PREVALENCE AND LOCALIZATION OF IMPACTED CANINE AMONG AL-QURAYYAT ORTHODONTIC PATIENTS: A STUDY CONDUCTED OVER THE PERIOD OF 4 YEARS

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ABSTRACT

Objective of this study was to highlight the prevalence of impacted canines in orthodontic patients of Al-Qurayyat, Al-Jouf, Saudi Arabia. Two thousand two hundred and thirty nine patients visiting the Department of Orthodontics, Qurayyat Specialized Dental Center, were included in this study. The study was conducted from year 2012 to 2015.

Frequency and percentages of the patients were recorded. Total number of males were n=836(37.34%) and females n= 1403(62.66%). The mean age of the patients was 22.92 ± 8.43. N=97/2239(4.33%) patients were diagnosed with impacted canines. Maxilla was the most common site of impaction, n=89/97(91.75%). Within maxilla, impacted canines were seen mostly as unilateral n=75(84.27%) and on left side n=59(66.3%).

Key Words: Impacted canines; maxilla; unilateral.

INTRODUCTION

Failure of the eruption of permanent teeth is commonly encountered dental anomaly.1 Impacted teeth are labelled those which have a delayed eruption time or that are partially erupted based on clinical and radiographic features.2 Impacted teeth lead to many problems like aberrant tooth movement, unacceptable esthetics, and functional discrepancies. Impaction is a pathological condition known by the delay of the eruption of a tooth into the oral cavity within the expected period and physiological limits of the normal eruption phenomena.3,4,5,6,7 Maxillary canine tooth impaction is frequently seen in the dental setups. Clinical examination and radiographic investigations (panoramic and occlusal radiographs) are primary tools in order to get a correct diagnosis and to develop an appropriate treatment plan.8,9

Maxillary canine is the second most common impacted tooth following third molars.10,11 According to the literature review, the incidence of impacted maxillary canine ranges from 0.92% to 4.3%.3,4,12,13 Maxillary canines are important teeth in terms of aesthetics and function.14,15

The common causes of canine impaction are usually localized and related to factors associated with this anomaly. Some of the causes are: prolonged retention or early loss of the deciduous canine, ankylosis, lack of space due to tooth size/ arch length discrepancies, anomalies in size and shape of adjacent lateral incisors or lack thereof, failure in the root resorption of the deciduous canine, excessive width of the palate, supernumerary teeth, trauma, dilaceration of the root, presence of an alveolar cleft, cleft lip and/or palate, premature closure of the root apex, rotation of the permanent tooth germ
and transverse maxillary deficiency.\textsuperscript{16,17,18,19,20} Since there is no published data regarding the prevalence and the location of impacted permanent canine in orthodontic population of Al Qurayyat, Al Jouf, Saudi Arabia, this study is one of its own kind regarding this issue.

**METHODOLOGY**

The results of 2239 patients attending the department of orthodontics, Qurayyat Specialized Dental Center, AL Qurayyat, Al Jouf, Saudi Arabia, between 2012 and 2015 were evaluated.

A written informed consent was obtained from all the patients. Ethical clearance was obtained from the institutional ethical committee. The data were collected from the patient records by a single researcher from the department of orthodontics. All the patients under went intraoral examination, palpation followed by panoramic, occlusal and periapical radiographs. Only those with permanent dentition fulfilled the inclusion criteria. Clark’s rule was followed for all intraoral periapical radiographs, if required to localize the position of the impacted canine, dental CT scans were advised. Patients with systemic disease, hereditary disease such as Down’s syndrome, history of trauma to the maxilla or mandible and local pathological condition such as developmental cyst, were excluded from the study. A tooth was considered to be impacted when it was obstructed by the adjacent teeth, bone, or soft tissue.\textsuperscript{2}

Data were analyzed by using SPSS statistical package version 22. The groups were compared by using chi-square test and P < 0.05 was considered significant.

**RESULTS**

Age range was 15-59 years with mean 22.92 ± 8.43. Maxilla was the most common site of impaction, n=89/97(91.75%). Within maxilla, impacted canines were seen mostly as unilateral n=75(84.27%) and on left side n=59(66.3%).

**DISCUSSION**

Normal Impacted teeth are a common finding in dental setups. Numerous studies have been conducted on incidence and prevalence of these teeth. Sample size, grouping methods, clinical examination and radiographic confirmations have been different in various studies making it difficult to compare results of the present study with them. Current study showed that maxillary canine were impacted in n=89/2239(3.97%)

### TABLE 1: DISTRIBUTION BY GENDER N=2239

<table>
<thead>
<tr>
<th>Sex of the patient</th>
<th>Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>836</td>
<td>37.34%</td>
</tr>
<tr>
<td>Female</td>
<td>1403</td>
<td>62.66%</td>
</tr>
<tr>
<td>Total</td>
<td>2239</td>
<td>100%</td>
</tr>
</tbody>
</table>

### TABLE 2: THE DISTRIBUTION OF IMPACTED CANINE ACCORDING TO LOCATION AND GENDER

<table>
<thead>
<tr>
<th>Gender</th>
<th>Maxilla</th>
<th>Mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
<td>Right</td>
</tr>
<tr>
<td>Male</td>
<td>16(27.1%)</td>
<td>5(31.25%)</td>
</tr>
<tr>
<td>Female</td>
<td>43(72.9%)</td>
<td>11(68.75%)</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>16</td>
</tr>
</tbody>
</table>

### TABLE 3: THE DISTRIBUTION OF IMPACTED CANINE ACCORDING TO AGE

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of patients</th>
<th>Percentage</th>
<th>Number of impacted canines</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-25</td>
<td>1647</td>
<td>73.56</td>
<td>17</td>
<td>17.5</td>
</tr>
<tr>
<td>&gt;25</td>
<td>592</td>
<td>26.44</td>
<td>80</td>
<td>82.5</td>
</tr>
<tr>
<td>Total</td>
<td>2239</td>
<td>100</td>
<td>97</td>
<td>100</td>
</tr>
</tbody>
</table>

### TABLE 4: THE DISTRIBUTION OF IMPACTED CANINE ACCORDING TO THE SITE OF THE IMPACTION

<table>
<thead>
<tr>
<th>Position</th>
<th>Maxilla</th>
<th>Mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of impacted canines</td>
<td>Percentage</td>
</tr>
<tr>
<td>Palatal</td>
<td>76</td>
<td>85.4</td>
</tr>
<tr>
<td>Buccal</td>
<td>13</td>
<td>14.6</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>100</td>
</tr>
</tbody>
</table>
patients overall. Distribution among the gender has been studies in various studies and most of them have reported that female to male ratio is more; 3:1 in most of the studies, as far as impacted canines and supernumerary teeth are concerned. This study showed the similar result and the ratio calculated was 2:1. There have been lots of hypothesis regarding the occurrence of supernumeraries and impacted teeth more commonly in females than males. One of them states that the smaller cranium in females is the cause, other emphasizes that females are more concerned about their esthetics as compared to males and that is why they seek the orthodontic treatment more frequently and thus are diagnosed on routine examinations and radiographs with these conditions.21

Impacted mandibular canines in the present study were n=8/97(8.25%) only. The dissimilarity between the prevalence of these teeth in maxilla and mandible is attributed to the fact that maxillary canines are last teeth to develop and they have to travel a long path before coming into the occlusion. During this path of eruption the chances of mechanical obstruction and displacement are high.22

There are few clinical signs which can raise a suspicion of the clinician towards the presence of impacted maxillary canine during routine clinical examination in dental office, e.g. Deciduous canine retained beyond 14-15 years of age, permanent canine failed or delayed to erupt into its anatomical location in the arch, normal labial canine bulge could not be palpated buccally, presence of palatal bulge and tipping, rotation or migration of the permanent lateral incisor.23,24

In this study the unilateral impaction of the maxillary canine was seen more commonly n=75(84.27%). Left side of the maxilla was affected more than the right n=59(66.3%). These findings are consistent with study conducted by Ali Gashi et al21 which showed that unilateral impaction was more common (75.6%) and left side was mostly affected (43.51%). Some studies have concluded that bilateral impaction is more common.25

The location of the impacted maxillary canine has also been studied extensively in different studies. Palataly placed impacted canine was more frequently seen in many studies.26,27 Our study also revealed that palatal location of these teeth was more common than the labial (85.4%). In contrast, studies conducted by Kim et al28 and Zhong et al29 proved that greater prevalence of labial impaction exists in these populations possibly due to racial and genetic differences.

A classification system has been determined in order to label canine tooth location and position once diagnosed as impacted tooth. Class I: Impacted canine located palataly, Class II: Impacted canine located labial, Class III: Impacted canine located both labial and palatal, Class IV: Impacted canine located vertically between premolars and incisors, Class V: Impacted canine in edentulous jaw, Class VI: Aberrant position of canine e.g. near to infraorbital rim or near to antral wall. This classification helps determine the severity of impaction as well as probable surgical approach and planning in order to expose or remove the tooth.3,4

The clinician can investigate and diagnose the presence of impacted cuspid by using visual examination, digital palpation of the ridge, X-ray – orthopantomogram, X-ray occlusal view and CT/CBCT.32 Cone beam computed tomography (CBCT) has proven to be more accurate than any other diagnostic modality in localizing the impacted tooth. It not only confirms the exact location of the tooth but also helps determine the clinician the proximity of the vital structures to the tooth e.g. nerves, maxillary sinus, nasal floor, infraorbital rim or floor, adjacent tooth roots, etc. Since CBCT is costly, time consuming and patient is exposed to radiations, it is not used routinely as diagnostic investigation.7,30

Early detection, accurate treatment planning and execution are the main stay for these dental conditions. If properly and timely done, might prevent the patient from esthetic and functional discrepancies. A dental surgeon should also have an idea of the prevalence of these dental anomalies among the population he or she is dealing with in dental offices. By doing so, early detection and better treatment results can be achieved which will benefit the patient in long term. Our study provides useful information and statistics regarding these issues.

CONCLUSION

According to the results of the study the incidence of the impacted canine in the selected population is estimated to be 4.33%. Maxilla compared to the mandible was more frequently involved bone and female predilection was high. Most of these teeth were Palataly impacted falling in the Class I of canine impaction classification system (85.4%). Mandibular impacted cuspid teeth were mostly located buccaly i.e. 5 out of 8 cases (62.5%). Maxillary left quadrant and mandibular right was more commonly affected side i.e. 59/89 (66.23%) and 5/8 (62.5%) respectively. Most of the patients diagnosed with the above mentioned dental anomaly were >25 years of age, n=80/97 (82.5%). This shows that they were late in the diagnosis and treatment of their condition and should have been screened earlier in their life to achieve the best possible post treatment results.

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CONTRIBUTION BY AUTHORS

1 Mohammad Raji Alrwuili: Manuscript writing
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4 Khurram Latif: Manuscript writing
5 Mohammed Ahmed Aljabab: Formulation of results
6 Mohamad Mosbah Sabsabi: Data collection


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