

Metaanalysis of the epidemiology and clinical manifestations of odontomas

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Abstract

Objective: To evaluate the epidemiological and clinical aspects of the different types of odontomas.

Study design: A metaanalysis was made of 3065 odontomas obtained from a literature review of 30 articles published in recent years.

Results: Odontomas show no gender predilection, and are most often diagnosed in the second decade of life. They are preferentially located in the upper maxilla, particularly in the anterior sector. Compound odontomas are more prevalent than complex odontoma, and show no predilection in terms of patient gender, age or location. Most such lesions are asymptomatic and constitute casual findings in X-ray studies indicated for other reasons. The most common clinical manifestations are the retention of permanent teeth and the presence of a tumor. Treatment consists of surgical removal of the lesion. The prognosis is very good, with a scant tendency towards relapse.

Conclusions: Odontomas are the most common odontogenic tumors. Their most significant characteristics comprise alterations in tooth eruption, and the diagnosis is casually established in the course of routine X-ray studies.

Key words: Odontogenic tumor, compound odontoma, complex odontoma, epidemiology, clinical manifestations.

Introduction

Odontomas comprise a group of benign malformations composed of hard tooth-like structures (enamel, cement and dentine) in variable proportions and with different degrees of development (1,2). Odontomas are the most common odontogenic tumors, accounting for 30-40% of all such lesions (1). The etiology is unknown, though different factors such as traumatism, infections or genetic mutations may be implicated (1,3).

The World Health Organization (WHO) classifies odontomas from the histopathological perspective as: (a) complex odontomas, in which the dental tissues are well formed but exhibit a more or less disorderly arrangement; and (b) composite odontomas, in which the dental tissues are normal, but their size and conformation are altered – giving

rise to multiple small tooth-like structures called denticles. In general, compound odontomas are more frequent than complex odontomas (1-4).

As regards the location of the lesions, complex odontomas are usually located in the mandible, in the zone of premolars and molars, while composite odontomas are more often found in the upper maxilla, in the zone of incisors and canines (3). There have been isolated reports of odontomas in the maxillary sinus, such as the case described by Mupparapu et al. in 2004 (5). An infrequent situation is when the odontoma has erupted, i.e., when it becomes exposed through of the soft tissues, as occurred in the cases published by Amado et al. (2003)(3) and Junquera et al. (2005)(6).

In general, these lesions are diagnosed between the second

and third-fourth decades of life. Complex odontomas are more frequent in children and adolescents (1,3).

Odontomas are generally asymptomatic, and constitute casual findings. The most frequent clinical signs are delayed eruption, persistence of the temporal tooth, and the presence of a tumor (1,3,7). In severe cases, infection or regional adenopathies may be observed (1).

In the X-ray study, compound odontomas appear as well delimited lesions with a radiotransparent halo and containing radiodense zones. Multiple follicular formations are seen, separated by fibrous septae, and the denticles are clearly distinguished (2,8). In complex odontomas, the radiodense elements appear as irregular and disorderly masses with no similarity to dental structures. A typical feature is the identification of a solar X-ray image (1,3). Depending on the degree of odontoma calcification, three different development stages can be identified radiographically: a first stage in which the lesion appears radiotransparent (due to the lack of calcification of the dental tissues); an intermediate stage characterized by partial calcification; and a final stage in which the odontoma appears radiodense and is surrounded by a fine radiotransparent halo (2).

The differential diagnosis must be established with ameloblastic fibroma, ameloblastic fibroodontoma and odontoameloblastoma (4,9,10).

Odontomas can also manifest as part of syndromes, such as basal cell nevus syndrome, Gardner syndrome, familial colonic adenomatosis, Tangier disease or Hermann syndrome (3,4).

Management usually consists of surgery (1-3), and the prognosis after treatment is very favorable, with scant relapse. In this context, the tendency towards relapse is greater when the lesion is removed in the non-calcified tissue stage (3,11). Very few cases of recurrent odontomas have been described in the literature. One of the most recent publications corresponds to Tomizawa et al., in 2005 (12).

However, there is no consensus regarding the epidemiological and clinical characteristics of these lesions. The present study was therefore designed to evaluate the epidemiological features of odontomas, i.e., age and gender distribution, and location, and to assess clinical aspects such as the frequency of the different types of odontoma and their clinical manifestations, with the purpose of offering more reliable information for diagnosing these tumors.

Material and Methods

A metaanalysis was made of the results obtained from a PubMed literature search. The articles selected were subjected to descriptive statistical analysis, with evaluation of the following parameters:

- Gender: evaluation of the gender distribution of odontomas, to determine whether the different types of lesions exhibit a predilection for one gender or the other.

- Age: correlation of the different types of odontoma to patient age at the time of diagnosis.

- Type of odontoma: evaluation of the frequency of the different types of odontomas.

- Location: assessment of the presence of odontomas in the upper maxilla or mandible, with differentiation of the anterior zone or sector (region of the incisors and canines), middle zone (premolars) and posterior zone (molars). The relationship between the type of odontoma and its location was also examined.

- Clinical manifestations: analysis of the presence of symptoms; retained teeth, persistence of the temporal tooth, agenesis of definitive teeth, pain, swelling, infection or inflammation, and dental malpositioning.

- Evaluation of patient management.

Results

A total of 3065 odontomas were registered. Since not all of the above mentioned parameters could be documented in all cases, we analyzed a variable population for each of them.

Gender could be evaluated for 1761 patients, of which 49.4% were females and 50.6% males (Fig. 1a).

Regarding the frequency of the different types of odontomas, classification only proved possible in 1340 cases: 61.3% were composite odontomas, 37% complex odontomas, and 1.7% could not be classified in any group (Fig. 1b).

Evaluation of the relationship between patient gender and the type of odontoma proved possible in 503 cases. Of these, 50.2% corresponded to females and 49.8% to males. Of the total odontomas found in females, 24.6% were composite lesions and 25.6% complex odontomas. In males, 26.4% were composite odontomas and 23.4% complex odontomas.

The mean patient age at the time of diagnosis, analyzed in 301 cases, was found to be 15.15 years. Of these cases, 158 were diagnosed in females and 143 in males – a difference of 1.1 years being observed between both genders (15.7 years in females versus 14.6 years in males).

The correlation of mean patient age at the time of diagnosis to the type of odontoma proved possible in 653 cases, comprising 340 compound odontomas and 313 complex odontomas. The results showed an earlier mean age at the time of diagnosis in the case of compound odontomas (14.8 years) versus complex odontomas (21 years).

Tumor location could be evaluated in the entire series of 3065 cases. Most of the lesions (56%) were located in the upper maxilla, with 44% in the mandible. In this context we differentiated an anterior zone (region of the incisors and canines), middle zone (premolars) and posterior zone (molars). Among the lesions found in the upper maxilla, the location could be identified in 73.01% of the cases: 72.8% were located in the anterior region, 18.3% in the posterior region, and 8.9% in the middle zone. In the

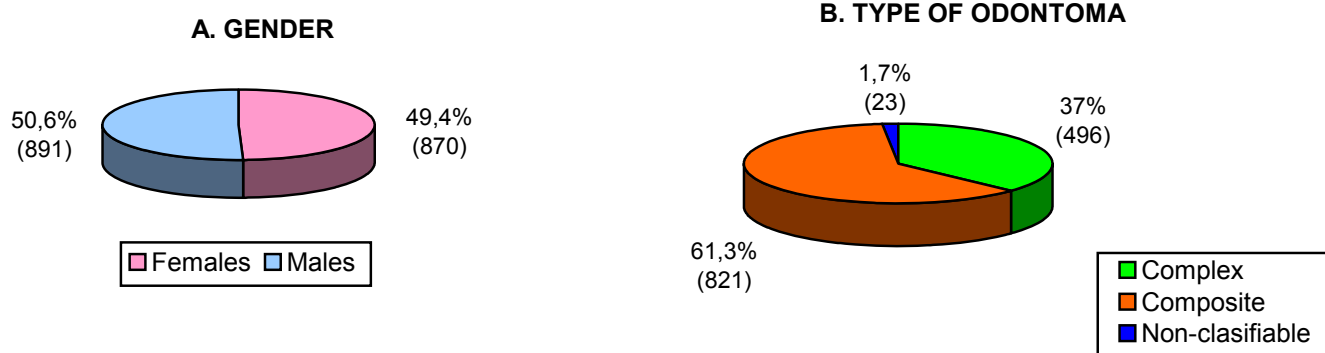


Fig. 1. a: Patient distribution by gender; b: Patient distribution by type of odontoma.

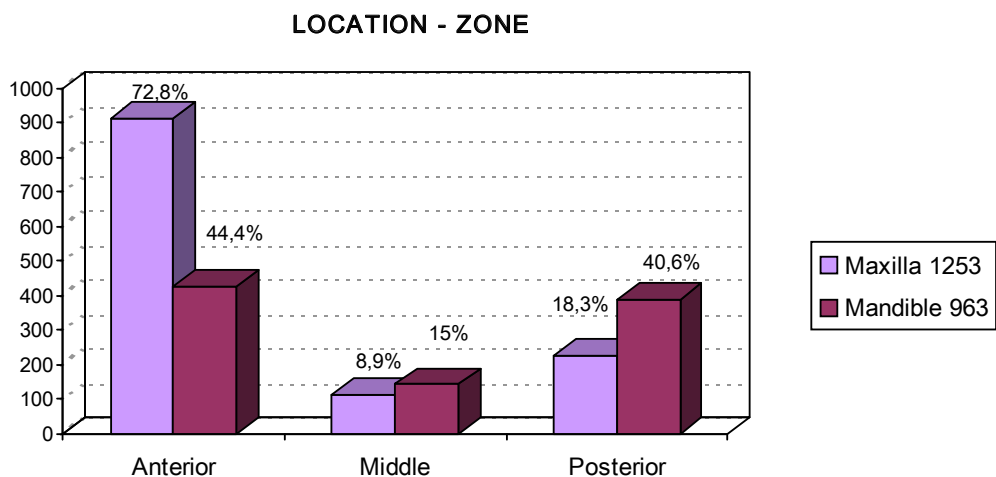


Fig. 2. Odontoma location by zones.

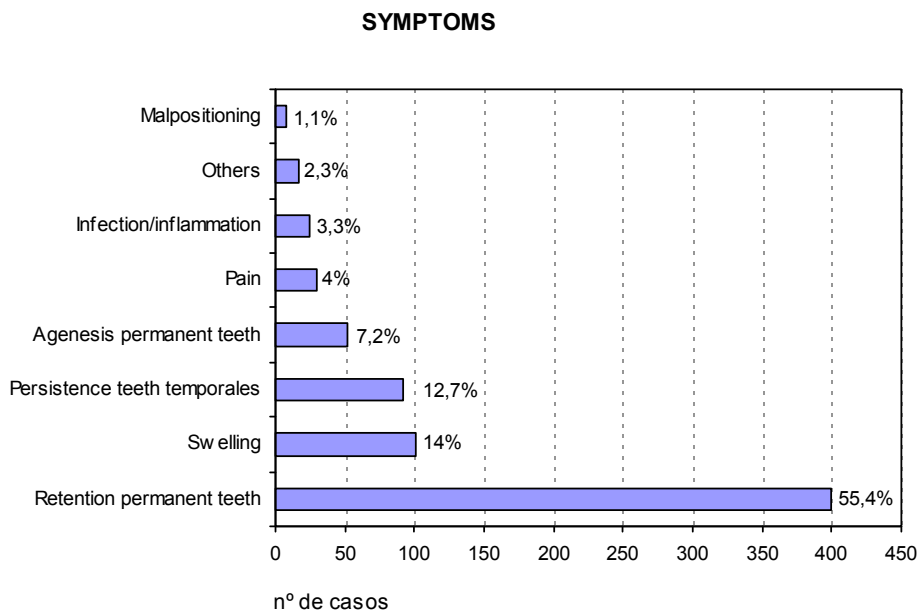


Fig. 3. Predominant clinical manifestations.

mandible, the location of the lesions could be established in 71.3% of the cases: 44.4% were located in the anterior region, 40.6% in the posterior region, and 15% in the middle sector (Fig. 2).

In 1000 cases we could correlate the type of odontoma to the location of the lesion. Of these tumors, 36.8% were complex and 63.2% compound odontomas. Among the former, 53.8% were located in the upper maxilla and 46.2% in the mandible, while in the case of the compound lesions, 59.5% were found in the upper maxilla and 40.5% in the mandible.

As regards the clinical manifestations, the lesions could only be classified as either symptomatic or asymptomatic in 1045 cases. Specifically, symptoms were recorded in 57.1% of cases, while 42.9% of the lesions caused no symptoms.

The most frequent clinical manifestations were the retention of permanent teeth (in 55.4% of the patients and more often in the anterosuperior sector); swelling (14%); the persistence of temporal teeth in the mouth (in 12.7%, and more often in the anterosuperior sector); agenesis of permanent teeth (7.2%); pain (4%); infection or inflammation (3.3%); dental malpositioning (1.1%); and other nonspecified manifestations (2.3%)(Fig. 3).

Management was analyzed in 77 cases, and in all cases consisted of surgical removal of the odontoma. Local anesthesia was used in 94% of the cases, and general anesthesia in 6%. The need for posterior orthodontic treatment was only cited in 7 cases.

Discussion

Odontomas account for a large percentage of all odontogenic tumors. A number of studies have examined large series of these tumors, and odontomas have been identified as the most frequent lesions. Buchner et al. (13) in 2006 examined a sample of 1088 odontogenic tumors, in which odontomas accounted for 75.9% of the total. Previously, in 2002, Ochsenius et al. (14) analyzed a sample of 362 odontogenic tumors in which odontomas represented 44.7%. In the year 1997, Mosqueda et al. (15) evaluated a series of 349 odontogenic tumors, of which 34.6% corresponded to odontomas.

Odontomas have been the subject of many studies, some involving a large number of cases, such as the group analyzed by Philipsen et al. (16) in 1997 (with 134 cases), or the study published by Hisatomi et al. (17) in 2002 (with 107 cases).

Since odontomas represent a large proportion of these lesions, adequate knowledge of their characteristics is necessary in order to establish correct diagnosis and treatment.

There is no consensus among the different authors as regards gender predilection. In effect, while some studies have reported a greater incidence in females (2,14,16,17), other authors report a higher incidence in males (12,13,18-

20). Some studies in turn report no differences between males and females (3,4,15,21), in coincidence with the results of our own group of patients. Studies involving large series of odontomas in which patient gender could be correlated to the type of odontoma have yielded no significant findings, though in our review a slight male predilection for compound odontomas was observed, while complex odontomas were slightly more common in females (14,16,18,21).

Regarding patient age at the time of diagnosis, odontomas can be identified at any age, though most authors report a peak incidence in the second decade of life – in coincidence with our own observations (4,12,17,20,21). There are no significant differences between males and females (3,12,16), though discrepancies are seen in patient age at the time of diagnosis as regards the type of odontoma. Some authors such as Amado et al. (3), Hisatomi et al. (17), Ochsenius et al. (14) or Patiño et al. (4) have found compound odontomas to be diagnosed at an earlier age, in contradiction to other investigators such as Miki et al. (20), who found complex odontomas to be diagnosed at a comparatively earlier age. The results of our series coincide with those of most authors, whereby compound odontomas are diagnosed at an earlier age than complex lesions.

As to the frequency of the different types of odontomas, we observed a clear predominance of compound lesions over complex odontomas, in coincidence with practically all the consulted sources (22,13,16).

In relation to tumor location, most studies report a clear predominance of the upper maxilla with respect to the mandible, in coincidence with our own observations (3,14,16,18,19,22). As to the anatomical region involved, the tendency to manifest in the anterior sector appears to be supported by the rest of authors, followed in descending order of frequency by the posterior zone and middle zone, in both the upper maxilla and in the mandible. Thus, the most common distribution comprises the anterosuperior region, anteroinferior zone and posteroinferior sector, in descending order (3,4,12-14,16-18,21,22).

Odontomas are benign tumors that usually produce no symptoms. As a result, they normally constitute casual findings in X-ray studies indicated for other reasons. In our review, 57% of the total odontomas generated symptoms, in agreement with the observations of most authors (2-4,22). The most common symptoms are the retention of permanent teeth, in which the odontoma impedes eruption (2,3). In such cases, the upper incisors and canines are the most commonly affected teeth (2,8,21,23,24), since the anterosuperior sector is where most odontomas are found. The appearance of a palpable tumor lesion is much less common. It is important to know that these two symptoms represent practically all the clinical manifestations of odontomas (22). There are other manifestations, though only of a very sporadic nature, such as the agene-

sis of permanent teeth, pain, inflammation or infection (2,4,6-8,21-23,25).

In most cases, the reason for patient consultation was a delay in the eruption of some permanent tooth, associated or not to persistence of the temporal tooth, or even to the presence of diastemas (4,8,23,26,27). If not diagnosed, they may remain in the mouth in an intrabony location for years, without causing symptoms of any kind (3).

The treatment of choice according to most consulted authors is surgical extraction, since the odontoma may interfere with eruption of the permanent tooth, displace the adjacent teeth, or give rise to a dentigerous cyst (4). Such treatment is carried out under local or general anesthesia. However, local anesthesia with an intrabuccal approach is clearly the predominant option (3,4,8,23). The resected odontoma should be submitted for histological study, to confirm the diagnosis (3,8,23).

In general, the prognosis of these tumors is very favorable, with a scant tendency towards relapse.

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