Clinico–pathological Analysis of Odontogenic Tumours
According to the Revised WHO (2005) Histopathological
Classification in Japanese

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Abstract

The revised histopathological classification of odontogenic tumours by the World Health Organization (WHO) was published in 2005 in “Pathology and Genetics of the Head and Neck Tumours”. This study sought to determine the relative frequency of odontogenic tumours in the Japanese population and to compare these data with previous classifications of odontogenic tumours.

289 patients with odontogenic tumours diagnosed at the Department of Oral Pathology in Kyushu Dental College, Japan during a 20–year period from 1985 to 2004 were reviewed and reclassified according to the revised histopathological classification of odontogenic tumours by WHO published in 2005. Clinical data, including frequency, age, gender, and anatomical location, were also analyzed and collected.

Odontogenic tumours accounted for 4.1% of all the oral and maxillofacial lesions (n=289). Of these, 289 patients (99.31%) had benign tumours and 2 (0.69%) had malignant tumours. The most frequent of the benign tumours were keratocystic odontogenic tumours (n=86), followed by ameloblastomas (n=81) and odontomas (n=79). These tumours constituted 84.43% of the all the odontogenic tumours. The mean age for benign odontogenic tumours was 32.36 ±19.83 years and for malignant tumours was 30 years, with the majority 189 (65.40%) of odontogenic tumours occurring in the second and the third molar region of the mandible, especially the posterior region 139 (48.10%). The male: female ratio for the all
odontogenic tumours was 1: 0.91.

**Conclusions**: Keratocystic odontogenic tumours therefore tend to show a higher frequency of occurrence among odontogenic tumours than ameloblastoma, according to this new classification.

**Key words**: Odontogenic tumours/Revised WHO (2005) histopathological classification/
Statistical study

**Introduction**

Odontogenic tumours are comparatively rare lesions derived from epithelial, ectomesenchymal, and mesenchymal elements in the tooth-forming apparatus. These tumours are found mainly within the jaw skeleton, although they may also be in rare cases, located in soft tissue. The first major attempt to classify odontogenic tumours was published in 1971 after a 5-year collaborative effort organized by the World Health Organization (WHO). An updated second edition of the WHO classification was published in 1992. Many studies involving odontogenic tumours have been reported in the 1992 classification.

The third revised histopathological classification of odontogenic tumours was reported in June 2005 by the International Agency for Research on Cancer (IARC). In comparison to the classification scheme from 1992, most malignant tumours in this new classification are generally considered to be counterparts of benign odontogenic tumours. The first category is the keratocystic odontogenic tumour (KCOT), which replace the odontogenic keratocyst (OKC) described in the previous WHO classification. In the second category, calcifying cystic odontogenic tumours and dentinogenenic ghost cell tumours replace the calcifying odontogenic cysts from the 1992 classification. There are also four augmented sub-classifications in the ameloblastoma category, including the unicuspic type, the solid/multicystic type, the extrasosseous/peripheral type, and the exodesmoplastic type. The malignant tumours are classified as either odontogenic carcinomas or odontogenic sarcomas. Benign tumours are classified into four categories similar to those seen in the 1992 classification. In light of these changes, it is necessary to review the entire data set of odontogenic tumours using the revised WHO classification (2005). However, few studies have conducted a clinico-pathological analysis of odontogenic tumours based on this revised classification. We report a clinico–pathological evaluation of odontogenic tumours diagnosed during the past 20 years (1985–2004) at the Kyushu Dental College Hospital in the southern part of Japan, according to the revised WHO 2005 classification.

**Materials and Methods**

The histopathology records for the present study were obtained from the 1st and the 2nd Departments of Oral Maxillofacial Surgery. The records were collected for 7,027 cases, and 289 (4.11%) of these patients had been diagnosed with odontogenic tumours. Biopsies had
been performed during the past 20 years from January 1985 to December 2004 at the Department of Oral Pathology of Kyushu Dental College. We re-evaluated the histological specimens, and the re-diagnosis in each case was confirmed or modified in accordance with the third edition of the WHO classification (2005)\(^5\). A total number of 289 lesions were analyzed on the basis of location, histopathologic typing, and recurrence. The age and gender of the patients were also included in the analysis.

Results

1. Distribution of the 289 cases according to the revised classification (Table 1)

Of these specimens, 287 were classified as benign (99.31 %), and 2 were classified as malignant (0.69 %) tumours. The most frequent type of benign tumour was keratocystic odontogenic tumour (KCOT) \((n=86, 29.76 \%)\) using the new classification, the second most frequent was ameloblastoma \((n=81, 28.03 \%)\), and the third was odontoma \((n=77, 26.64 \%)\). These three types of lesions accounted for 84.43 % of the benign tumours. The other types of benign lesions are shown in Table 1.

An analysis was conducted regarding the subclassifications of KCOT, ameloblastoma and odontoma. The histologic classification of KCOT, among the cases with KCOTs \((n=86)\), 82 were solitary type (95.35 %) and 4 were multiple type (4.65 %). Subclassifications of the ameloblastomas \((n=81)\) included the unicusitic type \((A-U)\) \((n=38, 46.91 \%)\), the solid/multicystic type \((n=37, 45.68 \%)\), the extraosseous/ peripheral type \((n=5, 6.17 \%)\), and the desmoplastic type \((n=1, 1.23 \%)\). In addition, the histologic classification of A-U, among the A-U \((n=38)\) and 24 were luminal type (63.16 %), 14 were mural type (36.84 %). In the 77 cases of odontoma, 48 were the complex type (62.34 %), and 29 were the compound type (37.66 %).

2. Patient gender (Table 2)

Among patients with odontogenic tumours, 151 were male and 138 were female \((M:F=1:0.91)\). Out of these patients, 150 males and 137 females had a benign tumour \((n=287)\).

A gender comparison among the higher frequency lesions revealed the following: KCOT (males 48, females 38; M:F=1:0.79), ameloblastoma (males 43, females 38; M:F=1:0.88),
Table 2  Gender distribution of 289 cases odontogenic tumours

<table>
<thead>
<tr>
<th>Type of tumour</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male to female ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keratocystic odontogenic tumour</td>
<td>48</td>
<td>38</td>
<td>86</td>
<td>1:0.79</td>
</tr>
<tr>
<td>Ameloblastoma</td>
<td>43</td>
<td>38</td>
<td>81</td>
<td>1:0.88</td>
</tr>
<tr>
<td>Complex type odontoma</td>
<td>25</td>
<td>23</td>
<td>48</td>
<td>1:0.92</td>
</tr>
<tr>
<td>Compound type odontoma</td>
<td>14</td>
<td>15</td>
<td>29</td>
<td>1:1.07</td>
</tr>
<tr>
<td>Odontogenic myxoma</td>
<td>6</td>
<td>7</td>
<td>13</td>
<td>1:1.16</td>
</tr>
<tr>
<td>Odontogenic fibroma</td>
<td>7</td>
<td>5</td>
<td>12</td>
<td>1:0.71</td>
</tr>
<tr>
<td>Dentinogenic ghost cell tumour</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>1:0.25</td>
</tr>
<tr>
<td>Cementoblastoma</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1:3</td>
</tr>
<tr>
<td>Calcifying cystic odontogenic tumour</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>Calcifying epithelial odontogenic tumour</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>NA</td>
</tr>
<tr>
<td>Ameloblastic fibroodontinoma</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>NA</td>
</tr>
<tr>
<td>Adenomatoid odontogenic tumour</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Ameloblastic fibro-odontoma</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Ameloblastic carcinoma</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1:1</td>
</tr>
<tr>
<td>Total</td>
<td>151</td>
<td>138</td>
<td>289</td>
<td>1:0.91</td>
</tr>
</tbody>
</table>

Abbreviation: NA = not applicable

complex type odontoma (males 25, females 23; M:F=1:0.88), compound type odontoma (males 14, females 13; M:F=1:1.07). More males than females were diagnosed with KCOT, ameloblastoma and complex type odontoma while more females were diagnosed with the compound type.

3. Patient age (Table 3)

The mean age (±SD) in the cases of odontogenic tumours was 32.36±19.83 years (range, 2 to 99 years). The most frequent age range seen in the cases of odontogenic tumours was within the 2nd decade of life (N=88, 30.45%) followed by the 3rd (N=55, 19.03%) and the 4th decades (N=37, 12.80%). Patients ranging 10 to 39 years of age accounted for 62.28% of the cases of odontogenic tumours.

The age distribution seen in KCOTs (Figure 1a) was 35.59±19.18 years (range, 10 to 78 years). Regarding the frequency of specific age ranges of patients with a KCOT, the peak age range occurring in the 2nd decade (n=23, 26.74%), followed by 3rd decade (n=19, 22.09%), and 6th decade (n=14, 16.28%). Patients between 10 and 39 years of age accounted for 61.63% of the cases with a KCOT.

The age distribution seen in patients with ameloblastomas (Figure 1b) was 36.98±21.03 years (range, 8 to 99 years). The peak age range was in the 2nd decade (N=21, 25.93%), followed by the 3rd decade (N=14, 17.28%), and the 5th decade (N=14, 17.28%). In addition, 46 patients (56.79%) were in the 2nd, 3rd or 4th decades of life.

The age distribution for patients with complex type odontomas (Figure 1c) was 29.83±19.57 years (range, 6 to 85 years), with the peak age range occurring in the 3rd decade.
Figure 1  Bar graph showing the age and gender.

a. Distribution of 86 cases of keratocystic odontogenic tumour.
b. Distribution of 81 cases of ameloblastomas.
c. Distribution of 48 cases of complex type odontoma.
d. Distribution of 29 cases of compound type odontoma.

Table 3  Age distribution of 289 cases of odontogenic tumours

<table>
<thead>
<tr>
<th>Type of tumour</th>
<th>0~9</th>
<th>10~19</th>
<th>20~29</th>
<th>30~39</th>
<th>40~49</th>
<th>50~59</th>
<th>60~69</th>
<th>70~79</th>
<th>80~89</th>
<th>90~99</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keratocystic odontogenic tumour</td>
<td>0</td>
<td>23</td>
<td>19</td>
<td>11</td>
<td>5</td>
<td>14</td>
<td>9</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>10~78 (35.59)</td>
</tr>
<tr>
<td>Ameloblastoma</td>
<td>1</td>
<td>21</td>
<td>14</td>
<td>11</td>
<td>14</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>8~99 (36.98)</td>
</tr>
<tr>
<td>Complex type odontoma</td>
<td>3</td>
<td>13</td>
<td>15</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6~85 (29.83)</td>
</tr>
<tr>
<td>Compound type odontoma</td>
<td>6</td>
<td>19</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7~32 (14.97)</td>
</tr>
<tr>
<td>Odontogenic myxoma</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15~68 (36.69)</td>
</tr>
<tr>
<td>Odontogenic fibroma</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7~68 (31.7)</td>
</tr>
<tr>
<td>Denticnogenic ghost cell tumour</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9~59 (28.8)</td>
</tr>
<tr>
<td>Cementoblastoma</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>18~70 (42)</td>
</tr>
<tr>
<td>Calcifying cystic odontogenic tumour</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11~16 (13)</td>
</tr>
<tr>
<td>Calcifying epithelial odontogenic tumour</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25~61 (43)</td>
</tr>
<tr>
<td>Ameloblastic fibrodentinoma</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2~9 (5.5)</td>
</tr>
<tr>
<td>Adenomatoid odontogenic tumour</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15 (15)</td>
</tr>
<tr>
<td>Ameloblastic fibro-odontoma</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Ameloblastic carcinoma</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30~36 (33)</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>88</td>
<td>55</td>
<td>37</td>
<td>25</td>
<td>28</td>
<td>25</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>289</td>
</tr>
</tbody>
</table>

(N=15, 31.25 %), followed by the 2nd decade (N=13, 27.08 %). The distribution for patients with compound type odontomas (Figure 1d) was 14.97±7.13 years (range, 7 to 32 years). The peak age range was the 2nd decade (N=19, 65.52 %). Other less common lesions are shown in Table 3.
4. Tumour location (Table 4)

215 (74.39 %) of the odontogenic tumours were located in the mandible and 74 (25.61 %) were in the maxilla. The mandible to maxilla ratio was 2.91:1. Within the mandible, 139 (64.65 %) of the tumours were located in the posterior area. In the maxillary region, most of the tumours were in the anterior teeth (N=37, 50 %).

Moreover, there was a higher incidence of KCOTs in the mandible (N=74, 86.05 %) than in the maxilla (N=12, 13.95 %). The mandible to maxilla ratio was 6.17:1. In addition, 47 of the mandibular lesions (54.65 %) were found in the posterior region. The second most common region was the premolar area, accounting for 24 cases (27.91 %). These two areas accounted for almost 82.56 % of the KCOTs (Figure 2a). Ameloblastomas were also more frequently located in the mandible (N=74; 91.36 %) than the maxilla (N=7; 8.64 %). The mandible to maxilla ratio was 10.57:1. 54 patients (66.67 %) had an ameloblastoma in the posterior mandibular region, while 14 (17.28 %) had the lesion in the premolar area. The tumours in these two locations accounted for 83.95 % of the ameloblastomas (Figure 2b).

Complex type odontomas also occurred most commonly in the mandible (N=25; 52.08 %)

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**Figure 2**

Topographical distribution location of a higher incidence odontoma.

a: Location within the jaw of 86 cases of keratocystic odontogenic tumors.
b: Location within the jaw of 81 cases of ameloblastoma.
c: Location within the jaw of 48 cases of complex type odontoma.
d: Location within the jaw of 29 cases of compound type odontoma.
Table 4  Anatomical distribution of 289 cases odontogenic tumours

<table>
<thead>
<tr>
<th>Type of tumour</th>
<th>Maxilla</th>
<th></th>
<th>Mandible</th>
<th></th>
<th>Maxillary:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anterior</td>
<td>Mindline</td>
<td>Posterior</td>
<td>Anterior</td>
<td>Mindline</td>
</tr>
<tr>
<td>Keratocystic odontogenic tumour</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Ameloblastoma</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Complex type odontoma</td>
<td>12</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Compound type odontoma</td>
<td>15</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Odontogenic myxoma</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Odontogenic fibroma</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Dentinogenic ghost cell tumour</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Cementoblastoma</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Calcifying cystic odontogenic tumour</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Calcifying epithelial odontogenic tumour</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ameloblastic fibrodentinoma</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Adenomatoid odontogenic tumour</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ameloblastic fibro-odontoma</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ameloblastic carcinoma</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>18</td>
<td>19</td>
<td>26</td>
<td>50</td>
</tr>
</tbody>
</table>

Abbreviation: NA = not applicable

and the maxilla (N=23; 47.92%). The mandible to maxilla ratio of these lesions was 1.07:1. Most of complex type odontomas were located in the posterior mandible (N=16 33.33%) and the second anterior maxilla (N=12; 25%) (Figure 2c). 17 (58.62%) compound type odontomas were located in the maxilla while only 12 (41.38%) were located in the mandible. The mandible to maxilla ratio in compound type odontomas was 0.71:1. The anterior maxilla was the most frequent location for compound type odontomas (Figure 2d). Other less common lesions are shown in Table 4.

5. Tumour recurrence (Figure 3)

Among 81 cases of ameloblastoma, there were 13 (16.05 %) recurrences after treatment. 7 of these were the solid/multicystic type and 6 were the U-A (including luminal type 4 and mural type 2). The longest

Figure 3  Distribution of recurrent cases.

a. 13 cases of recurrent of keratocystic odontogenic tumours.

b. 12 cases of recurrent of ameloblastomas.
duration before tumour recurrence was 40 years, and the shortest was 1 year after the initial discovery. Among 86 cases of KCOTs 12 (13.95 %) recurrences occurred after treatment. The longest duration before tumor recurrence was 25 years, and the shortest was 2 years after the initial discovery. In our records, no recurrences among other lesion types were recorded.

6. Malignant odontogenic tumours
There were 2 cases of malignant tumours that were classified as ameloblastic carcinoma–primary type by histopathologic findings. There was no metastasis to any other area and the male to female ratio was 1:1. The mean age was 33 years (the patients were 30 and 36 years old). Both of the tumors were located in the posterior mandible.

Discussion
Odontogenic tumours are relatively uncommon lesions accounting for less than 3 % of all reported oral and maxillo–facial lesions.\textsuperscript{4,6,8,10} However, some reports from Africa indicate the frequency of odontogenic tumours to be roughly 30 % of all oral and maxillo–facial lesions on that continent.\textsuperscript{11,13} The frequency of odontogenic tumours (4.1 %) in this study is somewhat higher than in previous studies,\textsuperscript{4,6,8,10} probably because of the university hospital setting, where patients are referred from many other hospitals and private clinics.

In the present study, KCOTs ranked as the most common odontogenic tumour. We suggest that KCOTs are the most common odontogenic tumours. Ameloblastoma and odontomas were the most commonly reported odontogenic tumours using the 1992 WHO classification.\textsuperscript{4,6,9,13} Our results illustrated a change in the frequency of tumour type due to the new WHO classification. The traditional designation is OKC, which stresses the benign behaviors of this lesion. However, the WHO Working Group recommends the term KCOT in order to reflect the neoplastic nature of the lesion. A KCOT is characterized by a lining of para–keratinized stratified squamous epithelium, usually about 5–8 cell layers thick and without discrete ridges and really showing basal cell proliferation and daughter cyst formation. The lesion can potentially show aggressive, infiltrative behavior. Cystic jaw lesions that are lined by ortho–keratinizing epithelium are not part of the KCOT spectrum. According the revised histopathological classification, among the 7,027 cases in our study, KCOTs were found in 86 while OKCs were found in 68 cases. As a result, the KCOT to OKC ratio was 1:0.79. The new classification of KCOTs highlights the frequency of the lesions and demonstrates the importance of prompt diagnosis and clinical treatment.

We found that ameloblastomas are the second most frequent odontogenic tumours. The sub–type classification of ameloblastomas shows that A–U is more common than the other three types (n=38, 46.91 %). This result indicates a higher frequency than reported by Reichart et al\textsuperscript{13} (5 to 15 %). The reason for such a discrepancy is not clear. Further study is thus called for to clarify this issue. The radiographic appearance of all A–Us shows two main patterns—unilocular and multilocular.\textsuperscript{13} A definitive diagnosis of a A–U cannot be
made radiologically, since similar radiographic features are displayed by OKCs and myxomas. CT scans or MRIs are recommended for diagnosis of these lesions because they enable the provider to visualize the scalloped shape of the cysts before surgery.

The gender distributions in the present study showed that slightly more males than females were diagnosed with an odontogenic tumour. This result is similar to data seen in previous studies. According to our results, KCOTs and dentinogenic ghost cell tumours are predominantly seen in males. Ameloblastomas, in the present study, were also slightly predominant in males, and this result agreed with other studies from China, India, and Nigeria. However, a higher incidence of ameloblastomas was reported in a study in females in Hong Kong, probably due to regional differences. Another example of regional differences illustrated by the present study is the higher frequency of complex type odontomas in comparison to compound type odontomas. This result agrees with studies from Thailand, but is different from that seen in a Chinese study. In our study, both the complex and compound type odontomas occurred roughly equally between the genders. This result is similar to data from a number of previous studies.

The most common age of onset for odontogenic tumours was between the second and third decades of life in this study. This finding is similar to those in previous studies from China, Thailand, and Nigeria. KCOTs occurred most often in the second and third decades of life in the patients in our study. KCOTs occurred most often in patients between 10 and 19 years old. Ameloblastomas were most frequent in patients 10 to 49 years old and the highest age of onset of ameloblastoma was 99 years old. There has not been a report of such a late age of onset of ameloblastoma until now. This result is probably associated with the Japanese mean longevity, which is the highest in the world. Complex type odontomas were most frequent in the third decade of life, whereas compound type odontomas were most frequent during the second decade of life in the present study. These results are similar to those seen in past reports.

The results for the site of odontogenic tumours showed a high frequency of mandibular tumours (74.39 %), with nearly two-thirds of these in the antero–posterior–ramus portion of the mandible. This finding is in agreement with previous reports. In addition, KCOTs, ameloblastomas, and dentinogenic ghost cell tumours have also shown a predilection for the mandible in the present study. The anterior maxilla was the predominant site of compound type odontomas, whereas complex type odontomas were more frequent in the anterior maxilla and mandibular postero–anterior region. These results are also consistent with those seen in previous studies.

The ameloblastoma relapse rates vary according to the tumor location, histologic type, and treatment modality. In the present study, 81 cases of ameloblastoma were reviewed, and 13 recurrences (16.05 %, Figure 3) occurred. Of these 13 cases, 7 (18.42 %) were the solid/multicystic type and 6 (15.79 %) were the A–U. Regarding A–U, two histopathologic types exist. The luminal type is a cystic lesion lined by ameloblastomatous epithelium. There is no tumour infiltration into the fibrous wall. On the other hand, the mural type, the
cyst wall is infiltrated by ameloblastomatous epithelium that exhibits either a follicular or plexiform pattern. In our study, in the 6 recurrences A–U, mural type (4 cases) was higher than that of luminal type (2 cases). We therefore recommend that when A–U is subsequently designated as a mural type, then further surgical intervention should thus be considered, along with a mandatory long-term following up. The time period until recurrences was 13.62 years ±12.17 (range: 1 to 40 years). Recurrence rates for the A–U after conservative surgical treatment are generally reported to be less than 25%. We observed lower recurrence rates, and in addition there were 12 (13.95%) recurrences of KCOTs at present. The time period until recurrence was 8.25 years ±7.68 (range: 2 to 25 years). Possible causes of a relapse include the degree of epithelial proliferation potency and the existence of a daughter cyst as well as operation procedures. No other recurrences of any lesion type were reported, based on our records.

Malignant odontogenic tumours are rarely seen in general, accounting for only 0.69% of all odontogenic tumours and only 0.03% of all oral and maxillofacial lesions in our records. The figures from our study were lower than the results reported by Gunhan et al. (1.5%)10 and Lu et al. (6.1%).10 The most common malignant odontogenic tumour was ameloblastic carcinoma. This result is similar to that reported by Lu et al.10 and Dhanuthai.15 The location of ameloblastic carcinoma is reported consistent with the studies of Lu et al.,10 Gunhan et al.,10 and Dhanuthai.15 The most frequent age of onset was within the third decade in all studies.

Using the new WHO classification, the KCOT is the most frequent odontogenic tumour seen in our records. Another significant finding is that ameloblastomas can appear in patients up to 99 years old. Our study also showed that recurrence rates for KCOTs and ameloblastomas are equal. In the future, it will be important to coordinate the findings from X–rays, clinical examination, and patho–histological studies to develop a diagnosis for KCOTs and ameloblastomas.

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歯原性腫瘍の臨床病理学的検討

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抄 録

緒言：2005年6月にInternational Agency for Research on Cancer (IARC) から「頭頸部腫瘍のWHO分類」と出版され、この中で歯原性腫瘍のWHO組織分類（1992）を改訂された。この改訂については、本学における歯原性腫瘍全体を見直す必要があり、今回われわれは、過去20年間（1985～2004）九州歯科大学附属病院症例からの歯原性腫瘍について、新分類に基づいて臨床病理学に検討を行ったのでその概要を報告する。

対象および方法：対象は1985年1月より2004年12月までの20年間に九州歯科大学第1および第2口腔外科を受診した7,077名の内、生検や手術摘出専門から、口腔病理学講座で歯原性腫瘍と確定診断された289例（4.11%）を抽出し、新分類に基づいて性別、年齢、部位、発生頻度などについて検討した。

結果：発症頻度では289例のうち良性腫瘍は287例（98.91%）であり、悪性腫瘍はわずか2例（0.69%）であった。良性腫瘍の発生頻度では、角化囊胞性歯原性腫瘍86例（29.76%）が最も多く、次にエナメル上皮腫81例（28.03%）、次いで歯牙腫77例（26.64%）で、その中に複雑性歯牙腫48例（62.34%）、集合性歯牙腫29例（37.66%）であった。この三者で全体の84.43%を占めていた。

性別では歯原性腫瘍全例では、男性153例、女性136例で男女比は1.09でやや男性に多くみられた。

発生年齢は、最低2歳から最高99歳まで、平均年齢は32.36歳であった。

年代別では10歳代が最も多く88例で30.45%、ついて20歳代が55例で19.03%、30歳代が37例で12.80%、10歳代から30歳代ではほぼ全体の2/3を占めていた。

で1/2以上を占めていた。

発生部位では部位別発生頻度では、下顎215例（74.39%）、上顎74例（25.61%）で下顎に多く発生し、上顎のほぼ3倍を占めていた。下顎では、大臼歯部を中心に発生する症例が119例（55.35%）と最も多く、下顎での半数以上を占めていた。

考察：今回の統計結果では本学では20年間歯原性腫瘍は289例（4.11%）で、その中では角化囊胞性歯原性腫瘍の発生頻度は86例（29.76%）で最も多く、ついでエナメル上皮腫であった。この結果は他の報告とは少し異なっていた。

性別、発生部位では他の報告と同様であった。年齢の分布においては他の報告と同様であったが、最高年齢99歳にみられたエナメル上皮腫での症例は過去に報告されたことがない。

結語：本学20年間に検証した歯原性腫瘍289例についてWHOの新分類（2005年）に基づいて発生頻度、性別、年齢、部位を調べて臨床病理学的に検討して報告した。新しくソフトした疾患の歯原性腫瘍としての位置付けは、臨床的に喚起を要することを報告した。

キーワード：歯原性腫瘍/新組織分類WHO(2005)/統計学的研究