response to chronic irritation or trauma (5,6). Within this category of common lesions, heterotopic ossification (HO) is infrequently referenced, as evidenced by a limited number of case reports (3,4).

The precise etiology of heterotopic ossification (HO) remains elusive. However, it has been noted that HO is more prevalent in individuals who have undergone significant bone resections or extensive soft tissue dissections (7). The process of HO formation necessitates the presence of osteogenic precursor cells, an inducing substance or event, and an environment conducive to osteogenesis (8).

Radiologically, heterotopic ossification (HO) has been observed to be more prevalent in young males (9). These formations typically manifest as painless, slow-growing, radiopaque lesions, often monitored during routine check-ups (10). For instance, Vencio et al. reported a case of HO situated between the maxillary incisor and lateral incisor in a 13-year-old male patient (11). Hong et al. documented a case of a 3 cm HO, palpable and causing trismus,

located in the masseteric area of the right mandibular ramus region in a patient who sought medical attention due to this issue (12). Additionally, Büyükakyüz et al. reported a case of HO in a patient presenting with complaints of pain in the right maxillary sinus (10).

In addition to its rarity within the maxillofacial region, heterotopic ossifications (HOs) are even more infrequently observed in the anterior maxilla. Potential triggers for its development in the maxilla may include tooth extraction or other irritants. The differential diagnosis of HO necessitates distinguishing it from calcified and ossified structures, ossifying hemangioma, fasciitis ossificans, ossifying pleomorphic adenoma, ossifying fibroma, osteoblastic tumors, and myositis ossificans. Histopathologically, HO typically exhibits a compact bone tissue appearance with inverted lines in decalcified sections (10).

HOs are typically painless and manifest as radiopaque formations observed during routine check-ups. A definitive diagnosis requires histopathological examination (10). Hong et al. reported a case in which they initially clinically and radiologically diagnosed the patient with osteochondroma. Upon surgical intervention, they found the excised mass to be softer than bone and surrounded by cartilage-like tissue. Histological examination revealed normal bone formation covered with osteoids (12).

For the treatment of heterotopic ossification (HO), a follow-up approach is typically recommended rather than invasive interventions, especially if there are no indications of malignancy (13). Güneri et al. have advised surveillance for asymptomatic cases in the maxillary sinus, suggesting a cautious approach without immediate surgery during the initial stage.

However, in specific cases where the condition significantly affects aesthetics and hampers normal lip movements, surgical treatment may be considered, deviating from the typical follow-up approach. In the instance discussed, surgical intervention was chosen due to the disruption of the patient's aesthetics and restricted lip movements.

Conclusion

The rarity of this case and its respective treatment contributes valuable insights to the existing literature. This singular case underscores the importance for maxillofacial surgeons to consider HO, although rare, along with other potential bone lesions like osteoma, osteochondroma, and osteosarcoma, when encountering patients with atypical bone presentations in the maxillofacial region.

Declarations

Author Contributions: *Conception/Design of Study- S.A.T.; Data Acquisition- Z.Y.; Data Analysis/Interpretation- H.A.; Drafting Manuscript- M.M.G.; Critical Revision of Manuscript- M.M.G.; Final Approval and Accountability- M.M.G.; Material and Technical Support- M.M.G.; Supervision- M.R.*

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REFERENCES

1. M. Mori, T. Kasai, P. Shrestha et al. Heterotopic ossifyingtumors in head and neck andheterotopic ossification and calcification. Journal of Oral and Maxillofacial Surgery, Medicine,and Pathology 2012;vol.24,no.4,pp.222–236.

2. Vencio EF, Alencar RC, Zancope E. Heterotopic ossification in the anterior maxilla: a casereport and review of the literature. J Oral Pathol Med 2007;36:120Y122. (Review)

3. Hong SK, Lee BY, Jung YS, Jung HD. Heterotipic ossification. Journal of International Society for Simulation Surgery 2016;vol.3,-no.2,pp.84-86.

4. Küçüker İ, Sakrak T, Demirbağ E. Heterotopic ossification in orbital roof, frontal sinus, andethmoidal cells leading to hypoglobus and upward-gaze deficit. J Craniofac Surg. 2013;24(1):e83-5.

5. Effiom OA, Adeyemo WL, Soyele OO. Focal reactive lesions of the gingiva: An analysis of 314 cases at a tertiary health institution in Nigeria. Niger Med J 2011;52:35-40.

6. Zarei MR, Chamani G, Amanpoor S. Reactive hyperplasia of the oral cavity in Kermanprovince, Iran: A review of 172 cases. Br J Oral Maxillofac Surg. 2007;45: 288-292,.

7. Mann H.A., Choudhury M.Z.B., Lee C.A., Goddard N.J. Heterotropic bone formation as acomplication of elective joint replacement in haemophilic patients a case report and literature review. Haemophilia. 2006;12:672–675.

8. Chalmers J, Gray DH, Rush J. Observation on the induction of bone in soft tissues. J BoneJoint Surg Br. 1975;57(1):36-45.

9. Knitcshke M, Siu K, Backer K, Attia S, Heterotopic Ossification of the Vascular Pedicle after Maxillofacial Reconstructive Surgery Using Fibular Free Flap: Introducing New Classification and Retrospective Analysis. Journal of Clinical Medicine 2021;10:15.

10. Buyukakyuz N, Ergun S, Olgac V, Tanyeri H. Heterotopic ossification in the maxillary sinus. JCraniofac Surg. 2008;19:684–686.

11. Vencio EF, Alencar RC, Zancope E. Heterotopic ossification in the anterior maxilla: a case report and review of the literature. J Oral Pathol Med 2007;36:120Y122.(Review)

12. Seok-Hwan Hong, Yong-Bin Lee, Young-Soo Jung, Hwi-Dong Jung. Heterotopic Ossification Journal of International Society for Simulation Surgery 2016;3(2):84-86

13. Guneri P, Kaya A, Caliskan MK. Antroliths: survey of the papilloma with bone formation,and residual bone, literature and report of a case. Oral Surg Oral Med Oral Patholradiographically. Histopathological examination of Oral Radiol Endod 2005;99:517Y

Cemento-Ossifying Fibroma in the Mandibular Posterior Region: 2 Case Reports

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ABSTRACT

Aim Cemento-ossifying fibroma (COF) is a mesenchymal, benign odontogenic tumor of the jaws that originates from the mesenchymal blast cells of periodontal ligament and can form osteoid, bone, cement-like tissue, fibrous cellular tissue or a combination of them. In this case report, it is aimed to present clinical, radiological and histopathological examination of two cemento-ossifying fibroma cases.
Case Report A 36-year-old systemically healthy female patient was referred to our faculty due to a lesion detected in the right mandibular posterior region. As a result of the clinical and radiological examination, an asymptomatic tumoral structure with a mixed appearance and regular borders was detected. No expansion was detected in the right mandibular posterior region. The patient was referred to the Department of Oral and Maxillofacial Surgery for biopsy. According to the biopsy report, it was learned that this tumoral structure was a COF. A 38-year-old systemically healthy female patient was admitted to our faculty due to gingival bleeding. As a result of the clinical and radiological examination, an asymptomatic lesion with a radiolucent appearance and sclerotic borders was detected in the right mandibular posterior region. According to the patient's biopsy report, it was discovered that this lesion was a COF.
Discussion COF may exhibit different clinical and radiological behaviors based on its stage. Diagnosis and treatment planning of COF should be made with clinical, radiological and histopathological examination.
Conclusion Two COF cases are reported with their detailed clinical and radiological examinations in this paper.

Keywords Benign, CBCT, Cemento-ossifying fibroma, Mandible, Odontogenic tumor

Introduction

Cemento-ossifying fibroma (COF) is a mesenchymal, benign odontogenic tumor of the jaws that originates from the mesenchymal blast cells of periodontal ligament and can form osteoid, bone, cement-like tissue, fibrous cellular tissue or a combination of them (1). In 1971, COF was first classified under the cementum-contained lesions including cementifying fibroma, fibrous dysplasia and ossifying fibroma by the World Health Organization (WHO) (2,3). In 2017, the term "cemento-ossifying fibroma" was defined as a mesenchymal, benign odontogenic tumor specific to the tooth- beared areas of the jaws (4). Several synonyms for COF such as osteo-fibroma, fibro-osteoma, and benign fibro-osseous lesion of periodontal ligament origin have been used (5). COF is classified as the central type originating from the periodontal ligament adjacent to the root apex and the peripheral type, which occurs only in the soft tissues of the tooth-bearing regions (6). Although the etiology of COF is not known exactly, there are reports of previous trauma to the lesion site (7). It is also known that it may be associated with congenital problems during the maturation of dental hard tissues that can form cementum and bone. Although it occurs especially in patients aged 20-40, it can occur in children and adolescents as well as in older adults. Women are affected more frequently than men at a ratio of 5:1 (8). This tumor, which is usually seen in the mandibular premolar-molar region, may also involve the maxillary region and paranasal sinuses and larger lesions may be encountered in this region as a result of the larger expansion area (9).

Radiological Features of Cemento-ossifying Fibroma

COF reveals well-circumscribed, mostly unilocular or rarely multilocular radiolucency with or without radiopaque foci native to the degree of calcification (1,10). Initially, COF presents as a radiolucent lesion without internal radiopacity. With the developing tumor maturity, radiopaque masses appear, which can merge to form a large radiopaque focus surrounded by a radiolucent border (11). There are three distinct patterns of radiographic borders: a lesion with no sclerotic border (40%), a lesion with a sclerotic border (45%), and a lesion with poorly defined margins (15%) which implies a fast-growing tumor (12,13). The non-linear centrifugal growth pattern is a specific diagnostic radiographic feature for COF and the lesion enlarges uniformly in all directions and presents as a rounded tumor mass in this pattern (11-13). COF may cause mobility, divergence and root resorption in the adjacent tooth (11,13). In addition, lingual and buccal bone expansion without cortical perforation may be encountered (1,14).

Clinical and Histopathological Features of Cemento-ossifying Fibroma

Clinically, COF is usually observed as an asymptomatic and slow-growing intraosseous lesion but when enlarged it may cause facial asymmetry or bone fractures. Although the adjacent teeth usually remain vital; pain or paresthesia may develop when pressure is applied on the adjacent nerve. It is mostly solitary but

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may rarely present as isolated or multiple lesions as a component of the hyperparathyroidism-jaw tumor syndrome (1,4,10).

Histologically, COF consists of well-vascularized fibrocellular tissue that capable of producing immature bone trabeculae and cementoids (1,7,14). Bone trabeculae are variable in size, often showing a combination of lamellar and woven patterns. Bone usually shows peripheral osteoblastic and osteoid and rimming (Figure 1). Cementoids are basophilic spherical bodies that mixed with adjacent connective tissue and represent the peripheral brush border (1,15).

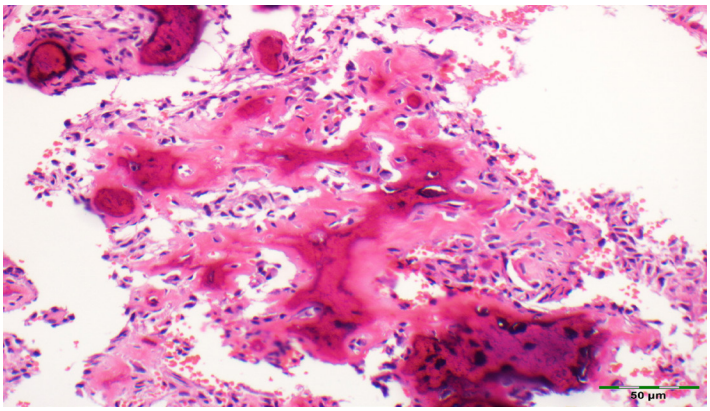

Figure 1: Histopathological section of cemento-ossifying fibroma

The aim of this study is to present two COF cases with clinical, radiological and histopathological findings.

Case Report

Case #1: A 36-year-old systemically healthy female was referred to our faculty from a private dental clinic due to a mandibular lesion. In the radiological examination, a radiolucent lesion with regular borders was detected in the right mandibular posterior region. In the intraoral and extraoral examination, it was observed that the right mandibular first molar was extracted, there was minimal lingual and buccal expansion and the area was asymptomatic. Axial CBCT sections showed thinning of the buccal and lingual cortical bone in the lesion area. Minimal buccal and lingual expansion was observed in coronal CBCT sections. The patient was referred to the surgical department for biopsy with a preliminary diagnosis of residual cyst. Enucleation of the lesion, which diagnosed as COF as a result of incisional biopsy, and right mandibular second molar tooth extraction were performed. In the follow-up radiographs of the third month after the operation, bone formation was observed in the lesion area (Figure 2a-b-c). Written informed consent was obtained from the patient that her medical and dental data could be used in scientific research.

Case #2: A 38-year-old systemically healthy female was admitted to our faculty due to gingival bleeding. As a result of radiological examination, a tumoral structure with mixed appearance and well-defined borders was detected in the right mandibular posterior region. In the intraoral and extraoral examination, it was determined that the right mandibular first molar was extracted, there was no buccal and lingual expansion and the related area was asymptomatic. The patient was referred to the surgical department for biopsy. As a result of excisional biopsy, it was learned that the lesion was COF. Two years later, recurrence was detected in the routine control (Figure 3a-b). Written informed consent was obtained from the patient that her medical and dental data could be used in scientific research.

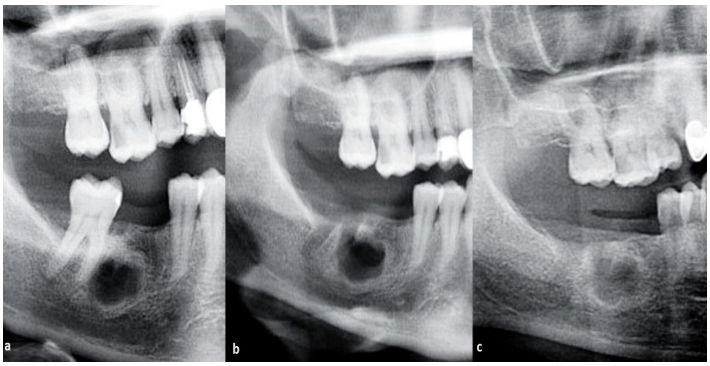

Figure 2: Case #1; a- Before the operation b- Immediately after the operation c- 3 months after the operation

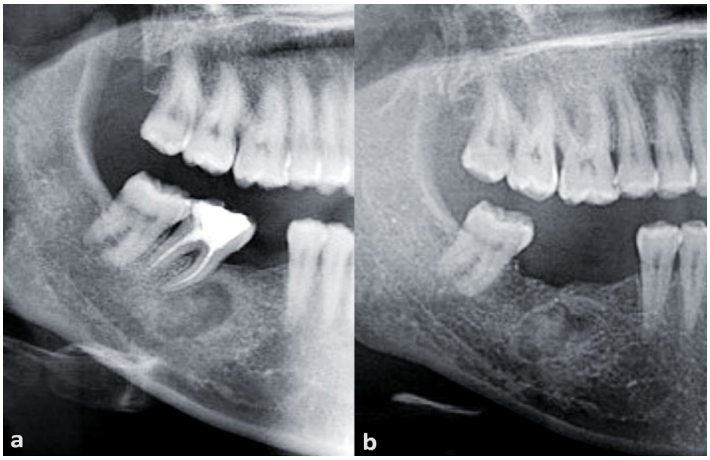

Figure 3: Case #2; a- Before the operation b- 2 years after the operation, recurrence was detected at the previous lesion site

Discussion

COF is a small and usually asymptomatic tumoral formation. However, it has been reported that COF lesions reaching large sizes may cause tooth displacement, nerve compression and paresthesia (16-19). In our cases, there was minimal expansion in the first case and no expansion in the second case. There was no displacement or paresthesia in the teeth. In the radiological examination, COF is radiolucent in the initial stage and it can be observed as mixed and radiopaque in advanced stages due to increased calcification. Radiographically, COF has sclerotic and smooth borders (20). The radiographic pattern of COF has been described by various researchers in the literature. Waldron and Giansanti stated that COF cases were observed as 63% radiolucent lesions with radiopaque foci, 26% radiolucent lesions and 12% diffuse and homogeneous lesions (21).

Titinchi et al. conducted a retrospective study and found that approximately 49.2% of COF lesions were radiopaque, 34.9% mixed radiolucent-radiopaque and 15.9% were radiolucent. Also,

84.1% of the lesions were reported as unilocular and 15.9% of them were multilocular on panoramic radiographs. In addition, multilocular radiolucency was observed in the posterior mandibula in all cases (22). Barberi et al. categorized the radiographic pattern of COF as a prominent lesion without a sclerotic border (40%), a prominent lesion with a sclerotic border (45%) and a lesion with indistinct borders (15%) (23). In our study, the first case was radiolucent with smooth borders and minimally expanded in the buccal and lingual directions, while the second case showed a mixed and regular border.

Differential diagnosis of COF include pathological formations such as central giant cell granuloma, adenomatoid odontogenic tumor, fibrous dysplasia and calcified epithelial odontogenic tumor. Fibrous dysplasia is not well-circumscribed and gives a ground-glass appearance on radiographs. Calcified epithelial odontogenic tumor and adenomatoid odontogenic tumor cannot be exactly differentiated from COF radiologically, but can be distinguished by histological examinations. Central giant cell granuloma is usually seen in younger patients (24). Before a definitive diagnosis can be made; clinical, radiological and histological evaluations should be evaluated as a whole.

Although the surgical approach is controversial in asymptomatic COF cases, enucleation and resection are usually performed (15). Enucleation by curettage is the first choice for small lesions; surgical resection and reconstructive surgery are preferred for larger lesions (1). Radiotherapy has been confirmed to be ineffective and contraindicated due to its inductive effect for malignant transformation (14). In our first case, surgical procedure was performed with the suspicion of cyst. In the second case, surgical procedure was the treatment of choice.

It has been reported that the recurrence rate in COF is 12% and the recurrence rate is higher especially in younger patients. Since the tumor growth is easier in the maxillary region than in the mandible, it has been determined that the recurrence is more common in maxillary cases (18). In our second case, although the patient was middle-aged and the related tumor formation was in the mandible, recurrence was detected two years later.

Conclusion

COF should be suspected in any lesion originating from the mandible or maxilla showing varying amounts of fibrous and osteoid tissue. In the diagnosis and treatment planning of COF, the importance of detecting the lesion at an early stage by performing radiological, clinical and histopathological examinations should be explained to the patients and the necessity of routine periodic controls should be stated to prevent recurrence or future complications after treatment.

Declarations

Author Contributions: *Conception/Design of Study- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Data Acquisition- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Data Analysis/Interpretation- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Drafting Manuscript- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Critical Revision of Manuscript- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Final Approval and Accountability- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Material and Technical Support- M.H.D., M.B.T., S.C.B., M.Ç.Ö.; Supervision- M.H.D., M.B.T., S.C.B., M.Ç.Ö.*

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REFERENCES

1. *Akkitap M, Gumru B, Idman E, Erdem N, Gumuşer Z, Aksakalli F. Cemento-Ossifying Fibroma: Clinical, Radiological, and Histopathological Findings. Clinical and Experimental Health Sciences. 2020;10(4):468- 472.*
2. *Pindborg JJ, Kramer IRH. Histological typing of odontogenic tumours, jaw cysts and allied lesions. International histological classification of tumours. Geneva: WHO;1971. p.31-34.*
3. *Kramer IR, Pindborg JJ, Shear M. The World Health Organization histological typing of odontogenic tumours; introducing the second edition. Eur J Cancer B Oral Oncol. 1993;29:169-171.*
4. *El-Mofty SK, Nelson B, Toyosawa S. Ossifying fibroma. El- Naggar AK, Chan JKC, Grandis JR, Takata T, Slootweg PJ, editors. WHO Classification of Head and Neck Tumours. 4th ed. Lyon: IARC Press; 2017. p. 251-252.*
5. *Naik RM, Guruprasad Y, Sujatha D, Gurudath S, Pai A, Suresh K. Giant cemento-ossifying fibroma of the mandible. J Nat Sci Biol Med. 2014;5(1):190-4.*
6. *Bala TK, Soni S, Dayal P, Ghosh I. Cemento-ossifying fibroma of the mandible a clinicopathological report. Saudi Med J 2017;38:541-545.*
7. *Silvestre-Rangil J, Silvestre FJ, Requeni-Bernal J. Cemento-ossifying fibroma of the mandible: Presentation of a case and review of the literature. J Clin Exp Dent. 2011;3(1):66-9.*
8. *Wanzeler AMV, Rohden D, Arús NA, Silveira HLD, Hildebrand LC. Central cemento-ossifying fibroma: clinical-imaging and histopathological diagnosis. Int J Odontostomat 2018;12:233-236.*
9. *Reddy R, Sarkar P, Manuel RA, Saxena D, Hoisala VR. Cementoossifying fibroma: A case report. IJSS Case Reports and Reviews 2016;3:13-15.*
10. *Neville BW, Damm DD, Allen CMA, Chi AC. Oral and Maxillofacial Pathology. 4th ed. St. Louis, Missouri: Elsevier; 2016.*
11. *Mithra R, Baskaran P, Sathyakumar M. Imaging in the diagnosis of cemento-ossifying fibroma: A case series. J Clin Imaging Sci 2012;2:52.*
12. *Rani A, Kalra N, Poswal R, Sharma S. Cemento ossifying fibroma: Report of a case and emphasis on its diagnosis. Indian J Multidiscip Dent 2017;7:140-143.*
13. *Swami A, Kale L, Mishra S, Choudhary S. Central ossifying fibroma of mandible: A case report and review of literature. J Indian Acad Oral Med Radiol 2015;27:131-135.*
14. *Dalghous A, Alkhabuli JO. Cemento-ossifying fibroma occurring in an elderly patient: A case report and a review of literature. Libyan J Med 2007;2:95-98.*
15. *Kharsan V, Madan RS, Rathod P, Balani A, Tiwari S, Sharma S. Large ossifying fibroma of jaw bone: a rare case report. Pan Afr Med J 2018;30:306.*

16. Pandey V, Sharma A, Sudarshan V. Cemento-ossifying fibroma – a rare case report with review of literature. IJCMR 2016;3:2681-2682.
17. Sridevi U, Jain A, Turagam N, Prasad MD. Cemento-ossifying fibroma: A case report. Adv Cancer Prev 2016;1:111.
18. Peravali RK, Bhat HH, Reddy S. Maxillo-Mandibular Cemento-ossifying fibroma: A rare case report. J Maxillofac Oral Surg 2015;14:300-307.
19. Ram R, Singhal A, Singhal P. Cemento-ossifying fibroma. Contemporary Clinical Dentistry. 2012;3(1):83–85.
20. Kaur T, Dhawan A, Bhullar RS, Gupta S. Cemento-ossifying fibroma in maxillofacial region: a series of 16 cases. J Maxillofac Oral Surg. 2021;20:240–245.
21. Waldron CA, Giansanti JS. Benign fibro-osseous lesions of the jaws: a clinical-radiologic-histologic review of sixty-five cases. Oral Surg. 1973;35:340–350.
22. Titinchi F, Morkel J. Ossifying fibroma: analysis of treatment methods and recurrence patterns. J Oral Maxillofac Surg 2016;74(12):2409-19.
23. Barberi A, Cappabianca S, Collela G (2003) Bilateral cementossifying fibroma of the maxillary sinus. Br J Radiol 2003;76:279–280.
24. Trijolet JP, Parmentier J, Sury F, Goga D, Mejean N, Laure B, et al. Cemento-ossifying fibroma of the mandible. Eur Ann Otorhinolaryngol Head Neck Dis. 2011;128:30–3.

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