

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

<sup>1</sup>MOHAMMAD RAJI ALRWUILI

<sup>2</sup>YOUSEF MUSARRAH ALANAZI

<sup>3</sup>NASSER ATTALLAH ALENZI

<sup>4</sup>KHURRAM LATIF

<sup>5</sup>MOHAMMED AHMED ALJABAB

<sup>6</sup>MOHAMAD MOSBAH SABSABI

## 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  $22.92 \pm 8.43$ .  $N=97/2239(4.33\%)$  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.<sup>1</sup> Impacted teeth are labelled those which have a delayed eruption time or that are partially erupted based on clinical and radiographic features.<sup>2</sup> Impacted teeth lead to many problems like aberrant tooth movement, unacceptable esthetics, and functional discrepancies.

Impaction is a pathological condition known by

<sup>1</sup> Mohammad Raji Alrwuili, General Dentist, Qurayyat Specialized Dental Center, Al-Qurayyat, Saudi Arabia. Makkah Street, District Hosaida, Al-Qurayyat Cell: +966-583829999 Email: Moh.alruwaily@gmail.com

<sup>2</sup> Yousef Musarraah Alanazi, Registrar, Oral Medicine, Qurayyat Specialized Dental Center, Al-Qurayyat, Saudi Arabia Cell: +966-508070522

<sup>3</sup> Nasser Attallah Alenzi, General Dentist, Qurayyat Specialized Dental Center, Al-Qurayyat, Saudi Arabia Cell: +966-500666375

<sup>4</sup> Khurram Latif, Specialist, Oral and Maxillofacial Surgeon, Qurayyat Specialized Dental Center, Al-Qurayyat, Saudi Arabia Cell: +966-508248985

<sup>5</sup> Mohammed Ahmed Aljabab, General Dentist, Qurayyat Specialized Dental Center, Al-Qurayyat, Saudi Arabia Cell: +966541464183

<sup>6</sup> Mohamad Mosbah Sabsabi, Consultant, Orthodontist, Qurayyat Specialized Dental Center, Al-Qurayyat, Saudi Arabia Cell: +966-503038089

**Received for Publication:** February 21, 2016  
**Approved:** March 8, 2016

the delay of the eruption of a tooth into the oral cavity within the expected period and physiological limits of the normal eruption phenomena.<sup>3,4,5,6,7</sup> 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.<sup>8,9</sup>

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

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.<sup>16,17,18,19,20</sup> 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 peri-

apical 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.<sup>2</sup>

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  $22.92 \pm 8.43$ . 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

Sex of the patient	Patients	Percentage
Male	836	37.34%
Female	1403	62.66%
Total	2239	100%

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

Gender	Maxilla			Mandible		
	Left	Right	Bilateral	Left	Right	Bilateral
Male	16(27.1%)	5(31.25%)	4(28.57%)	1(33.3%)	2(40)	0(0%)
Female	43(72.9%)	11(68.75%)	10(71.43%)	2(66.7%)	3(60)	0(0%)
Total	59	16	14	3	5	0

TABLE 3: THE DISTRIBUTION OF IMPACTED CANINE ACCORDING TO AGE

Age	Number of patients	Percentage	Number of impacted canines	Percentage
15-25	1647	73.56	17	17.5
>25	592	26.44	80	82.5
Total	2239	100	97	100

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

Position	Maxilla		Position	Mandible	
	Number of impacted canines	Percentage		Number of impacted canines	Percentage
Palatal	76	85.4	Lingual	3	37.5
Buccal	13	14.6	Buccal	5	62.5
Total	89	100	Total	8	100

patients overall. Distribution among the gender has been studied 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.<sup>21</sup>

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.<sup>22</sup>

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.<sup>23,24</sup>

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 al<sup>21</sup> 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.<sup>25</sup>

The location of the impacted maxillary canine has also been studied extensively in different studies. Palatally placed impacted canine was more frequently seen in many studies.<sup>26,27</sup> 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 al<sup>28</sup> and Zhong et al<sup>29</sup> 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 palatally, Class II: Impacted canine located la-

bial, 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.<sup>3,4</sup>

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.<sup>32</sup> 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.<sup>7,30</sup>

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 Palatally impacted falling in the Class I of canine impaction classification system (85.4%). Mandibular impacted cuspid teeth were mostly located buccally i.e. 5 out of 8 cases (62.5%). Maxillary left quadrant and mandibular right was more commonly affected site 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.

## REFERENCES

- 1 Haghnegahdar A, Najafi HZ, Abdollahi S. Prevalence and Localization of Impacted Canine Teeth in Both Jaws Using

- Panoramic Radiograph in a Selected Iranian Population, Shiraz, 2012. *GMJ* 2014; 3(1): 24-28.
- 2 Patil S, Maheshwari S, Santosh BS, Khandelwal S. *Universal Research Journal of Dentistry* 2014; 4(3): 148-52.
  - 3 Watted N, Abu-Hussein M. Prevalence of impacted canines in Arab Population in Israel. *International Journal of Public Health Research* 2014; 2(6): 71-77.
  - 4 Roberts-Harry D, Sandy J. *Orthodontics. Part 10: Impacted teeth. Br Dent J* 2004; 196: 319-27.
  - 5 Zahrani AA. Impacted cuspids in a Saudi population: prevalence, etiology and complications. *Egypt Dent J* 1993; 39: 367-74.
  - 6 Aydin U, Yilmaz HH, Yildirim D. Incidence of canine impaction and transmigration in a patient population. *Dentomaxillofac Radiol* 2004; 33: 164-69.
  - 7 Wedl JS, Danias S, Schmelzle R, Friedrich RE. Eruption times of permanent teeth in children and young adolescents in Athens (Greece). *Clin Oral Investig* 2005; 9: 131-34.
  - 8 Junqueira Da Silva A, Cruz De Morais C, Neves Cury M, Vieira Cury SE. Impacted Maxillary Canines: Frequency in a Brazilian population. *WebmedCentral Oral Medicine* 2013; 4(11): 1-6.
  - 9 Britto AM, Fraga CFF, Goursand D, Costa EM, Grossi E, Rocha Jr JFR. Impactação de caninos superiores e suas conseqüências: relato de caso clínico. *J Bras Ortodon Ortop Facial* 2003; 8(48): 453-59.
  - 10 Grover PS, Lorton L. The incidence of unerupted permanent teeth and related clinical cases. *Oral Surg Oral Med Oral Pathol* 1985; 59(4): 420-25.
  - 11 Thilander B, Jakobsson S. Local factors in impaction of maxillary canines. *Acta Odontol Scand* 1968; 26(1-2): 145-68.
  - 12 Jacobs SG. The impacted maxillary canine. Further observations on aetiology, radiographic localization, prevention/interception of impaction, and when to suspect impaction. *Aust Dent J* 1996; 41: 310-16.
  - 13 Sağlam AA, Tüzüm MS. Clinical and radiologic investigation of the incidence, complications, and suitable removal times for fully impacted teeth in the Turkish population. *Quintessence Int* 2003; 34: 53-59.
  - 14 Veli I, Yuksel B, Uysal T. Prevalence of Maxillary Permanent Canine Impaction in Relation to Anomalous Lateral Incisors. *Turkish J Orthod* 2015; 27(3): 90-99.
  - 15 Ericson S, Kurol J. Longitudinal study and analysis of clinical supervision of maxillary canine eruption. *Community Dent Oral Epidemiol* 1986; 14: 172-76.
  - 16 Graciano MJG. Tracionamento de canino impactado. Instituto de Ciências da Saúde. Monografia (Especialização), FUNORTE/SOEBRAS, 2010.
  - 17 Pereira CCS, Jardim ECG, Carvalho ACGS, Gealh WC, Cursino MN, Garcia Jr IR. Surgical-Orthodontic traction for impacted maxillary canines: a critical review and suggested protocol. *Stomatol* 2012; 34(1): 78-83.
  - 18 Maahs MAP, Berthold TB. Etiologia, diagnóstico e tratamento de caninos superiores permanentes impactados. *R. Ci. Méd Biol* 2004; 3(1): 130-8. 19. Jacoby H. The etiology of maxillary canine impactions. *Am J Orthod* 1982; 84(2): 125-32.
  - 19 Tito, MA, Rodrigues RMP, Guimarães JP, Guimarães KAG. Bilaterally impacted upper canines. *RGD* 2008; 56(2): 15-19.
  - 20 Al-Nimri K, Gharaibeh T. Space conditions and dental and occlusal features in Patients with palatally impacted maxillary canines: an aetiological study. *Eur J Orthod* 2005; 27(5): 461-65.
  - 21 Gashi A, Kamberi B, Abdyli RA, et al. The incidence of impacted maxillary canines in a Kosovar population. *Inter Schol Research Notices* 2014; 1-4.
  - 22 Mustafa RA, Auaffan AH. Prevalence of impacted canines among Sudanese university students. *Braz Dent Sci* 2014; 17(4): 27-33.
  - 23 Kamilogu B, Kelahmet U. Prevalence of impacted and transmigrated canine teeth in a Cypriot orthodontic population in the Northern Cyprus area. *BMC Research notes* 2014; 7: 346.
  - 24 Manne R, Gandikota C, Juvvadi SR, Rama HR, Anche S. Impacted canines: etiology, diagnosis and orthodontic management. *J Pharm Bioallied Sci* 2012; 4: 5234-38.
  - 25 C. Marzola, *Fundamentos De Cirurgia Buco maxilo facial*, CDR, Independente, Bauru, Brazil, 2005.
  - 26 Liu DG, Zhang WL, Zhang ZY, Wu YT, Ma XC. Localization of impacted maxillary canines and observation of adjacent incisor resorption with cone-beam computed tomograph. *Oral Surg Oral Med Oral Pathol Oral radio Endodont* 2008; 105(1): 91-98.
  - 27 Chaushu S, Chaushu G, Becker A. The role of digital volume tomography in the imaging of impacted teeth. *World J Ortho* 2004; 5(2): 120-32.
  - 28 Kim Y, Hyun XL, Jang KT. The position of maxillary canine impactions and the influenced factors to adjacent root resorption in the Korean population. *Eur J Orth* 2012; 34(3): 302-6.
  - 29 Zhong YL, Zeng XL, Jia QL, et al. Clinical investigation of impacted maxillary canine. *Zhonghua Kou Qing Yi Xue Za Zhi* 2006; 41(8): 483-85.
  - 30 Ericson S, Kurol J. Radiographic examination of ectopically erupting maxillary canines. *Am J Othod Dentofacial Orthop* 1987; 91(6): 483-92.

#### CONTRIBUTION BY AUTHORS

- |                                     |                        |
|-------------------------------------|------------------------|
| <b>1 Mohammad Raji Alrwuili:</b>    | Manuscript writing     |
| <b>2 Yousef Musarrahan Alanazi:</b> | Data collection        |
| <b>3 Nasser Attallah Alenzi:</b>    | Formulation of results |
| <b>4 Khurram Latif:</b>             | Manuscript writing     |
| <b>5 Mohammed Ahmed Aljabab:</b>    | Formulation of results |
| <b>6 Mohamad Mosbah Sabsabi:</b>    | Data collection        |