Prevalence of retained/transmigrated permanent and persistence of primary teeth associated with odontomas in young children



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Abstract

Aim Odontomas are odontogenic tumours of the jaws; they are generally asymptomatic with an unknown aetiology. This study was conducted on non-syndromic children aged 9 to 14 years to explore the side effects deriving from the presence of these benign tumours, as retention, transmigration, ectopic eruption of permanent teeth and the permanence of primary teeth in the affected area.

Methods Two hundred panoramic (OPT) and 92 Cone Beam Computed Tomography radiographs (CBCT) of patients (130 males and 70 females) were analysed from February 2018 to December 2019. Two hundred odontomas (145 compound and 55 complex type) and 800 teeth (160 primary and 640 permanent) were included.

Results The prevalence of these tumours in both male and female subjects was 65% and 35%, respectively; the prevalence of compound odontomas in maxillary and mandibular bones was respectively 27.58% and 72.41%. The prevalence of complex odontomas in maxillary bones in female and male subjects was 37.5% and 62.5% respectively. It was observed the presence of a primary tooth in 81% of cases, the presence of retained teeth in 16.5% and a dental transmigration in the remaining 2.5% of cases in the compound type. Gender ($p=0.158$) has no significant correlation.

Conclusions An early diagnosis and removal of odontomas in primary dentition is crucial in order to prevent later dental complications. Since the detection of odontomas is mainly an accidental radiological finding, the need for routine radiographic analysis should be highlighted.

KEYWORDS Ectopic eruption; Odontoma; Prevalence; Retention; Transmigration.

Introduction

Odontomas are odontogenic benign tumours of unknown aetiology correlated with the development of teeth even if trauma, infections, developmental anomalies might be possible causes [Trejo-Remigio et al., 2019]. Microscopic and histologic features differentiate the main two types; the first one is defined compound for the altered size and conformation of denticles; whereas a mass with a disorderly arrangement typifies the complex type [Isola et al., 2017]. They usually appear in the first two decades of life, mainly in the male population with an incidence ranging from 9% to 37% [Da Silve et al., 2016]. Generally, compound odontomas are more frequent than complex ones and are usually located in the posterior region of the mandible; while the second type is usually found in the anterior part of the maxilla [Hildalgo-Sànchez et al., 2008; Poli et al., 2019; An et al., 2012]. Most of times they are asymptomatic, so they can be discovered by routine X-rays or while investigating the persistence of primary teeth with the retention or the inclusion of permanent teeth, or unjustified spaces in both maxillary or mandibular arches [Trejo-Remigio et al., 2019]. The election treatment is surgery, through both traditional rotary instruments or piezosurgery [Vercellotti et al., 2005]. In literature many studies regarding prevalence are present [Hildalgo-Sànchez et al., 2008; Poli et al., 2019; An et al., 2012; Vercellotti et al., 2005], but no one has analysed the correlation between the odontomas and the side-effects regarding the correlated teeth.

Therefore, the aim of this study was to analyse the prevalence of these odontogenic lesions, the side-effects in both mixed and permanent dentition, in non syndromic 9 to 14-year-old patients, by means of panoramic and Cone Beam Computed Tomography radiographs, to give a significant mean to some frequent clinical and radiographic findings. Moreover, another purpose is to correlate these aspects to age, gender, prevalent sites and prognosis of related teeth.

Materials and methods

The present study was conducted on non syndromic patients aged 9 to 14 years from February 2018 to December 2019 at the Complex Operative Unit of Stomatological Surgery in Developmental Age of University of Campania Luigi Vanvitelli, in Naples. After obtaining the signed informed consents from the patients' parents and after collecting data of 200 patients with a diagnosis of a compound or complex odontoma, confirmed by histological analysis, 200 panoramic X-rays (OPT) and 92 Cone Beam Computed Tomography (CBCT) were assembled. The following parameters were recorded.

- Age and gender.
- Compound/complex odontomas in the maxillary bone reporting the anatomical area interested.
- Compound/complex odontomas in the mandibular bone

	Male	Female		Age	
Compound odontomas	90	55	145	10.3 y m 9.4 y f	Chi-square: 1,99 p: 0.158
Complex odontomas	40	15	55	12y m 9.7y f	
Total	130	70			

TABLE 1 Distribution of the compound and complex odontomas according to age and gender.

TABLE 2 Quadrants and arch distribution of the compound and complex odontomas.

	URQ	ULQ	Maxillary arch	LLQ	LRQ	Mandibular arch	
Compound odontomas	25 (20m, 5f)	15 (15m + 0f)	40 (35m, 5 f)	85 (45m + 40f)	20 (10m + 10f)	105 (55m + 50f)	Chi-square: 1,99 p: 0.158
Complex odontomas	8 (5m, 3f)	0	8 (5m, 3f)	24 (20m + 4f)	23 (15m + 8f)	47 (35m + 12f)	
Total	33 (25m, 8f)	15 (15m, 0f)	48 (40m, 8f)	109 (65m, 44f)	43 (25m, 18f)	152 (90m, 62f)	

(URQ: upper right quadrant; ULQ: upper left quadrant; LLQ: lower left quadrant LRQ: lower right quadrant)

reporting the anatomical area interested.
- Persistence of primary teeth.
- Retention, transmigration, ectopic eruption of permanent teeth, identifying the most affected tooth, if any.

A total of 800 teeth (160 primary and 640 permanent) were observed.

Analysis of samples and diagnostic criteria

OPT and CBCT images of both compound and complex odontomas were selected from the hospital's database based on histological findings by the same two operators in order to avoid any bias. Not all patients performed CBCT due to X-ray issues and the high costs of the examination.

Statistical analysis

The obtained data were coded and entered into Microsoft Excel, and then subjected to statistical analysis. Categorical data were analysed by Chi-square test that was performed to determine the statistical significance of differences in prevalence of findings between the sexes, the upper and lower jaws, the right and left sides of the patient, as well as the type of odontoma and complications. The results were expressed in percentage. Significance for all statistical tests was predetermined at a probability value of 0.05 or less (data were analysed using the statistical package SPSS Software, Version 14, Chicago, USA).

Results

A total of 200 OPT and 92 CBCT were analysed.

The prevalence rate is grouped in Tables 1, 2 and 3. In the first one, age and gender were classified; in the second one, the kind of tumour and its location were analysed, whereas in the third one, retention, transmigration and persistence of the primary teeth were assembled.

No cases of ectopic eruption were found. In Table 1 the predilection of odontomas for age and gender is reported.

Of the 200 children (130 m; 70 f) examined, 145 presented a compound odontoma and 55 a complex one. Of 130 males, 90 (69%) presented compound odontomas and of a total of 70 females, 55 (78.6%) presented the same tumours (P =0.158). The prevalence of these tumours in both male and female subjects was 65% and 35% respectively. The prevalence of compound odontoma in both male and female subjects was 62% and 38% respectively, while the prevalence of complex odontoma in both male and female subjects was 72% and 28% respectively. The prevalence of compound odontomas in maxillary and mandibular bones was of 27.58% and 72.41% respectively. The prevalence of complex odontomas in maxillary and mandibular bones was of 14.54% and 85.45% respectively (Fig. 1). The prevalence of compound odontomas in maxillary bones in female and male subjects was 12.5% and 8.5% respectively. The prevalence of complex odontomas in maxillary bones in female and male subjects was correspondingly 37.5% and 62.5%. The prevalence of compound odontomas in mandibular bones in female and male subjects was 47.6% and 52.4%. The prevalence of complex odontomas in mandibular bones in female and male subjects was 25.5% and 7.5% (P =0.158) (Table 2).

In the complex type, the observed form of dental alteration is in all cases (100%) a retained tooth, and the second mandibular molar is always affected (Fig. 2).

As regards the compound type, the permanence of a primary tooth was observed in 81% of cases, the presence of retained teeth in 16.5% and dental transmigration in the remaining 2.5% of cases (Table 3, Fig. 3, 4, 5).

Out of a total of 31 retained teeth found, 28 (90%) were associated with a compound odontoma. Twenty-six (83.9%) of these teeth were canines and appeared distributed in LLQ (12: 7m+5f) and in LRQ (14: 8m+6f); 57% of the teeth retained

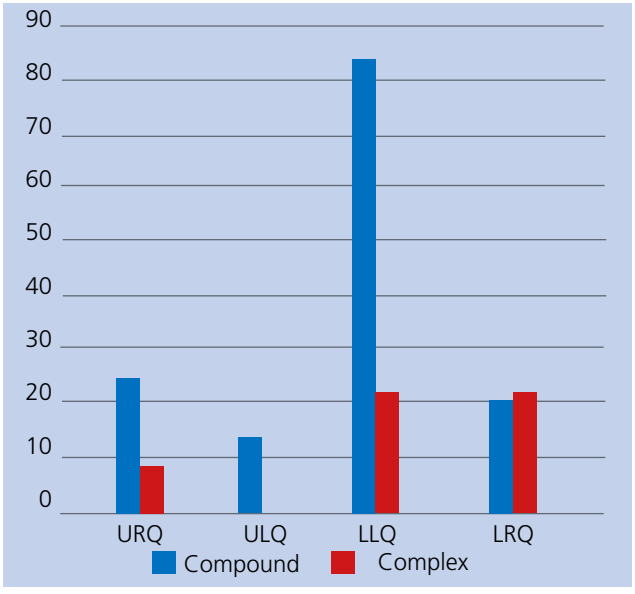


FIG. 1 Distribution of compound and complex odontomas in maxillary and mandibular bones.

	Retained teeth				Transmigrated teeth				Permanence of primary teeth			
	URQ	ULQ	LLQ	LRQ	URQ	ULQ	LLQ	LRQ	URQ	ULQ	LLQ	LRQ
Compound odontomas												
Canine	0	0	12 (7m+5f)	14 (8m+6f)	0	0	3 (3m)	1 (1m)	22 (17m, 5f)	14 (14m)	82 (42m, 40f)	19 (9m, 10f)
2°Premolar	0	0	0	1 (1m)	0	0	0	0	0	0	0	0
2° Molar	0	0	1 (1f)	0	0	0	0	0	0	0	0	0
Complex odontomas												
2° Molar	0	0	1m	2f	0	0	0	0	0	0	0	0
Total	0	0	14 (8m, 6f)	17 (9m, 8f)	0	0	3 (3m)	1 (1m)	22 (17m, 5f)	14 (14m)	82 (42m, 40f)	19 (9m, 10f)

(URQ: upper right quadrant; ULQ: upper left quadrant; LLQ: lower left quadrant LRQ: lower right quadrant)

TABLE 3 Distribution of retention, transmigrated of permanent teeth and the persistence of primary teeth according to age, gender and quadrants

below compound odontomas were observed in males. Regarding the complex odontomas, the most affected tooth was the second molar and, also in this case, the LLQ (1m) and the LRQ (2f) were the most affected.

Only 4 cases of transmigrations have been found, all associated with a compound odontoma and all involving a canine in the LLQ (3m) and the LRQ (1m).

The prevalence of the permanence of primary teeth was only observed in compound odontomas and it was found in 94.5% of subjects (60% males and 40% females). In all cases evaluated, the affected tooth was the canine and in the 59.85% of times it was located in the LLQ.

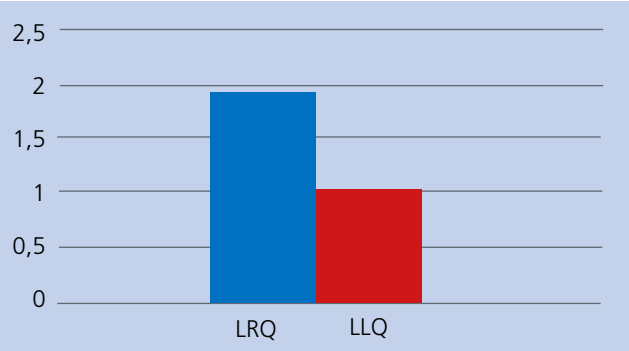


FIG. 2 Prevalence of retained second molar in complex odontoma.

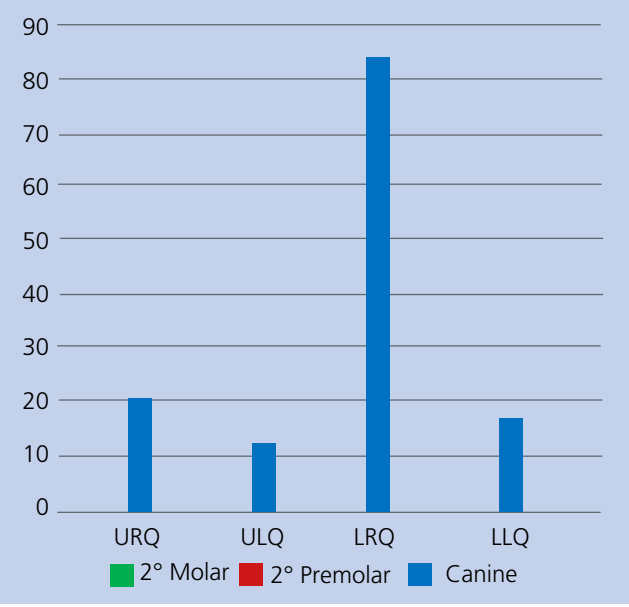


FIG. 3 Prevalence of the permanence of primary teeth in all quadrants in compound odontoma.

Discussion

Odontomas are benign tumours, mostly asymptomatic, identified as the most frequent odontogenic tumours [Vercellotti et al., 2005; Siriwardena et al., 2012; Arotiba et al., 1997].

According to Siriwardena et al. [2012], in their sample of 169 cases odontomas show a higher maxillary predilection. Their findings are in contrast with those in the current study, where both compound (72,41%) and complex (85,45%) odontomas are more prevalent in the mandible. Regarding gender, although some literature evidences indicate that females are more frequently affected [Ochsenius et al., 2002; Santos et al., 2001;

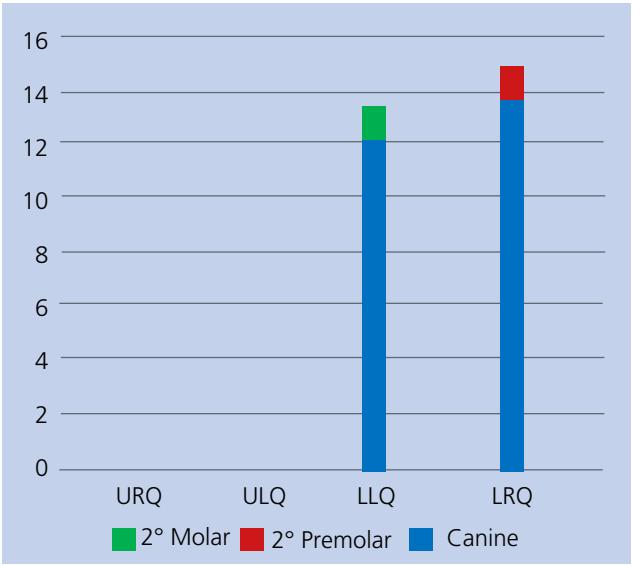


FIG. 4 Prevalence of the retained teeth in all quadrants in compound odontoma.

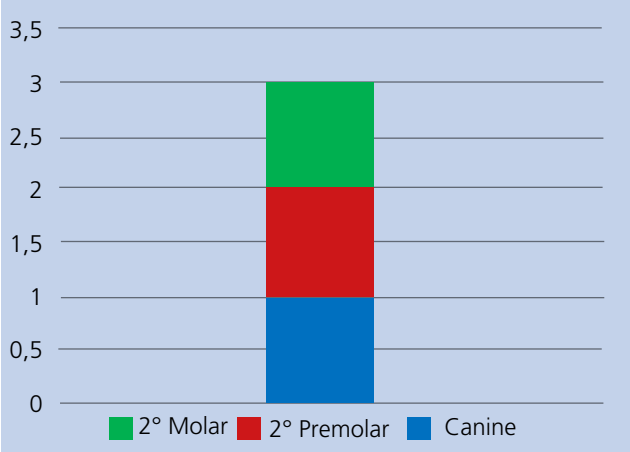


FIG. 5 Prevalence of transmigrated teeth in all quadrants in compound odontoma.

Jing et al., 2007; Díaz-Sánchez et al., 2016], in our case, as illustrated in Table 1, the distribution of the compound and complex neoformations shows a higher prevalence in males (65%). This could be partially due to the presence in our sample of a greater number of males, although these data have been considered in the statistical analysis which does not report a significant difference in gender distribution.

As regards the side-effects and dental problems correlated with these benign tumours, the literature is poor of information and often based on small samples of patients [Vercellotti et al., 2005; Siriwardena et al., 2012; Arotiba et al., 1997; Ochsenius et al., 2002; Santos et al., 2001; Jing et al., 2007; Díaz-Sánchez et al., 2016]. For this reason, we carried out this study observing and examining 200 odontomas (145 compound and 55 complex types) and 800 teeth involved or related to these lesions (160 primary and 640 permanent) in order to report the prevalence of dental side effects in all quadrants [Díaz-Sánchez et al., 2016; Bereket et al., 2015] based on both OPT and CBCT X-rays. As shown also in Figure. 3, since compound odontomas are often located in the anterior region of the mandible (specifically in the lower right quadrant), one of most involved tooth is the canine, also because it erupts later than the lower incisors. This datum suggests that the development of odontomas occur in a period following the formation of the incisors whicho are, therefore, not affected by its presence. Otherwise the canine undergoes either a stop or alteration of its eruptive phase. This applies also to the complex type (Fig. 2), that is mainly located in the posterior part of the lower jaw often involving the second molar for anatomical reasons.

Our results are in agreement with those of some authors, which show a higher prevalence of compound tumours. Specifically, compound odontomas were found in 69% of male subjects, and in in 78.6% of the 70 females [Díaz-Sánchez et al., 2016; Bereket et al., 2015; Chrysomali et al., 2013]. Concerning the prevalence of compound odontomas in the maxillary bone, in contrast with other studies [Jing et al., 2007; Díaz-Sánchez et al., 2016; Bereket et al., 2015; Chrysomali et al., 2013; Nammalwar et al., 2018; Lele and Modi, 2013; Aktan et al., 2012], the present findings show a higher prevalence in female subjects (12.5%).

Considering the higher permanence of primary teeth in the age range where odontomas develop, and since these lesions are most of times asymptomatic, it is not easy for the patients' parents to detect the persistence of the primary tooth in the arches outside the normal exfoliation time, thus increasing the risks of possible side-effects. For this reason, periodic dental visits and radiographic checkups are crucial. Indeed, the presence of undiagnosed odontoma, could force the underlying tooth to transmigrate to areas of less resistance. In these patients, the affected canines were all positioned mesio-angularly within the jawbone, labially with respects to the front teeth and with the crown positioned below the central and lateral incisors [Mupparapu, 2002]. The clinical dental implications associated with compound and complex odontomas exist and are several, since early detection of some dental anomalies and a routine X-ray check-up may call the attention of professionals to remove them.

Conclusion

Odontomas affect mainly male subjects. Compound odontomas are mostly found in the anterior area of the mandible. Odontomas are significantly associated with impacted teeth, affecting mainly the lower canines. The most affected retained permanent tooth is the lower canine and often the primary tooth, missing the eruptive thrust of the permanent, remains in the arch. Early diagnosis and timely treatment are essential to avoid complications, such as prolonged retention of primary teeth and delayed eruption of permanent teeth.

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