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Odontogenic tumors in Thailand: A study of 590 Thai patients

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ABSTRACT

Objective: This paper studies the relative frequencies and the clinicopathologic features of odontogenic tumors in Thailand, and compares these data with previously published reports from other parts of the world.
Materials and methods: The files of the Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Mahidol University, Bangkok, Thailand, served as source material for this study. A total of 590 cases of odontogenic tumors were identified out of 4808 biopsy specimens from a 34-year period, 1973–2006. Clinical data (sex, age, tumor site, signs and symptoms, radiographic features, clinical diagnosis) and histopathologic diagnoses were obtained from the biopsy submission forms when available and they were reviewed and analyzed.
Results: Odontogenic tumors were identified in 12.3% (590/4808). There were 586 benign tumors (99.2%) and 4 malignant tumors (0.7%). The most common was ameloblastoma, solid/multicystic type (35.0%), followed by keratocystic odontogenic tumor (24.2%) and odontoma (15.2%), respectively. Differences in the relative frequencies of odontogenic tumors were found among various ethnic groups.
Conclusions: There is geographic or racial variation in the relative frequencies of odontogenic tumors. These differences may be due to genetic (ethnic) and/or environmental (geographical) variations. Further studies based on molecular levels are needed. The clinicopathologic features of the common odontogenic tumors in Thailand generally agree with the literature.

1. Introduction

Odontogenic tumors are lesions derived from epithelial, ectomesenchymal and/or mesenchymal elements that still are, or have been, part of the tooth-forming apparatus [1]. In other words, odontogenic tumors are lesions that arise from the dental lamina or any of its derivatives. As a group, odontogenic tumors are uncommon lesions, and malignant odontogenic tumors are rare [2]. Because of the diversity of odontogenic tumors, several histologic classification schemes have been published in an attempt to define their diagnostic criteria and biologic behavior. At present, most investigators classify these lesions according to the criteria in the 1992 World Health Organization (WHO) histologic classification of odontogenic tumors [3]. In 2005, WHO published the latest (third) edition of the histologic classification of odontogenic tumors, which divides these tumors into those composed of odontogenic epithelium, those composed of odontogenic epithelium with odontogenic ectomesenchyme, and those composed of mesenchyme and/or odontogenic ectomesenchyme [1].

In the United States, odontogenic tumors constitute about 9% of all tumors of the oral cavity and 2.4% of all lesions biopsied in dental offices. By contrast, in some parts of Africa, one odontogenic tumor alone (ameloblastoma) constitutes more than 25% of all tumors of the jaws. Thus the incidence of this group of lesions clearly demonstrates geographic variation [4]; these geographic differences may lead to clues concerning the cause(s) of these lesions.

There is a paucity of information on geographic or racial variation in the incidence and prevalence of these tumors. However, several reports have documented the relative frequency of these tumors in different countries: Regezi et al. [5], 706 cases in the United States (1978); Buchner et al. [6], 1088 cases in the United States (2006); Daley et al. [7], 445 cases in Canada (1994); Mosqueda-Taylor et al. [8], 349 cases in Mexico (1997); Ochsenius et al. [9], 362 cases in Chile (2002); Tamme et al. [10], 75 cases in Estonia (2004); Günhan et al. [11], 409 cases in Turkey (1990);

☆ Asian AOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

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Odukoya [12], 289 cases in Nigeria (1995); Adebayo et al. [13], 318 cases in Nigeria (2005); and Lu et al. [14], 759 cases in China (1998). The clinicopathologic features of odontogenic tumors have been well characterized in the literature [15–27,29–37].

To the best of the authors' knowledge, there is only one report on the relative frequency of odontogenic tumors in Thailand in the English-language literature [38] and only a few reports on the clinicopathologic features of ameloblastomas in Thai patients have been published in Thai dental journals [39–41]. The purpose of this study was to determine this information, and to compare these data with previously published reports from other parts of the world to see if there are any differences.

2. Materials and methods

The files of the Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Mahidol University, Bangkok, Thailand, served as source material for this study. A total of 590 cases of odontogenic tumors were identified out of 4808 biopsy specimens from a 34-year period, 1973–2006. Odontogenic tumors were classified according to the criteria in the 2005 World Health Organization (WHO) histologic classification of odontogenic tumors.

Clinical information – including sex, age, tumor site, signs and symptoms, radiographic features, clinical diagnosis, and histologic diagnosis – was obtained from the biopsy submission forms when available.

For tumor site, the following scheme was used. The maxilla was divided into two anatomic regions: anterior (from the distal surface of the right canine to the distal surface of the left canine) and posterior (from the mesial aspect of the first premolar to the tuberosity). The mandible was divided into four anatomic regions: anterior (from the distal surface of the right canine to the distal surface of the left canine), posterior (from the mesial aspect of the first premolar to the distal side of the third molar), ramus (from the distal aspect of the third molar distally), and angle (the inferior portion of the ramus adjacent to the angle of the mandible).

The histologic slides were 6-μm paraffin sections stained with hematoxylin and eosin. The histopathologic diagnosis was obtained after microscopic study of at least one representative section from each case. Histochemical and immunohistochemical stains were used in equivocal cases. Odontogenic myxoma/myxofibroma may be histologically confused with other myxoid jaw tumors and myxoid change in an enlarged dental follicle or the dental papilla of a developing tooth. In odontogenic myxoma/myxofibroma, the ground substance is histochemically positive for Alcian blue. Immunohistochemically, the myxoma cells show diffuse immunoreactivity with antibodies directed against vimentin, with focal reactivity for muscle-specific actin. All slides were reviewed, diagnosed and reclassified according to the criteria for odontogenic tumors included in the 2005 World Health Organization classification of head and neck tumors [1].

This research was approved by the Ethics Committee of Mahidol University.

Descriptive statistics were used to analyze the clinicopathologic features of odontogenic tumors in order to determine the frequency and percentage. A chi-square test was used to test the association or homogeneity of the clinicopathologic features of various types of odontogenic tumors. All data were analyzed using the Statistical Package for the Social Sciences, version 17.0 (SPSS Inc., Chicago, IL, USA). Statistical significance was considered at P-value < 0.05.

3. Results

Odontogenic tumors were found in 12.3% (590/4808) of the total biopsy specimens. There were 586 benign tumors (99.2%) and 4 malignant tumors (0.7%). The most common was ameloblastoma, solid/multicystic type (35.0%), followed by keratocystic odontogenic tumor (24.2%), odontoma (15.2%), calcifying cystic odontogenic tumor (6.3%), adenomatoid odontogenic tumor (3.9%), ameloblastoma, unicystic type (3.7%), central odontogenic myxoma/myxofibroma (3.0%), cementoblastoma (1.9%), and ameloblastoma, desmoplastic type (1.4%). Each of the remaining types of tumor comprised less than 1.0% (Table 1).

In the present study, ameloblastoma, solid/multicystic type, keratocystic odontogenic tumor, odontoma, and calcifying cystic odontogenic tumor occurred in large enough numbers to draw some valid conclusions and the clinicopathologic features of these tumors were as follows:

Ameloblastoma, solid/multicystic type was more common in males than females (male:female ratios, 1.3:1); whereas keratocystic odontogenic tumor, odontoma (complex type), odontoma (compound type), and calcifying cystic odontogenic tumor were more common in females than males (female:male ratios, 1.04:1, 1.3:1, 1.6:1, and 1.5:1, respectively) (Table 1).

The ages of patients with ameloblastoma, solid/multicystic type, keratocystic odontogenic tumor, and calcifying cystic odontogenic tumor ranged from 5 to 76, 7 to 82, and 8 to 72 years, respectively, with means ± SD of 31.98 ± 15.39, 32.04 ± 15.97, and 29.64 ± 15.91 years, respectively; peak age frequency was in the third decade (34.8, 26.6, and 35.1%, respectively). The ages of patients with odontoma, complex type and compound type, ranged from 10 to 63 and 4 to 71 years, with means ± SD of 25.72 ± 14.04 and 21.32 ± 15.92 years, respectively; peak age frequency was in the second decade (39.1 and 51.2%, respectively) (Table 1).

Ameloblastoma, solid/multicystic type, most commonly occurred in the posterior/ramus (36.2%) and posterior (27.1%) regions of the mandible (mandible:maxilla ratio, 11.2:1). Keratocystic odontogenic tumor showed a predilection for the posterior region of the mandible (24.5%) (mandible:maxilla ratio, 1.7:1). Most of the odontoma, complex type, occurred in the posterior region of the mandible (33.3%) (mandible:maxilla ratio, 1.2:1). In contrast, odontoma, compound type, was most frequently found in the anterior region of the maxilla (46.3%) (mandible:maxilla ratio, 0.6:1). Calcifying cystic odontogenic tumor most commonly occurred in the anterior region of the mandible or the maxilla (35.1 and 32.4%, respectively) (mandible:maxilla ratio, 1.1:1) (Table 2).

Most of the patients with ameloblastoma, solid/multicystic type, keratocystic odontogenic tumor, and calcifying cystic odontogenic tumor presented with painless swelling (58.0, 30.1, and 64.9%, respectively). Most odontomas, complex type and compound type, showed no signs and symptoms (45.8 and 65.9%, respectively) (Table 3).

Ameloblastoma, solid/multicystic type mostly appeared as multilocular radiolucent lesions (41.1%), with unspecified radiographic features (43.0%). Keratocystic odontogenic tumor mostly appeared as unilocular radiolucent (54.5%), with 28.7% having unspecified radiographic features; lesions that appeared as multilocular radiolucent were found in only 16.8%. Calcifying cystic odontogenic tumor was mostly unilocular radiolucent (35.1%), followed by mixed radiolucent–radiopaque (27.0%); 35.1% had unspecified radiographic features. Odontoma (complex type) and odontoma (compound type) presented similar radiographic features: radiopaque was the most common (58.3 and 43.9%, respectively), followed by mixed radiolucent–radiopaque (4.2 and 34.1%, respectively); 37.5 and 22.0%, respectively, had unspecified radiographic features; and none of them were radiolucent (Table 4).

Geographic or racial variation in the relative frequencies of odontogenic tumors was shown. Odontoma was the most common in North America, South America, and Europe but ameloblastoma was the most common in Africa and Asia (Table 5).