Radiographic Analysis and Prevalence of Impacted Maxillary Canine Teeth in Children Between 8 and 16 Years

Betty Bizcar Mercado*,**; Paulo Sandoval Vidal**,*** & Pablo Navarro Cáceres*

ABSTRACT: The objective of this study was to determine the prevalence of impacted maxillary canines and analyze variables associated with its retention in panoramic radiographs. Manual and Retrospective observational study of 16,835 records. A sample of 1,353 panoramic radiographs was obtained. The variables measured were canine angle, distance from the canine apex to occlusal plane, vertical and horizontal canine location. For reliable measurement an intra class Fleiss and Cohen correlation coefficient was used (0.997). Prevalence was 2.3%. 31 subjects had one or both retained canines. Average age 10.77 ± 2.45, 61.3% were women. 64.5% presented unilateral retaining of which the largest percentage was left. A total of 41 retained canines were observed. Distance to occlusal plane 19 mm on average. In relation to the vertical location the highest percentage (48.7%) was found in the apical third. Regarding the horizontal location the highest percentage (77.6%) was found in sectors 1, 2 and 3. When analyzing the canine angle it was found that 83% measured 31 degrees or more. Radicular resorption was observed in 2 lateral incisors. The prevalence found is similar to that reported in the international literature. It occurred more frequently in women and left unilateral both not statistically significant.

KEY WORDS: impacted, tooth, unerupted teeth, canine, prevalence study.

INTRODUCTION

Dental retention is considered a tooth with significant delayed eruption or clinical and radiographic signs of uneruption. Canines have a high retention rate surpassed only by third molars. Its prevalence goes from 1 to 3 % (Grover & Lorton, 1985) with twice the frequency in women and slight left unilaterality. No work has been reported in international literature related to the prevalence in Chile, so the goal is to determine the prevalence, using a radiographic analysis of impacted canines, in patients treated at the Faculty of Dentistry, Universidad de La Frontera.

Canine retention is related to its position in the bone. The panoramic radiograph can show the position and predict eruption pathway based on different measurements (Erickson & Kurol, 1988) reservation of the canine is fundamental for being the strongest hemi-arch tooth, it occupies a strategic place of transition between the anterior and posterior area, having an aesthetic function giving harmony to the anterior face and in dental occlusion it guides laterality movements. An early diagnosis reduces treatment time, costs, complexity and potential complications such as ankylosis of the canine, cysts, infections and most importantly radicular resorption of adjacent teeth especially lateral incisor threatening its survival rate.

MATERIAL AND METHOD

We reviewed 16,835 records manually, general population who received dental care at the Faculty of Dentistry at the Universidad de La Frontera between 2005 and 2012, from which 11,983 were excluded for
being over 16 years and 610 for being less than 8 years, leaving 4,242 records aged 8 to 16 years. Of these 1,353 with access to panoramic radiographs; to obtain the sample it was considered as "impacted maxillary canine" anyone who had tooth crown in intraosseous position and with complete root formation or the root apical third incomplete, but with a larger canine angle to 31° as reported on Power and Short, leaving a final sample of thirty-one records with panoramic radiography where it was possible to observe one or both upper impacted canines where finally the radiographic analysis was performed.

All radiographs were taken with a Panoramic Radiograph (Proline CC, Planmeca, Helsinki, Finland). Conventional radiographic plates were used trademark Kodak T-MAT G/RA and revealing machine (XR 24 Pro, Dürr Dental AG, Bietigheim-Bissingen, Germany).

This project was approved by the Ethics Committee of the Universidad de La Frontera. The general findings of records and panoramic radiographs were managed according to ethical principles, safeguarding the confidentiality of sensitive data.

The measurements were performed directly on panoramic radiographs by a single operator, which was calibrated by an expert orthodontist. For calibration intraoperator 10 random radiographs were taken which were measured twice with a week difference between both. The intra class correlation coefficient (ICC) Fleiss was used to quantify the reliability of the measurements (Fleiss & Cohen, 1973). The strength of concordance obtained was ICC 0.997 (>0.90 very good). The materials used for measurements were acetate paper for plotted negatoscope, pencil lead chuck 0.5 mm and Goniometer (BaselineTM CE Diagnostic and Measuring Instruments).

Horizontal location of the impacted canine was measured using the sectoral method of Ericson & Kurol (1987) and modified by Lindauer et al. (1992) (Fig. 1). Vertical location (Fig. 2) and canine angle was measured according to that described by Power & Short (1993) (Fig. 3). And the distance from the apex of the impacted canine to occlusal plane was measured in relation to that described by Ericson & Kurol (1987) (Fig. 3).

To collect data a spreadsheet was designed in Microsoft Office Excel 2010, for further statistical analysis (IBM SPSS Statistics for Windows version 20.0, IBM Corp., Armonk, NY). Chi Square test of Pearson, Fisher exact test and t test for independent samples were performed. A value of p<0.05 was chosen as the threshold for statistical significance.
RESULTS

The prevalence was 2.3% overall child population. 31 subjects had one or both impacted canines. Average age was 10.77±2.45 years; 61.3% were women. 35.5% (11 subjects) presented bilateral canine retaining, 64.5% (20 subjects) presented unilateral retaining, of which 29% (9 subjects) was only right side and 35.5% (11 subjects) only the left side, obtaining a total of 41 impacted canines. Distance to occlusal plane 19 mm on average. In relation to the vertical location at the highest percentage of canine teeth retained (48.7%) was found in the apical third (Table I). Relative to the horizontal location the higher percentage (77.6%) was found in the sectors 1, 2 and 3 (Table II). When analyzing the canine angle it was found that 83% measured 31 degrees or more (Table III). Root resorption of 2 lateral incisors as a result of canine adjacent retention was observed, this resorption was observed in the root apical third. None of the measured variables were statistically significant.

<p>| Table I. Distribution of impacted maxillary canine teeth retained relative to its vertical location. |
|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Apical third</th>
<th>Middle third</th>
<th>Coronal third</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>20</td>
<td>13</td>
<td>8</td>
<td>41</td>
</tr>
<tr>
<td>Percentage</td>
<td>48.7%</td>
<td>31.7%</td>
<td>19.5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<p>| Table II. Distribution of impacted maxillary canine teeth retained in relation to its horizontal location. |
|-------------------------------------------------|------------|------------|------------|------------|</p>
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Sector 1</th>
<th>Sector 2</th>
<th>Sector 3</th>
<th>Sector 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>20</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>41</td>
</tr>
<tr>
<td>Percentage</td>
<td>47.6%</td>
<td>14.3%</td>
<td>16.7%</td>
<td>21.4%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<p>| Table III. Distribution of maxillary canines relative to the size of canine angle. |
|----------------------------------|-------------|-------------|-------------|----------|----------|------------|-------------|----------|</p>
<table>
<thead>
<tr>
<th>Frequency</th>
<th>10° – 20°</th>
<th>21° – 30°</th>
<th>31° – 40°</th>
<th>41° – 50°</th>
<th>51° – 60°</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>5</td>
<td>23</td>
<td>7</td>
<td>4</td>
<td>41</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>4.8%</td>
<td>12.2%</td>
<td>56.1%</td>
<td>17.1%</td>
<td>9.8%</td>
<td>100%</td>
</tr>
</tbody>
</table>

DISCUSSION

Determined by radiographic analysis, the prevalence of impacted canines and factors associated with their retention in patients between 8 and 16 years treated at the Faculty of Dentistry of the Universidad de La Frontera, were the main objectives of this study.

The prevalence of this study (2.3%) was found to be similar to that reported in the international literature on epidemiological studies in European general population ranging from 1–3% (Peck et al., 1994). However it is lower than that reported by Aydin et al. (2004) who found a 3.29% in a population of Turkey and found by Patil & Maheshwari (2014) which was 9.7% in India.

When observing the prevalence of orthodontic patients from these consultations were also higher to those found in our study in Mexico (Güere Rochebaum & Silva Meza, 2013), observed a canine retaining of 5.3% (Becker et al., 1981), reported a prevalence of 13.9% (Lempesi et al., 2014) obtained 5.6% of canine retaining.

According to sex in this study was observed more frequently (not statistically significant) in women, coinciding with those reported by other authors, as Nieri et al. (2010), Becker et al., Lempesi et al., who reported in their studies a higher retention in women.
In this study canine retaining occurred more frequently unilaterally than bilaterally, predominantly on the left side, being this distribution similar to that found by Becker et al., who reported higher unilateral percentage (54.6%) than bilateral (45.4%). Lempesi et al. report an unilaterality of 65.7% of cases as in all studies analyzed in Peck et al., unilateral retaining was higher; Stewart et al. (2001) found 61% of unilateral and bilateral 38.3%, but unlike our study they found higher percentage (50.8%) of retaining at the right side.

When analyzing horizontal location of the impacted canines of our population the highest percentage stood at sectors I, II and III being similar that found by Jung et al. (2012) in children under 15 years (Warford et al., 2003; Lindauer et al.).

Regarding the mesial angulation of canine, our study found that 83% of cases measured 31 degrees or more which coincides with the findings of Sajnani & King (2012) that was 30 degrees, this could be related to canines rooted in formation, which to be included in King (2012) that was 30 degrees, this could be related or more˚ which coincides with the findings of Sajnani &

83% of cases measured 31 degrees with a minimum of 10.5 to a maximum of 69 degrees. In Nieri et al., the average size of the canine angle was 36 degrees similar to ours that was 36.2 degrees, a standard deviation of 10.29 degrees than 35 degrees. In Nieri et al., a low percentage (35.4%) of cases with higher angle˚ was 36 degrees similar to ours that was 15 mm.

In relation to resorption of lateral incisors this occurred in 4.7% of subjects resulting in a prevalence of 0.1%, in contrast to what was found by Ericson & Kurol (1987) that was 12% of cases with a prevalence of 0.7% and from the study of Schindel & Sheinis (2013) in which root resorption of lateral incisors was 21.8%.

CONCLUSION

The prevalence found is similar to that reported in the international literature. It occurred more frequently in women, unilaterally, with a slight preference for the left side. The canine angle was located more frequently in the sectors I, II and III; All these variables were not statistically significant.

REFERENCES


Dirección para Correspondencia:
Prof. Paulo Sandoval Vidal
Departamento de Odontopediatría y Ortodoncia
Facultad de Odontología
Universidad de La Frontera
Manuel Montt 115
Temuco
CHILE
Email: paulo.sandoval@ufrontera.cl

Recibido : 02-05-2015
Aceptado: 03-06-2015