

Intra-osseous lesions in Greek children and adolescents. A study based on biopsy material over a 26-year period

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Objective: The purpose of this retrospective study was to investigate the spectrum of oral intra-osseous lesions in a Greek population, consisting of children and adolescents under 18 years of age.

Material and Methods: Data was obtained from the histopathological reports that accompanied biopsy request forms, which were retrieved from the files of the Oral Pathology Department, Faculty of Dentistry, University of Athens, during a 26-year period. A retrospective analysis with respect to patients' age and gender, frequency and location of the lesions was performed. The lesions were classified into cystic (odontogenic and non-odontogenic) and solid lesions (odontogenic and non-odontogenic). The patients were divided into three age groups: a) 0-6 years old, b) 7-12 years old and c) 13-18 years old. *Results:* 474 intra-osseous lesions were detected and represented 2,38 % out of a total of 19933 biopsies. Male/female ratio was 1,25/1. The majority of the lesions was located in the mandible (49,8%) and occurred in the third age group of patients (58,7%). Odontogenic cysts represented the most frequent intraosseous lesion (64,1%) followed by non-odontogenic solid lesions representing 22,5% of the intra-osseous population. The most frequently encountered lesions in descending order were radicular (36,3%) and dentigerous (18%) cysts, keratocysts (9,5%), apical granulomas (7,6%), odontomas (6%) and fibrous dysplasia (5%). Only 6 malignant lesions were reported (1,3%).

Conclusions: This clinicopathologic study revealed that a broad spectrum of mostly benign bony lesions may occur during childhood.

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INTRODUCTION

Bony enlargements of the jaws may encompass a broad spectrum of entities. Anatomic variants, inflammatory and reactive lesions, tumor-like growths, cysts, odontogenic, non-odontogenic lesions and neoplasms, constitute a heterogeneous group of pathologic entities, which can be seen in children and adolescents¹⁻²

During the last decade, numerous studies dealing with the incidence, clinical features and guidelines for the management of oral and maxillofacial lesions in children have been conducted.³⁻⁹ Most of this data refers to racial and geographical differences with regard to oral lesions in children from various countries.^{5,7,10-13} Therefore in this retrospective study, analysis of intra-osseous oral lesions in a population of pediatric patients from Greece (homogenous white Caucasians) is attempted in order to determine the most commonly occurring bony lesions in this age group. Data regard-

ing patient's gender and age as well as site predilection of the lesions are also evaluated.

MATERIALS AND METHODS

A total of 19,933 histopathologically diagnosed cases of oral and maxillofacial lesions were retrieved from the files of the Oral Pathology Department, Faculty of Dentistry, University of Athens. The Oral Pathology Department of the Dental School of the University of Athens is in close proximity to the two major Pediatric Hospitals of the central and southern country. Thereby it receives and handles a significant number of pediatric oral biopsies.

These biopsies were performed during a 26-years period from 1976 to 2002. A total number of 1515 biopsy specimens referred to patients aged from 6 months to 18 years that were divided into three major age groups: 0-6, 7-12 and 13-18 years.

The 1515 cases included intra-osseous (474 cases) and soft tissue lesions (1041 cases). Intraosseous lesions were classified into two major categories: cystic (odontogenic and non-odontogenic) and solid lesions (odontogenic and non-odontogenic). Non-odontogenic lesions were also subdivided into inflammatory diseases, benign fibro-osseous lesions, central giant-cell granulomas, benign mesenchymal tumors and malignant neoplasms.

RESULTS

474 intra-osseous lesions were analyzed and represented 2,38% out of a total of 19,933 biopsies. Male to female ratio was 1,25/1. The majority of the lesions (58,7%) occurred in the oldest age group of patients (Table 1) and was predominantly located in the mandible (49,8%). The lesions most frequently encoun-

Table 1. Frequency of intraosseous lesions according to age group and gender

Patient's age (years)	Gender M/F	Number of intraosseous lesions	% Intraosseous population (474 cases)	% Pediatric population (1515 cases)
0-6	13/11	24	5%	1,6%
7-12	106/66	172	36,3%	11,4%
13-18	144/134	278	58,7%	18,4%
Total	263/211	474	100%	31,3%

Table 2. Type and prevalence of intraosseous lesions

Classification of lesions	Number of lesions	% Intraosseous population	% Pediatric population
Cystic lesions	318	67,1%	21%
<i>Odontogenic</i>	304	64,1%	20%
<i>Non-odontogenic</i>	14	3%	1%
Solid lesions	156	33%	10,3%
<i>Odontogenic</i>	49	10,3%	3,2%
<i>Non-odontogenic</i>	107	22,5%	7%
Total	474	100%	31,3%

tered were odontogenic cysts (64,1%), and in descending order radicular (36,3%), dentigerous (18%) and keratocysts (9,5%). (Tables 2,3) Solid lesions represented 33% of the intra-osseous population and included of 22,5% non-odontogenic, and 10,3% odontogenic lesions. (Tables 2,4,5)

Table 3. Type and prevalence of cystic lesions

Type of cystic lesion	Number of lesions	% Intraosseous population	% Pediatric population
Odontogenic	304	64,1%	21%
<i>Radicular</i>	172	36,3%	11,4%
<i>Dentigerous</i>	86	18%	5,7%
<i>Keratocyst</i>	45	9,5%	3%
Calcifying odontogenic	1	0,2%	0,07%
<i>Non-odontogenic</i>	14	3%	1%
<i>Aneurysmal</i>	5	1,05%	0,3%
<i>Solitary bone</i>	4	0,85%	0,26%
<i>Incisive canal</i>	4	0,85%	0,26%
<i>Median mandibular</i>	1	0,2%	0,07%
Total	318	67,1%	21%

Table 4: Type and prevalence of solid non-odontogenic lesions

Type of solid non-odontogenic lesion	Number of lesions	% Intraosseous population	% Pediatric population
Inflammatory	43	9%	2,9%
<i>Periapical granuloma</i>	36	7,6%	2,4%
<i>Osteomyelitis</i>	7	1,5%	0,46%
Fibro-osseous lesions*	30	6,3%	2%
<i>Fibrous dysplasia</i>	24	5%	1,6%
<i>Ossifying fibroma</i>	4	0,84%	0,26%
<i>Periapical cemental dysplasia</i>	1	0,2%	0,07%
Central giant cell granuloma	20	4,2%	1,3%
Benign mesenchymal tumors	8	1,7%	0,5%
<i>Osteoma</i>	4	0,84%	0,26%
<i>Hemangioma</i>	2	0,4%	0,1%
<i>Benign osteoblastoma</i>	1	0,2%	0,06%
<i>Neurofibroma</i>	1	0,2%	0,06%
Malignant neoplasms	6	1,26%	0,4%
<i>Langerhans cell disease</i>	3	0,6%	0,2%
<i>Osteosarcoma</i>	2	0,4%	0,1%
<i>Ewing's sarcoma</i>	1	0,2%	0,06%
Total	107	22,5%	7%

*According to the classification of benign fibro-osseous lesions by Waldron, 1993 (24)

Table 5: Type and prevalence of solid odontogenic lesions

Type	Number of lesions	% Intraosseous population	% Pediatric population
<i>Odontoma</i>	28	6%	1,85%
<i>Ameloblastoma</i>	10	2%	0,66%
<i>Ameloblastic fibroma</i>	3	0,6%	0,2%
<i>Ameloblastic odontoma</i>	3	0,6%	0,2%
<i>Adenomoid odontogenic tumor</i>	2	0,4%	0,13%
<i>Odontogenic myxoma</i>	2	0,4%	0,13%
<i>Odontogenic fibroma</i>	1	0,2%	0,06%
Total	49	10,3%	3,23%

Jaw tumors are rather infrequent in pediatric populations.^{5,6,14} In the present study, 1,515 pediatric cases comprising 7,6% out of a total number of 19,933 biopsies submitted between the years 1976-2002, were retrieved. This percentage of pediatric cases is much lower compared to some reports^{3,4,8,10,12,13} but comes in agreement with other studies,^{5,7,11} despite the different parameters used. Of the 1515 cases occurring in children and adolescents under the age of 18 years, 474 (31,3%) were intra-osseous lesions while the remaining 1,041 (68,7%) represented soft tissue lesions¹⁵.

The patient's age ranged from 6 months to 18 years and three age groups were defined: 0-6 years, 7-12 years and 13-18 years. The great majority of the lesions (58,65%) occurred in the third age group and included cystic lesions (178/318 cases, 55,6%), non-odontogenic lesions (69/107 cases, 64,5%) and odontogenic tumors (31/49 cases, 63,3%). The mandible was most commonly affected (49,8%) which is in agreement with the findings of Tanaka.⁶

Male to female ratio was 1,25:1. It should be noted that this ratio refers only to intra-osseous lesions, which was the subject of this survey. A considerable number of studies in the literature also report a slight predominance of boys regarding oral, soft tissue and intra-osseous, lesions,^{3,13,16-19} while some studies report equal sex distribution between boys and girls.^{6,9}

The most frequent lesions were cystic in origin (318/474, 67%). Cystic lesions are common in the pediatric populations regardless of race or origin.^{5,10,12,20} The majority of the cystic lesions in the present study (56,7%) occurred in the mandible, which is in agreement with the findings of other researchers.^{5,10} Bodner *et al*,¹⁸ on the other hand, reported that cystic lesions affect equally both jaws. Radicular cysts represented 36,3% of all cystic lesions followed by dentigerous and odontogenic keratocysts. Other studies reported that dentigerous cysts occur more frequently than radicular.^{5,10,18}

The view that most pediatric jawbone lesions are non odontogenic in origin^{11,14,16} does not apply in the present study because 74,5% of the intra-osseous lesions (353/474 cystic and solid lesions) were odontogenic. Other reports in the literature also seem to support our findings.^{4,5}

The most common solid non-odontogenic lesion was periapical granuloma (36/107 cases) representing 2,4% of the total number of pediatric lesions (soft tissue and bony), which was lower than the percentage reported by others.^{5,10} It is noteworthy that fibrous dysplasia represented the second most frequent of all lesions in this category (1,6%). This observation comes in agreement with the findings of Chen *et al*.⁵ The third most frequent lesion was central giant cell granuloma, a finding that contrasts a study by Al-Khateeb *et al*.¹³ The maxilla was found to be slightly more frequently affected than the mandible in the category of solid non-odontogenic

lesions, which disputes the report of Al-Khateeb *et al*.¹³

Among the solid odontogenic lesions, odontomas and ameloblastomas were more frequently encountered. Chen *et al*,⁵ and Sato *et al*,⁴ have reported similar results. The most frequently occurring solid odontogenic lesions were odontomas, which were also observed by other authors.^{8,9} Despite the rarity of bony myxoma in pediatric populations,²¹ in our study 2 cases (out of 49 odontogenic tumors) of odontogenic myxomas were found. Solid odontogenic lesions were found to equally affect the maxilla and the mandible. In Jordanian children a higher frequency of odontogenic tumors was reported in the maxilla,¹³ while a slightly higher frequency of odontogenic tumors was noticed in the mandible in Japanese⁴ and Nigerian children.

In our study, the majority of the lesions were benign (468 cases, 98,7%) and only 6 (1,3%) malignant. This finding comes to confirm previously published data referring to a high percentage of benign oral and maxillofacial tumors among children and adolescents.^{3,4,6,7,13} In the present study Langerhans cell histiocytosis was the most common malignant lesion (0,6%), which is consistent with the findings of other researchers.^{5,9,22} The remaining 3 malignancies consisted of 2 osteosarcomas (0,4%) and 1 Ewing's sarcoma (0,2%). In reports on Nigerian^{3,23} and Tanzanian¹⁷ children populations, Burkitt's lymphoma was the most frequent malignant tumor. Sarcomas on the other hand, are reported to be the most frequent malignant tumors in Jordanian⁸ and Asian children.⁴

This clinicopathologic study revealed that a broad spectrum of intra-osseous lesions occur during childhood. The histopathological type, the age, sex and location of oral bony lesions in Greek children and adolescents exhibited similarities and differences compared to other studies which can be partly explained by racial and geographical differences.

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