THE PATTERN OF BENIGN JAW TUMOURS IN A UNIVERSITY TEACHING HOSPITAL IN KENYA: 
(A 19-YEAR AUDIT)

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Introduction

The importance of oral and maxillofacial tumours lies in the fact that they are rare, cause disfiguring of the face necessitating subsequent reconstructive surgery. (Nzegwu and Uguru 2008). The skull, jaws and facial bones are not only the site of a number of unusual lesions but, also pose unique histological problems often associated with intra-oral variation in oral structure varying from potentially malignant to pseudo malignant features. (Odwell 2001 and Barret 2001).

Odontogenic tumours (OT) are exclusive to the jaws, as they are derived from epithelial and / mesenchymal elements that are part of the tooth forming apparatus. There is a variance in the frequency of the various types of OT geographically. (Gupta et al. 2011, Regezi JA 1993 and Barnes L 2005). They account for between 1 % to 30% of oral lesions. (Ulmansky M 1999, Arotiba JT 1997, Odukoya OO 1995). Despite various studies done in some countries across the continents including Africa there remain unanswered questions as to the frequency and incidence of some OT. (Elison Simon 2005 and Kamulegeya 2008). The bone related lesions (BRL) include the fibro-osseous lesions (FOLs), cherubism and aneurysmal bone cysts (ABC) in accordance with the latest classification (Reichart). The WHO classifies the following as fibro-osseous lesion among the NOT: fibrous dysplasia (FD), ossifying fibroma (OSF) and cement-osseous dysplasia(COD). (Liu Y 2010). FOLs are a group of poorly defined lesions with more than 70% affecting the head and neck region (Barnes 2005).

There has been documentation of these tumours from East Africa, with one study from Kenya in 1997 (from the Kenyatta National Hospital) and a more recent one from Uganda and Tanzania (Wakiaga 1997 and Kamulega A 2008). There is still remains a dearth of information from this region hence, the aim of this study was to determine the demographic presentation and frequency of various jaw tumours in a University of Nairobi, faculty of Dentistry over a 19-year period.
Materials and Methods

Permission to conduct this audit was granted by the School of Dental Sciences at the University of Nairobi. A retrospective survey was done by collection of data records in the Department of Oral Medicine and Pathology from 1991 to 2010 (19 years). The department processes and reports specimens both from the Oral and maxillofacial clinic/theatre situated at the University and from various public hospitals, it being a referral centre. The following details were recorded, age, gender and histopathological diagnosis of lesions. Site was not recorded as it was missing in the majority of the records. In those cases with unspecified diagnoses, the slides were retrieved and re-evaluated according to the WHO classification (12 Reichart).

Results

During the 19-year-period there were 4257 biopsies processed of which 597 (14.02%) were tumours of the jaw bones with an equal gender predilection. There was a greater number of OT 417 (69.85%) than BRLs 180 (30.15%). The M: F ratio of OT was 1:1 while, that of the BRL 1:1.6. The age range of this population was from 1 to 85 years (mean = 25.4 yrs), with the majority (76.5%) being between 10 to 39 years of age. (Fig. 1)

Odontogenic Tumours (OT)

The age range of the OT was between 5 – 85 years (mean = 24.1) with equal gender distribution. The most commonly affected age was between 11 – 40 years. Of the OT, epithelial (58%) were the most common whilst the mesodermal and mixed type consisted of only 6% respectively. The ameloblastoma was the most frequent epithelial OT (65.7%), followed by (keratocystic odontogenic tumour) KCOT (16.1%) and then (calcifying epithelial odontogenic tumour) CEOT (1.2%) and (adenomatoid odontogenic tumour) AOT (1%). Out of the two mesodermal OT recorded, the myxoma (7%) was more common than the cementoma (1.7%). The myxoma (mean = 25.6 yrs) occurred in a younger age as compared to the cementoma (mean = 47.1yrs). There were four types of mixed OT with the lowest of
frequency between (1–2.7%) in this population occurring in the following descending order odontoma, ameloblastic fibroma, myxofibroma and amelofibro-odontoma. (Table 1)

**Bone related lesions**

This group mainly consists of the BRLs, consisting of OSF (62.8%), FD (21.7%), COD (10%), giant cell granuloma (GCG) (2.8%) and aneurysmal bone cyst (ABC) (2.8%). The FOLs represented 2.47% of the total biopsy specimens. The numbers of females (110) were greater than males (70), (M: F = 1:1.6), within an age range from 4 – 86 years. There were far more females than males in both the COD and OF, unlike FD which had equal gender predilection (Fig 3) The mean age (51.9yrs) of those with COD was much higher than the rest of the BRL while that of the ABC was the lowest 21.6yrs. Both FD and OSF presented over a wide age range (4 – 72yrs) compared to other BRLs. (Table 2)

**DISCUSSION**

**Odontogenic tumours**

OT are reported to be frequent in the 2nd to 5th decade over an age range of 4–85yrs with equal gender prevalence. In our population, the age range and the gender prevalence was similar, however they were more common in the 1st to 3rd decade. (Ladeinde 2005, Arotiba 97, Lu Y 98). The majority (68.8%) of the patients were in age range of 10 to 40 years which is in similarity to that reported by Simon (71%) while in Nigeria, 88.1% were between 11 to 50 years and in Zimbabwe 70.2% were between 11 and 60 years. Simon et al. 2005, Ladeinde et al. 2005 and Chidzonga 1996). Onyango et al. stated that OT occurred a decade younger than elsewhere. (Onyango 1995). Studies on OT tumours from Africa are few with 15 – 31% reported from West Africa, which is higher than that in Nigeria and South Africa. (Ladeinde et al 2005 and Chidzonga 1996). Of the benign neoplasms recorded by Kamulega, 33.3% were odontogenic, with ameloblastoma (84%) featuring as the highest. This is similar to other African and Chinese studies, however, different from European and American studies. (Kamulega 2008, Bhaskar 1968, Chidzonga 1996, Jones 2006, Yong Lu 1998, Wakiaga 1997, Buchner A 2006, Simon 2005).

Wakiaga et al. also reported ameloblastoma accounting for 33.3% of jaw tumours and 78% of OTs in an earlier study done at a major referral hospital in Kenya. The statistics in this study
are in tandem to that of the African and Chinese studies whereby the most common was the OT, in addition the ameloblastoma, being the most frequent. Elison et al. and Kamulega and Kalyanyama reported Ameloblastoma as the most common OT in East Africa. The second most common tumour in this study was KCOT followed by myxoma, which is different from the findings of Simon et al. who reported the myxoma as the most prevalent after ameloblastoma. There was equal gender prevalence in both the ameloblastoma and KCOT. The WHO has recently classified calcifying odontogenic cyst (COC) a benign cystic neoplasm of odontogenic origin, similarly, the odontogenic keratocyst has been redesignated as the keratocystic odontogenic tumour (KCOT) due to the aggressive behaviour, histology and genetics (Praetorius 2005 Madras 2008). The age at diagnosis and sex distributions of patients with KCOTs have been reported. It was found to occur in patients of a wide age range, with an average patient age of 30.8 years, in this study our age range was wide (10–62years), however the average age at presentation was lower (25.6yrs). (Myoung H 2001). Based on the recent classification the myxoma features as the third (M<F) otherwise, in the absence of KCOT it would still feature as the second most common after ameloblastoma.

Myxoma has been reported to affect more females than males Arotiba 1997 British J Oral Max Ochsensius G 2002 J Oral Pathol Med. It shows a lower distribution in Asia with a higher trend in America, Africa and Europe. Luo HY 2009, Buchner 2006, Ladeinde 2005) There were twice more females than males with a mean age of 25.6 yrs. Studies in States have reported myxoma more prevalent than AOT. (Daley TM 94 ooo, Mosqueda –Taylor 97 000. Ladeinde et al. found the AOT as the second most common tumour after ameloblastoma which was in contrast with other reports from Africa which reported myxoma occurring more commonly after ameloblastoma. (Adebayo 2002 and Simon 2005). Odontoma was the fourth most common (M:F=1:1) followed by the cementoma:odontoma is a relatively rare lesion in the African continent which is consistent with our findings.(Chidzonga 96, Arotiba 97, Adebayo 02). Simon reported odontomas, CEOT, cementoblastoma, ameloblastic fibroma, COC and AOT with low frequency 0.9% – 2.6%. Ladeinde reported CEOT exclusive to females with low frequency in their series confirming the rarity of these tumours Mosqueda 97, Ochsensius 02 Lu Y 98 (000) and in contrast the COC and odontogenic fibroma were
relatively frequent unlike in our study. The rest of the types had a very low frequency of 1.2% that is the AOT, CEOC, myxofibroma, CCOT and amelofibro-odontoma which is similar to latter studies with the exception of the AOT.

*Bone related lesions*

The epidemiology of OSF and COD is unclear due to the confusion between the two lesions, it appears to occur in a wide age range. The greatest number of cases occurred in the 3rd and 4th decade with a female predilection, this was in similarity to our findings *Neville 2002*. COD occurs in tooth bearing areas of the jaws and is probably the most common FOL encountered in clinical practise. Surprisingly, in our study the most common FOL, was OSF and this could due to lack of clinicians not subjecting these patients with a clinical and radiographic diagnosis of COD to a biopsy. FD of the monostotic type is most common accounting for up to 80 – 85% of all cases with the jaws being the most commonly affected sites. It is mostly diagnosed during the 2nd decade of life with an equal M:F predilection *Neville 02*. We however, had more females affected, although the mean age was in the second decade. ABCs of the jaws are uncommon and the mean age of presentation is 20yrs this was identical to our data. GCG the majority (60%) occur before the age of 30yrs, its presentation in this study had a mean age of 21.6yrs and a limited age range unlike that reported *Neville 02*. The number of cases of both ABC and GCG were too few to make a conclusive statement from this series.
References


95% Confidence Interval (CI)

Fig. 1 Gender distribution of benign jaw tumours.

Fig. 2 Proportion of odontogenic (OT) and bone related lesions (BRL)
<table>
<thead>
<tr>
<th>TUMOURS</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
<th>MALE</th>
<th>FEMALE</th>
<th>AGE RANGE</th>
<th>MEAN (yrs)</th>
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<tbody>
<tr>
<td>Epithelial</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Ameloblastoma</td>
<td>274</td>
<td>45.90</td>
<td>137</td>
<td>137</td>
<td>5 - 85</td>
<td>29.7</td>
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<tr>
<td>KCOT</td>
<td>67</td>
<td>11.20</td>
<td>33</td>
<td>34</td>
<td>10 - 62</td>
<td>25.8</td>
</tr>
<tr>
<td>CEOT</td>
<td>5</td>
<td>0.80</td>
<td>2</td>
<td>3</td>
<td>12 - 32</td>
<td>18.6</td>
</tr>
<tr>
<td>AOT</td>
<td>1</td>
<td>0.20</td>
<td>0</td>
<td>1</td>
<td>17</td>
<td>17</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>347</strong></td>
<td><strong>58.10</strong></td>
<td><strong>172</strong></td>
<td><strong>175</strong></td>
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<tr>
<td>Mesodermal</td>
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<td></td>
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<tr>
<td>Myxoma</td>
<td>29</td>
<td>4.90</td>
<td>9</td>
<td>20</td>
<td>8 - 60</td>
<td>25.6</td>
</tr>
<tr>
<td>Cementoma</td>
<td>7</td>
<td>1.20</td>
<td>1</td>
<td>6</td>
<td>11 - 68</td>
<td>47.1</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>6.00</strong></td>
<td><strong>10</strong></td>
<td><strong>26</strong></td>
<td></td>
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<tr>
<td>Mixed</td>
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<td></td>
</tr>
<tr>
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<td>16</td>
<td>2.70</td>
<td>8</td>
<td>8</td>
<td>7 - 30</td>
<td>16.5</td>
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<tr>
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<td>1.20</td>
<td>4</td>
<td>3</td>
<td>11 - 32</td>
<td>19.7</td>
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<tr>
<td>Myxofibroma</td>
<td>6</td>
<td>1.00</td>
<td>3</td>
<td>3</td>
<td>1 - 33</td>
<td>22.8</td>
</tr>
<tr>
<td>CCOT</td>
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<td>0</td>
<td>4</td>
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<tr>
<td>Amelofibro-odontoma</td>
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<td>0.20</td>
<td>1</td>
<td>0</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>34</strong></td>
<td><strong>5.70</strong></td>
<td><strong>16</strong></td>
<td><strong>18</strong></td>
<td></td>
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</tbody>
</table>

Table 1. Illustrates the frequency, age range/ mean and gender distribution of the OT

![Bar chart showing gender distribution and frequency of BRLs](image-url)

Fig 3 Shows the gender distribution and frequency of BRLs
<table>
<thead>
<tr>
<th>Tumour type</th>
<th>Frequency</th>
<th>%</th>
<th>Age range (yrs)</th>
<th>Mean age</th>
<th>Std dev +/-</th>
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<tr>
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<td>21.7</td>
<td>4 – 72</td>
<td>23.4</td>
<td>13.8</td>
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<tr>
<td>OSF</td>
<td>113</td>
<td>62.8</td>
<td>4 – 72</td>
<td>27.0</td>
<td>13.7</td>
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<tr>
<td>COD</td>
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<td>10</td>
<td>30 – 86</td>
<td>51.9</td>
<td>16.0</td>
</tr>
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<td>GCG</td>
<td>5</td>
<td>2.8</td>
<td>7 – 35</td>
<td>18.2</td>
<td>10.4</td>
</tr>
<tr>
<td>ABC</td>
<td>5</td>
<td>2.8</td>
<td>11- 40</td>
<td>21.6</td>
<td>9.21</td>
</tr>
</tbody>
</table>

Table 2 show the age range, mean and standard deviation of BRLs
Age groups - Odontogenic tumors

Age Grp | 0-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 |
---|---|---|---|---|---|---|---|---|---|
0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
10 | 7 | 68 | 92 | 58 | 31 | 5 | 11 | 1 | 1 |