

Original Article

Odontogenic tumors in Iran, Isfahan: A study of 260 cases

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ABSTRACT

Background: The aim of this study was to record the relative frequency of odontogenic tumors (OTs), evaluate and analyze the epidemiological features of the lesions in patients referring to dental faculty of Isfahan and compare these data with previous studies.

Materials and Methods: In this study, we reviewed the records of 6,860 lesions from 1988 to 2010 archived in the oral pathology department of dental faculty of Isfahan retrospectively and using criteria for histological typification published by the WHO in 2005. Age, sex, site and extent of tumors were analyzed.

Results: Among recorded lesions 260 were OTs (3.79%). Of these, 259 were benign and just 1 was malignant. The most common lesions were ameloblastomas ($n = 95$) followed by odontomas ($n = 86$), odontogenic myxomas ($n = 24$) and others. There were a few more female patients ($n = 133, 51.15\%$) than male and the mean age of patients was 27.8 years (range 1.5-80 years).

The posterior of mandible was the most common site ($n = 86, 33\%$).

Conclusion: According to accumulated data, odontogenic tumors are uncommon lesions and malignant tumors are very rare.

Key Words: Ameloblastoma, odontogenic lesions, odontogenic tumors, odontoma

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INTRODUCTION

Odontogenic tumors (OTs) are a group of heterogeneous lesions derived from epithelial and/or mesenchymal elements that are part of the tooth forming apparatus.^[1] Although, some of them represent hamartomas, there are many others that are true benign and malignant neoplasm with different degrees of aggressiveness.^[2] OTs are rare lesions of the mandible and maxilla that must be considered as a differential diagnosis of lesions that occur in the jaws.^[3] In humans, OTs comprises about 1% of all jaw tumors,^[4] and are located mainly in the maxilla and mandible, and occasionally in the gingiva.^[5,6] In 1971, the first

edition to classify this group of lesions was published by the World Health Organization (WHO)^[7] and in 2005 a revised third edition was done.^[8]

There are not enough reports, to our knowledge, on OTs in Iranian population, thus our analyses of OT in Isfahan population could provide useful additional data to the literature.

This study evaluates the relative frequency of odontogenic tumors recorded at the Dental faculty of Isfahan, Iran over a period of 23 years (1988-2010) and compares these data with other parts of the world.

MATERIALS AND METHODS

This study is a descriptive and cross-sectional research. We reviewed 6,860 samples of oral and biopsy from the patient records of the oral pathology service, Dental faculty of Isfahan, Iran over a 23-year period (1988-2010). Data were analyzed for age, gender, tumor site and histopathologic typing according to 2005 WHO classification. Those cases

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lacking information about one of the above features were documented in a new column in their relative table. We divided OTs in to 2 major groups based on WHO classification: benign and malignant.

The jaw was divided in to 3 areas: Anterior region (from canine to canine), posterior region (posterior to the canine) and anterior posterior region, posterior area of the mandible included the ascending ramus. Data was analyzed by the SPSS for windows (version 13.0) statistical software package.

RESULTS

We found 260 cases of oral cavity and jaw lesions referred to oral pathology laboratory of Dental faculty of Isfahan, Iran during this 23-year period were OTs, which constituted 3.79 % of these lesions. 259 were benign and only 1 was malignant which was ameloblastic carcinoma.

With regard to benign tumors, there were 126 males and 133 females. Benign tumors presented a male: female ratio of 1:1.05 and that one malignant tumor was found in 26-year-old male.

Table 1 shows the frequency and gender distribution of odontogenic tumors listed based on WHO classification of odontogenic tumors. It reveals 0.4% of all tumors were malignant and 99.6% were benign. The most prevalent tumor was ameloblastoma followed by odontoma and myxoma.

Table 1: Frequency and gender distribution of odontogenic tumors listed by diagnostic type, WHO classification of odontogenic tumors

Tumors	Total		Female		Male	
	n	%	n	%	n	%
Benign						
Odontoma	86	33	44	51.1	42	48.9
Ameloblastoma	95	36.5	51	53.7	44	46.3
Ameloblastic fibro odontoma	17	6.5	7	41.1	10	58.9
Cementifying fibroma	1	0.4	1	100	-	-
Ameloblastic fibroma	2	0.8	2	100	-	-
Calcifying epithelial odontogenic tumor	2	0.8	1	50	1	50
Odontogenic fibroma	11	4.2	4	36.4	7	63.6
Odontogenic myxoma	24	9.2	14	58.3	10	41.7
Fibromyxoma	2	0.8	-	-	2	100
Squamous odontogenic	2	0.8	2	100	-	-
Adenomatoid odontogenic tumor	17	6.6	7	41.2	10	58.8
Malignant						
Ameloblastic carcinoma	1	0.4	-	-	1	100
Total	260	100	133	51.1	127	48.9

Table 2 shows the mean age of this patient population is 27.8. Most cases ($n = 179$) were found in the second, third and fourth decades, with the peak in the second decade (32.3%). The most prevalent OT arose in the second decade of life was odontoma (29.8%), following by ameloblastoma (27.4%), AOT (16.7%), and myxoma (10.7%).

Table 3 shows the distribution of benign and malignant OT based on their location. The mandible was more common site, with the ratio of 3.42:1. The posterior region of the mandible and the anterior region of the maxilla were the most frequent affected area, that 33% and 10.4% of all tumors were appeared there, respectively. The anterior zone was the most common involved area for each OTs that occurred in the maxilla, with the one exception of fibromyxoma.

Ameloblastic carcinoma, ameloblastic fibroma and squamous odontogenic tumor were only detected in the mandible. 91.6% of the ameloblastoma were affected the mandible and most frequently the posterior zone; besides, odontoma and odontogenic myxoma were mostly occurred in the posterior area of mandible, 30.2% and 20.8%, respectively. Cases of odontogenic tumors which affected both area of each jaw, anterior and posterior, were odontoma and ameloblastoma.

Table 4 gather prevalence of all histopathologic types of OTs from different studies and compare them with our study. In the Ochsenius series, Fernandes series and Saghravanian series we can notice the referrals from other places.

DISCUSSION

There are a few numbers of published studies that reveal about odontogenic tumors, besides based on our information there is just one comprehensive related survey in our country, which was done in Mashhad,^[9] so this made us to plan this survey in another state of our country in order to collect more reasonable data source about odontogenic tumors incidence in Iran.

In the present study we made the comparison the Saghravanian,^[9] Fernandes,^[10] Ochsenius,^[11] Ledeinde,^[12] Adebayo,^[13] Olgac^[14] and Lu^[15] series.

In this study, OTs found as an infrequent lesions (3.79%) among jaw and oral biopsies, which is similar to many published series^[9,10,11,14] and different with some others which carried out in Nigeria^[12,13] that OTs represent 9.6% and 32% of all oral lesions, respectively.

Table 2: Age distribution of 260 odontogenic tumors

Tumors	Total	Age (years)										Mean age+SD** (Yrs)	Age range (Yrs)
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	+70	NS*			
Odontoma	86	4	25	28	9	8	7	1	-	4	26.7±14	3.5-63	
Ameloblastoma	95	6	23	23	13	14	5	4	2	5	33.9±19.4	1.5-80	
Ameloblastic fibro odontoma	17	4	6	4	2	-	-	-	1	-	20±17.7	1.5-76	
Cementifying fibroma	1	-	-	1	-	-	-	-	-	-	29	29	
Ameloblastic carcinoma	1	-	-	1	-	-	-	-	-	-	26	26	
Ameloblastic fibroma	2	1	1	-	-	-	-	-	-	-	12.5±3.5	10-15	
Calcifying epithelial odontogenic tumor	2	-	1	1	-	-	-	-	-	-	21.5±7.7	16-27	
Odontogenic fibroma	11	-	4	2	2	-	3	-	-	-	30.6±17.7	11-58	
Odontogenic myxoma	24	3	9	2	5	3	-	1	-	1	22.2±14.7	9-65	
Fibromyxoma	2	-	1	-	1	-	-	-	-	-	31±24	14-48	
Squamous odontogenic tumor	2	2	-	-	-	-	-	-	-	-	9	9	
Adenomatoid odontogenic tumor	17	-	14	-	1	-	1	-	-	1	20.6±10.8	12-54	
Total	260	20	84	62	33	25	16	6	3	11	27.8±17	1.5-80	

NS*: Not specified, SD**: Standard deviation

Table 3: Distribution of 260 benign and malignant tumors by location

Tumors	Maxilla			NS	Total, n (%)	Mandible			NS	Total, n (%)	NS, n (%)
	Ant	Post	Ant-post			Ant	Post	Ant-post			
ODT	15	10	1	3	29 (33.7)	6	26	4	15	51 (59.3)	6 (7)
AME	-	-	-	2	2 (2.1)	5	39	9	34	87 (91.6)	6 (6.3)
AFO	1	-	-	1	2 (11.8)	2	4	-	8	14 (82.3)	1 (5.9)
CF	-	-	-	-	-	-	-	-	-	-	1 (100)
AMC	-	-	-	-	-	-	-	-	1	1 (100)	-
AF	-	-	-	-	-	-	2	-	-	2 (100)	-
CEOT	-	-	-	-	-	-	-	-	-	-	2 (100)
OF	4	-	-	-	4 (36.4)	2	5	-	-	7 (63.6)	-
MYX	2	2	-	2	6 (25)	1	5	-	9	15 (62.5)	3 (12.5)
FMXX	-	1	-	-	1 (5)	-	1	-	-	1 (50)	-
SOT	-	-	-	-	-	-	2	-	-	2 (100)	-
AOT	5	-	-	5	10 (58.9)	1	2	-	2	5 (29.4)	2 (11.7)
Total	27	13	1	13	54	17	86	13	69	185	21

NS: Not specified, ODT: Odontoma, AME: Ameloblastoma, AFO: Ameloblastic fibro odontoma, CF: Cementifying fibroma, AMC: Ameloblastic carcinoma, AF: Ameloblastic fibroma, CEOT: Calcifying epithelial odontogenic tumor, OF: Odontogenic fibroma, MYX: Odontogenic myxoma, FMXX: Fibromyxoma, SOT: Squamous odontogenic tumor AOT: Adenomatoid odontogenic tumor

According to sex distribution, in this study the male to female ratio of 1:1.05 was found. In Saghravanian series^[9] it is 1:1.17, in Fernandes series^[10] it is 1:1.21, in Ochsenius series^[11] it is 1:1.16, in Olgac series^[14] it is 1:1.16, in Lu series^[15] it is 1:1.3, but in Ledeinde^[12] and Adebayo^[13] series the ratio was found 1.03:1 and 1.3:1, respectively. By all these studies we can conclude the equal sex predilection for odontogenic tumors.

These tumors were mostly detected in the mandible (3.42:1). In Nigeria^[12,13] and China^[15] this ratio was found 4.1:1, 4.4:1 and 3.2:1, respectively, which could be due to the greater prevalence of ameloblastoma. While another Iranian,^[9] Brazilian,^[10] Chilean^[11] and Turkish^[14] series showed a slight frequency for the mandible (2.4:1, 1.9:1, 1.1:1 and 1.9:1 respectively).

Ameloblastoma was the most common tumor in this study (36.5%) which is comparable with the reports in Iran; Mashhad,^[9] Brazil,^[10] Nigeria,^[12,13] Istanbul^[14] and China^[15] but, in contrast of studies in America,^[3] Canada^[16] and Chile.^[11] In latest series, odontoma was the most frequent tumor (73.8%, 45.8% and 44.7% respectively).

In our study, we considered on incidence of ameloblastoma of 35.7% to occur in the posterior site of mandible, while in other studies it shows major frequency in this area for this tumor.^[9,10,11,14]

We found odontoma as the second most frequent OT (33%) after ameloblastoma. Its prevalence is less than the result from Chile,^[11] USA^[3] and Canada^[16] but

Table 4: Comparison of the relative frequency of odontogenic tumors from selected references of different countries and this study

Tumors	Kowkabi <i>et al.</i> (Iran, Isfahan)		Saghravanian <i>et al.</i> (Iran, Mashhad)		Fernandes <i>et al.</i> (Brazil)		Ochsenius <i>et al.</i> (Chile)		Ladeinde <i>et al.</i> (Nigeria)		Adebayo <i>et al.</i> (Nigeria)		Olgac <i>et al.</i> (Istanbul)		Lu <i>et al.</i> (China)	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Benign																
Odontoma	86	33	44	26.7	85	24.91	162	44.7	8	2.5	7	2.2	109	20.6	51	6.7
Ameloblastoma	95	36.5	70	42.5	154	45.2	74	20.4	201	63	233	73.3	133	25.2	445	58.6
Ameloblastic fibro odontoma	17	6.5	5	3	1	0.3	6	1.7	-	-	1	0.3	-	-	2	0.3
Ameloblastic fibroma	2	0.8	4	2.4	6	1.76	2	0.6	6	2	10	3.1	8	1.5	14	1.8
Calcifying epithelial odontogenic tumor	2	0.8	3	1.8	4	1.17	2	0.6	5	1.6	3	1	5	0.9	7	0.9
Odontogenic fibroma	11	4.2	3	1.8	11	3.22	20	5.5	17	5.3	4	1.2	52	9.8	5	0.7
Odontogenic myxoma	24	9.2	15	9.1	31	9.1	32	8.8	21	6.5	38	11.9	83	15.7	64	8.4
Fibromyxoma	2	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Squamous odontogenic tumor	2	0.8	-	-	5	1.47	2	0.6	6	2	1	0.3	11	2	3	0.4
Adenomatoid odontogenic tumor	17	6.6	15	9.1	13	3.8	24	6.6	24	7.5	9	2.8	11	2	63	8.3
Clear cell odontogenic tumor	-	-	-	-	2	0.6	2	0.6	-	-	-	-	-	-	2	0.3
Odonto ameloblastoma	-	-	1	0.6	6	2	-	-	1	0.3	-	-	-	-	2	0.2
Calcifying odontogenic cyst	-	-	-	-	12	3.52	26	7.2	17	5.3	8	2.5	29	5.5	35	4.6
Benign cementoblastoma	-	-	5	3	8	2.35	6	1.7	2	0.6	-	-	10	1.9	20	2.6
Ameloblastic fibro dentinoma	-	-	-	-	-	-	2	0.6	-	-	-	-	12	2.2	-	-
Cementifying fibroma	1	0.4	-	-	-	-	-	-	-	-	-	-	39	7.4	-	-
Gigantiform cementoma	-	-	-	-	-	-	-	-	-	-	-	-	9	1.7	-	-
Cemento osseous dysplasia	-	-	-	-	-	-	-	-	-	-	-	-	3	0.5	-	-
Ameloblastic odontoma	-	-	-	-	-	-	-	-	-	-	-	-	7	1.3	-	-
Malignant																
Ameloblastic carcinoma	1	0.4	-	-	1	0.3	-	-	7	2.2	-	-	2	0.3	-	-
Clear cell odontogenic carcinoma	-	-	-	-	1	0.3	-	-	-	-	-	-	-	-	-	-
Odontogenic carcino sarcoma	-	-	-	-	-	-	1	-	1	0.3	-	-	1	0.1	-	-
Malignant ameloblastoma	-	-	-	-	-	-	-	-	1	0.3	-	-	-	-	24	3.2
Odontogenic carcinoma	-	-	-	-	-	-	-	-	-	-	3	1	-	-	6	0.8
Odontogenic sarcoma	-	-	-	-	-	-	-	-	-	-	1	0.3	-	-	-	-
Ameloblastic sarcoma	-	-	-	-	-	-	1	0.3	1	0.3	-	-	3	0.5	2	0.3
Primary intraosseous carcinoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	1.4
Malignant calcifying odontogenic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	0.4
Total	260	100.0	165	100.0	340	100.0	362	100.0	319	100.0	318	100.0	527	100.0	759	100.0

more than the results from Iran; Mashhad,^[9] Brazil,^[10] Nigeria,^[12,13] Turkish^[14] and China.^[15]

In the present study, male to female ratio for odontogenic myxoma was found 1:1.4 that is agree with Saghravanian,^[9] Lu,^[15] Fernandes^[10] and Olgac^[14] studies. With regard to myxoma, we did not found any gender predilection. This agreed with related contents

in oral and maxillofacial pathology textbook.^[17,18] Other studies of OT reported a female predilection.^[11-13,19-21]

In our study, ameloblastic fibro odontoma was more common (6.5%) than other reports.^[9-15]

Our findings show a mean age of 33.9 years for ameloblastoma, which is comparable with other reports^[9,10-13] which shows 38.5, 27.7, 37.4, 31.7,

29 years respectively for mean age.

In the present study, malignant tumors were rare (0.4% of the total OT). This rarity was also confirmed by studies in Iran; Mashhad,^[9] Brazil,^[10] Chile,^[11] Istanbul^[14] and America^[2,16] while in African^[12] and Chinese^[15] series we can see significantly higher frequency for malignant tumors (3.4% and 6.1% respectively). It should be mentioned that in 2005 WHO classification, odontogenic keratocyst has been renamed as keratocystic odontogenic tumor and COC classified as a tumor. However, some of the standard references in oral pathology still use the term OKC^[22,23] and definitely classify COC as a cyst,^[24] so we have not termed OKC and COC as tumor in this study.

CONCLUSION

In conclusion, this study shows odontogenic tumors are not common among oromaxillofacial lesions and malignant types are very rare. These tumors mostly occurred in posterior site of mandible and there is a slight prevalency for females. Also, most cases were found in second decade of life. These data are in correlation with those mentioned in Saghravani study in the other parts of Iran.^[9] So, maybe we can extent these findings to other site of our country, but for better understanding and perfect conclusion it seems more studies in other areas are necessary.

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