Impacted Maxillary Canines: Frequency in a Brazilian population

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Corresponding Author:
Prof. Sergio E Vieira Cury,
DDS PhD, Oral Pathology - UniFOA - University of Volta Redonda, 27.310-060 - Brazil

Submitting Author:
Prof. Sergio E Cury,
DDS PhD, Oral Pathology - UniFOA - University of Volta Redonda, 27.310-060 - Brazil

Other Authors:
Ms. Ana Carolina Junqueira Da Silva,
Dental School Student, Oral Pathology - University of Volta Redonda - Brazil
Ms. Caroline Cruz De Morais,
Dental School Student, Oral Pathology - University of Volta Redonda - Brazil
Prof. Maria Dorotea Neves Cury,
MDS, DDS, PhD, Oral Pathology - University of Volta Redonda - Brazil

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Impacted Maxillary Canines: Frequency in a Brazilian population

Author(s): Junqueira Da Silva A, Cruz De Morais C, Neves Cury M, Vieira Cury SE

Abstract

Objective: To evaluate the occurrence of impacted maxillary canines in the population of Volta Redonda, Rio de Janeiro, taking into account age, gender and affected side of the face.

Methods: Three thousand five hundred and forty panoramic radiographs were carried out during 2012. These files, which belong to the Class of Oral Pathology, at the Dentistry Course of UniFOA, were evaluated for the presence of impacted maxillary canines.

Results: From a total of 3,540 panoramic radiographies studied, 53 presented images which showed impacted maxillary canines. There was a predominance of female subjects, and a higher concentration in the age group ranging from 13 to 30 years. It was also observed that the left side was the most affected.

Conclusions: The overall incidence of impacted maxillary canines studied in the 3,540 radiographies corresponded to 1.5%, observed in the average numbers found in the specific literature.

Introduction

The eruption of a tooth combines body movements of the tooth before and after the appearance of the tooth crown, and its function is to bring and keep the tooth in occlusion with the elements of the opposing arch. It starts when the coronary development is complete and the roots begin to be formed. The teeth follow a sequence of eruption which is favorable in the development of the normal occlusion, but some disturbances during the transition period from the mixed to the permanent dentition can lead to permanent changes in the sequence or in the path of eruption, causing impaction of the teeth.

Normally, the last teeth to erupt within the chronological physiology are those which can remain impacted or semi-impacted. Neville et al. (2010) defines impacted teeth as those which are obstructed by a physical barrier or seem to show a loss in the eruptive force. Considering that the maxillary canines have the longest and most tortuous development path and in addition, they start the mineralization process before the maxillary incisors and molars, although it takes twice as long to complete their eruption, they become more susceptible to changes in their trajectory path.

The exact etiology for the impaction of maxillary canines is still unclear, but local causes are more related to factors associated with this anomaly. Some of the main causes are: early loss of the deciduous canine or its prolonged retention; failure in the root reabsorption of the deciduous canine; lack of space, due to insufficient length or girth of the arc; excess width of the palate, presence of pathological lesions in the region and ankylosis; anomalies in size and shape of adjacent lateral incisors or the lack thereof; supernumerary teeth; dilacerated root; cleft lip and/or palate, rotation of the permanent tooth germ, premature closure of the root apex and transverse maxillary deficiency.

The impaction of maxillary canines is very frequently observed in the dental clinics. Anamnesis, a good and thorough clinical examination and the good usage of additional tests such as periapical and panoramic radiographs, cephalometric analysis, photographs and study models are essential and fundamental tools in order to obtain a correct diagnosis and develop an adequate treatment plan.

The appropriate eruption and the final position of the canines in the arcades is an essential part of the dental maturation and ensure an adequate occlusion and esthetics. Failures in the canine eruption may result in a bad position and periodontal involvement of the adjacent element as well as the formation of cysts associated with the impacted tooth. Impacted canines complicate orthodontic treatment, because they may compromise the occlusion and esthetics. An early diagnosis, surgery and orthodontic manipulation to prevent impaction and/or correction of the impaction of that tooth is essential to obtain a good result for the patient. An early diagnosis can minimize problems resulting from the impaction of the canines, such as the root reabsorption of these teeth and of the lateral incisors. The development of the treatment plan and of the surgical and/or orthodontic procedures of a tooth with this type of complication depend on the tooth...
involved and of its position in relation to the adjacent elements\(^3\)

Crozariol & Habitante (2003)\(^4\) reported in their work having observed an incidence of 1.08% of impacted canines among the periapical radiographs from the 919 medical records registered at the School of Dentistry of the Universidade de Taubaté.

Aydin, Yilmaz & Yildirim (2004)\(^5\) analyzing 4,500 panoramic radiographs, found an incidence of 3.58% impacted canines.

Caovilla (2005)\(^6\) analyzed 7,934 records of patients attended by the Semiology class of the Dentistry course of the Universidade Vale do Rio Verde de Três Corações - UNINCOR, between the period of 2002 and 2004. Among these subjects, patients aged less than ten years old that had impacted upper canines and who had been referred for surgical treatment were evaluated. The prevalence of retention was 0.43%, totalizing 34 impacted teeth in 31 patients, and in 3 patients the impaction was bilateral (9.68%). The incidence of impacted canines was higher in females (74%) and white patients (48.39%) were more affected when compared to patients of different skin colors. 19 (56%) of 34 teeth were affecting the left side of the dental arch. The diagnosis of this change occurred more frequently in the age group between 10 and 14 year olds, leading the author to conclude that the impaction is more often discovered during the early second decade of life. With regard to location, using the Clark technique, it was found that 82% of the impacted canines were 91% for palatal and mesial.

Upon reviewing the literature in 2006, Cook and Wang\(^7\) realized that the upper canines are, statistically, the second teeth with the highest inclusion rate, with an incidence ranging from 1 to 2.5%. They also noted that these may be impacted buccal or palatally, and are more frequent in female patients rather than in male patients.

Tito et al. (2008)\(^8\) observed, through various researches held, that it is not rare to find impacted canines in the dental clinic. They are more frequent for palate, upper arch, and have a unilateral tendency on the left side, especially in women.

Toledo et al. (2008)\(^9\) analyzed 3,152 radiographs from the digital archives of the All Doc Radiology Clinic, among which 503 showed impacted teeth, and out of these, 40 were canines. The most affected gender was female, with 63.8% (23 women). Their ages ranged from 15 to 65. A predominance of significant unilateral impactions (80%) over the bilateral (20%) was observed.

Cury (2009)\(^10\) analyzed 5,400 panoramic radiographs obtained between January 2008 and July 2009, also in the city of Volta Redonda, Rio de Janeiro, and found 81 images which showed impacted canines (1.5%), finding a predilection for females (62.9%), with the highest concentration in the age group ranging from 10 to 19 years old (51.86%), and the most affected was the right side (51.85%)

In a literature review, Graciano (2010)\(^11\) found that the ectopic eruption of maxillary canines and impaction occur in approximately 1-2% of the population, the location of this tooth in the palatal region is more frequent and that, in most patients, it occurs unilaterally. Gaetti-Jardim et al., 2012, also found in the literature review that there seems to be a predominance of females, and the impaction of maxillary canines is more common than in the lower counterpart.

Campoy et al. (2013)\(^12\) observed 2,888 patients between 2005 and 2009 in the Dentistry Clinic of the Instituto de Ciências da Saúde-Norte (ISCSN, Portugal). The prevalence of impacted teeth was 1.8% (52 patients), and, among these, the majority was composed of impacted maxillary canines (n = 40, corresponding to 58% of all the impacted teeth), irrespective of gender (20 male patients and 20 female patients).

The aim of this study is to evaluate the occurrence of impacted maxillary canines in the population of Volta Redonda, Rio de Janeiro, taking into account age, gender and the affected side.

**Methods**

Three thousand five hundred and forty panoramic radiographs were carried out during 2012, from the files of the Oral Pathology Department of the school of Dentistry UniFOA, Volta Redonda, Rio de Janeiro, Brazil were evaluated for the presence of impacted maxillary canines.

The radiographs were obtained through X-ray machine digital panoramic and cephalometric Pax400 (Vatech – Korea) and the images were analyzed directly on the computer screen, using digital zoom of up to 100%. The analysis was performed by the participating students and by the Supervisor.

As an inclusion criteria, teenagers and adults were considered, taking into account the initial age of 13 years old (recommended age for the English language, the “teenagers”). We excluded individuals younger than 13 years old, firstly because that is an age group during which the maxillary canines might still erupt, and secondly, because if they had impacted canines
for ages under 13, you could not have access to the reason why the element was retained in the first place.

Data was cataloged in a spreadsheet prepared by the Supervisor, using Microsoft Excel 2010. The results were presented as tables.

To evaluate the ethical criteria, a protocol was submitted to the Ethics Committee for Human Research of the Centro Universitário de Volta Redonda, which gave its favorable assent to their implementation and registered the document with the National Commission for Ethics in Research of the Ministry of Health (CAAE - 0004.0.446.000-10, Opinion No. 43/10 of 20/08/2010).

Results

From a total of 3,540 studied panoramic radiographs, 1.5% (n = 53) presented images which showed impacted canines.

Of the 53 cases which were found, there was a predilection for individuals of the female gender, totaling 56.6% cases (n = 30) when compared to males, with 43.4% (n = 23), a ratio of 1.30 X1 (Table 1).

Table 1 - Gender

<table>
<thead>
<tr>
<th>GENDER</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>30</td>
<td>56,6</td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>43,4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

The ages varied from 13 to 52 years old, with an average of 25 years (Table 2) , with the highest incidence in the age group ranging from 13 to 30 years old (79.25% - n = 42).

Table 2 - Age

<table>
<thead>
<tr>
<th>AGE</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 a 20</td>
<td>23</td>
<td>43,40</td>
</tr>
<tr>
<td>21 a 30</td>
<td>19</td>
<td>35,85</td>
</tr>
<tr>
<td>31 a 40</td>
<td>5</td>
<td>9,43</td>
</tr>
<tr>
<td>41 a 50</td>
<td>4</td>
<td>7,55</td>
</tr>
<tr>
<td>&gt; de 50</td>
<td>2</td>
<td>3,77</td>
</tr>
<tr>
<td>TOTAL</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

The left side was the most affected (54.72% and n = 29), with an extensive margin in relation to the right side (32.07% and n = 17). 13.21% (n=7) of the surveyed individuals presented bilaterally impacted canines (Table 3).

Table 3 - Affected Side

<table>
<thead>
<tr>
<th>SIDE</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>17</td>
<td>32,07</td>
</tr>
<tr>
<td>Left</td>
<td>29</td>
<td>54,72</td>
</tr>
<tr>
<td>Both sides</td>
<td>07</td>
<td>13,21</td>
</tr>
<tr>
<td>TOTAL</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

Still regarding the affected side, comparing it with the gender, it was found that in females 30% (n = 9) of the impacted canines were on the right side, 60% (n = 18) were on the left and 10% (n = 3) were found bilaterally (Table 4). Comparing the affected side with the males, it was found that 34.78% (n = 8) were on the right side, 47.83% (n = 11) on the left, and 17.31% (n = 4) were bilateral (table 5).

Table 4 - Female gender and affected side

<table>
<thead>
<tr>
<th>SIDE</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>09</td>
<td>30,0</td>
</tr>
<tr>
<td>Left</td>
<td>18</td>
<td>60,0</td>
</tr>
<tr>
<td>Both sides</td>
<td>03</td>
<td>10,0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5 - Male gender and affected side

<table>
<thead>
<tr>
<th>SIDE</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>08</td>
<td>34,78</td>
</tr>
<tr>
<td>Left</td>
<td>11</td>
<td>47,83</td>
</tr>
<tr>
<td>Both sides</td>
<td>04</td>
<td>17,39</td>
</tr>
<tr>
<td>TOTAL</td>
<td>23</td>
<td>100</td>
</tr>
</tbody>
</table>

During the study, a new data was observed, which was not in the originally studied goals: it was the presence of mandibular impacted canines. We found 9 people (0.25%) with impaction in the mandibular arch, of which 5 were on the right side, 3 were on the left and 1 was bilateral (Table 6).

Table 6 - Impacted mandibular canines

<table>
<thead>
<tr>
<th>SIDE</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>5</td>
<td>55,56</td>
</tr>
<tr>
<td>Left</td>
<td>3</td>
<td>33,34</td>
</tr>
<tr>
<td>Both sides</td>
<td>1</td>
<td>11,10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion

Impacted teeth are those which are obstructed by a physical barrier or seem to show a loss in the eruptive force.

Among the findings of this study, the overall incidence of impacted maxillary canines in the 3,540 radiographs evaluated represented 1.5% (n = 53), which coincided with the literature: Crozariol and Habitante (2003) reported an incidence of 1.08%; Cook and Wang (2006) reported an incidence of 1 to 2.5%; Tito et al. (2008) and Graciano (2010) reported an incidence of 1 to 2 %, showing that data such as ethnic and
geographic location does not have any influence on the impaction ratio of the maxillary canines.

Of the 53 studied cases with impacted maxillary canines, there was a prevalence of female subjects, totaling 56.6% of cases (n = 30) when compared to males, with 43.4% (n = 23). This is consistent with reports of Caovilla (2005), Cook and Wang (2006), Tito et al. (2008), Toledo et al. (2008), Cury (2009) and Gaetti-Jardim et al. (2012), who also reported a greater incidence of impacted canines in females. Cury, in 2009, reported that the possible reason for this unanimous incidence in the female gender would be associated with high incidence of abnormal dental shapes and congenital agenesis, especially in maxillary lateral incisors, in this gender.

Regarding age, there was a variation in the ages ranging from 13 to 52 years, with a 25 year average, having a higher incidence in the age group between 13 and 20 years old (43.4% – n = 23), and this is consistent with studies by Caovilla in 2005, which concluded that the discovery of retention(s) of the canine(s) is more frequent in the second decade of life, and studies carried out by Cury (2009), also found that the prevalence of cases of impaction of canines in the group ranging to 20 years of age. We associate this high incidence of diagnosis of impacted maxillary canines in the second decade of life to the fact that, in the adolescence, there is a greater concern with esthetics and an increased demand for orthodontic treatment, for which purpose it is necessary to take panoramic radiographs.

The most affected side found in our research was the left side, with 54.72% (n = 29), coinciding with what was attested by Tito et al. (2008) regarding a prevalence of the left side as being the most affected, and Caovilla (2005), who found a prevalence of 56% of the impacted maxillary canines on the left side. However, Cury (2009) found in his studies a prevalence of the right side. In our opinion, this only represents a coincidence, from what has been studied in the referred literature, no argument that justified any predilection for one specific side has been found.

A fact which was not found in other studies, but which we decided to report in this paper, refers to the comparison of the affected side in relation to gender: it was found that, in females, 30% (n = 9) of the impacted maxillary canines were on the right side, 60% (n=18) were on the left side and 10% (n = 3) were found bilaterally. Comparing the affected side with the males, it was found that 34.78% (n = 8) were on the right side, 47.83% (n = 11) were on the left, and 17.31% (n=4) were found bilaterally. It is interesting to notice that, when we separate the patients analyze them by gender, the incidence remains higher on the left side in both cases, but this difference in females is much higher and expressive, reaching to double the number of impacted maxillary canines on the right side. We believe this to be a coincidence, since we found nothing in the researched literature relating to this increased incidence of impaction of maxillary canine on the left side of the female gender.

Conclusion

After the performed evaluation, we concluded that:

1. The incidence of impacted maxillary canines we found was 1.5%
2. The age group found as the most frequent was comprised between 13 and 30 years range
3. The most affected gender of impacted maxillary canines is the female
4. The left side was the most affected

References

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