

Incidence Of Canine Impaction In Palestinian Population

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ABSTRACT

The objective of this study was to determine the prevalence of impacted maxillary canine in patients in Arabs Community in Israel (ARAB 48, Israel) visiting our Center For Dentistry, Research & Aesthetics, Jatt, Almothalath, Israel, 4250 patients. This study comprises data from patients who attended the out-patient department 2200 patients between June 2006 and December 2013. Patients were examined in order to detect the impacted maxillary canines by intraoral examination, palpation, dental records and followed by radiographs. It was found that the prevalence of canine impaction was 0.8% ($n = 4250$), 1.6 ($n = 2200$), 43.9 ($n = 82$) in males and 1.1% ($n = 4250$), 2.1 ($n = 2200$), 56.1 ($n = 82$) in females suggesting that prevalence of impacted maxillary canines is more in females than males and it is statistically significant. The overall prevalence for maxillary impacted canines was found to be 3.7% ($n = 2200$), which suggested that it is much higher than previous studies. The results of this study were slightly different than other studies, while the dissimilarities may be attributed to the sample selection, method of the study and area of patient selection, which suggest racial and genetic differences.

Keywords: Clark's rule, Impacted canines, panoramic radiography, prevalence

INTRODUCTION

The canine is the cornerstone of the dental arch. It plays a vital role in facial appearance, dental esthetics, arch development, and functional occlusion.^[1] It has the longest period of development and the most tortuous route to full occlusion, and it is for this reason that it is considered to be the third most common tooth to be impacted, next to mandibular and maxillary third molars. The prevalence of impacted maxillary canines ranges from a minimum of 0.92% to a maximum of 4.3%.^[2-4] Impaction is a pathological condition defined by the lack of eruption of a tooth in the oral cavity within the time and physiological limits of the normal

eruption process.^[5-7] Treatment options for this condition include observation, extraction, autotransplantation, and orthodontic alignment. Accurate assessment of the position of the impacted canine, in three planes of space, is essential for determining the most appropriate treatment and benefit of the patient.^[8,9] This is based on a combination of clinical and radiographic findings.

The orthodontic treatment of impacted maxillary canine remains a challenge to today's clinicians. The treatment of this clinical entity usually involves surgical exposure of the impacted tooth, followed by orthodontic traction to guide and align it into the dental arch. Bone loss, root resorption, and gingival recession around the treated teeth are some of the most common complications.^[10-13] Early diagnosis and intervention could save the time, expense, and more complex treatment in the permanent dentition. Tooth impaction can be defined as the infraosseous position of the tooth after the expected time of eruption, whereas the anomalous infraosseous position of the canine before the expected time of eruption can be defined as a displacement.^[10,11,14] Most

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of the time, palatal displacement of the maxillary canine results in impaction. With early detection, a timely interception and well-managed surgical and orthodontic treatment, impacted maxillary canines can be allowed to erupt and be guided to an appropriate location in the dental arch. However, it is only with interdisciplinary care of general dentists and specialists that impacted maxillary canines can be treated successfully.^(1,8,15-17)

The aim of this study was to perform a clinical and statistical research on permanent impacted canine patients among those with dental impaction referred to and treated at the Center for Dentistry, Research and Aesthetics, Jatt, Israel, over a 7 years period (2006-2013).

The study highlights, statistically, the localization, distribution according to gender and age, quadrants, skeletal maturation, the correlation with other dental anomalies of maxillary canine impaction.

MATERIALS AND METHODS

A clinical and statistical study a study performed by sampling, transversally and retrospectively, of the X-rays, models, and photos of patients who came to the orthodontist for a specialty examination during 2006-2013. The patients included in the study were aged between 12 and 39, 5 years old and had late mixed dentition and permanent dentition. In point of skeletal development, the patients belonged to stages CS4-CS6.

In order to obtain the results aimed at, clinical and paraclinical (X-rays, photos and models) studies (tests) of the patients with canine impaction were performed.

The examination of the X-rays focussed on the following:

1. Skeletal development (cervical stages) and a possible correlation with the biological age
2. Localization of the impaction on the quadrant and the relation to the middle of the alveolar ridge (buccal, middle of the ridge or palatin). This localization is purely theoretical, the surgical approach to discover the canine being B or P, followed by the creation of a tunnel from the level uncovered up to the middle of the alveolar ridge (the place where we wish to position the canine) – The newest, most conservative method from the point of view of periodontal health
3. Distribution of the canine impaction according to sex and age
4. Ectopic impactions (the possible M3 impactions will not be taken into consideration)
5. Depth of the impaction

6. A-P position of the apex of the canine
7. Existence of coexistent a D-M or of complications (eruption cyst)
8. Location of the crown of the canine as against interleukin (IL)
9. Axis (orientation) of the respective canine - angulation of the canine or angle of the impaction
10. Degree of overlapping on IL
11. Preservation or absence of the necessary space for the eruption of the impacted canine, persistence of the temporary canine at the level of the arch.

The clinical examination, the models, and the photos were performed in the clinic, and they aimed at showing:

- a. The type of impaction
- b. The esthetic troubles determined by the canine impaction (dental anomalies in point of shape and volume associated to maxillary IL; consecutive position anomalies - Quintero's sign - pathognomonic for the canine impaction: MV rotation IL adjacent to the impaction)
- c. The functional troubles (anterior and lateral guidance).

Furthermore, by reviewing clinical records, we were able to establish whether the patient was referred by a specialist (orthodontist, dentist, general physician), or presented spontaneously. Finally, we analyzed the surgical protocols and the type of treatment applied to each patient (combined surgical-orthodontic or odontectomy). Data were collected into a Microsoft Excel file and processed with the Epi Info system.

Clinical protocol

This study comprised data from 2200 patients who attended the out-patient department of Center For Dentistry Reaserch and Aesthetics, Jatt, Hamisholash, Israel, between January 2006 and December 2013 out of which 1797 were males and 2453 were females. Patients were examined in order to detect the impacted maxillary canines by intraoral examination, palpation, dental records and followed by radiographs. All radiographs were examined carefully by a single skilled dentist on a transparency projector under constant lighting conditions. A tooth that was prevented from erupting by a physical barrier was defined as an impacted tooth. Taking into account the mean eruption time, canines were considered as impacted when they remained in the jaw minimum 2 years after the respective mean age of tooth eruption. For the purpose of this study the cases of age more than 10.2-39.5 years were considered and were defined in groups according to

the gender. Whenever Ericson's criteria for palpation were breached, radiographs were advised. For each case thorough clinical examination was done by conventional methods like inspection and palpation to find out any retained deciduous canine, bulge of canine, splaying of lateral incisors, lost space, crowding or fibrous tissue overlying canine region. Cases in which conventional examination methods revealed that the maxillary canine was impacted and if the patient was ready for the orthodontic treatment then radiographs were advised, which helped in determining the type of impaction i.e. palatal or labial and whether it was favorable or non-favorable.

Radiographs such as intraoral periapical radiographs, which follow the Clark's rule and panoramic radiographs or dental computerized tomography scans were advised. The mandibular canine is much less of a concern because it is almost 10 times less frequently impacted. After the examination of the patient records, patients who exhibited one or more of the following pathological situations were excluded from the study:

- a. Any hereditary diseases or syndromes such as Down's syndrome or cleidocranial dysostosis
- b. Any disease, trauma or fracture of the jaw that might have affected the normal growth of a permanent dentition.

Data were gathered and analyzed using the SPSS statistical package (version 12 software). The differences between the groups were tested using the Chi-square test and Mann-Whitney test.

RESULTS

From a total of 4250 orthopantomographies were analyzed 2200 (51.8%) [Table 1], 846 (38.4%) from male patients and 1354 (61.6%) from female [Figure 1 and Table 2]. There were 82 (3.7%) cases of impacted canine [Figure 2 and Table 2], being 36 (43.9%) from male and 46 (56.1%) from female ($P < 0.0001$) [Figure 3 and Table 3].

Ages were in the range of 10.2-39.5 years, with a mean age of 16.3 years [Table 4], in 58 patients (71%), we found unilateral impaction, whereas the remaining

24 (29%) were bilateral. This difference was also statistically significant ($P < 0.0001$). Among the 58 unilaterally impacted canines, were on the left side and were on the right side.

The hemi arch in which the impacted canine occurred more was the upper left side, with female unilateral 36 cases being 20 cases (55.6%) on left and 16 (44.4%) on right in female [Figure 4, Figure 5 and Tables 5, 6]. The localization female impact has been 46 (56%), buccally 6 (13%) and palatally 40 (57%) [Figure 6 and Table 7]. In the male unilateral 22 cases (27%), left 16 (72.7%) and right 6 (27.3%) [Figure 7 and

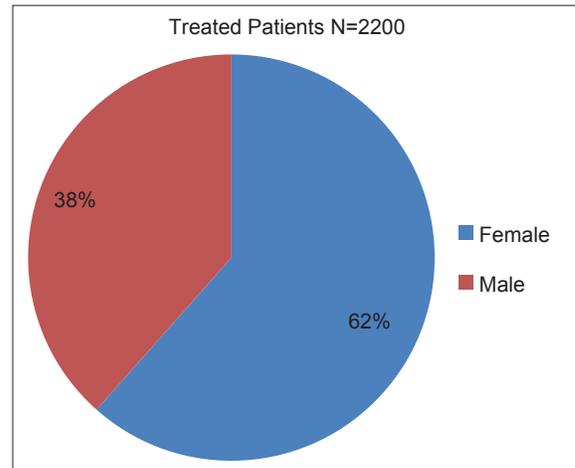


Figure 1: Gender distribution of patients treated

Treated (Orth.)	n=2200	%
Female	1354	61.6
Male	846	38.4
Impacted	82	3.7
Non impacted	2118	96.3

Impacted	n=82	%	% Treated (2200)	% Investigated patients (4250)
Female	46	56.1	2.1	1.1
Male	36	43.9	1.6	0.8

Age, impacted	Min	Max	Average
	10.2	39.5	16.2

Investigated patients	n=4250	%
Female	2453	57.7
Male	1797	42.3
Treated (Orth.)	2200	51.8
Non treated	2050	48.2

Unilateral	n=58	%	% Impacted (82)	% Treated (2200)
Male	22	37.9	26.8	1.0
Female	36	62.1	43.9	1.6

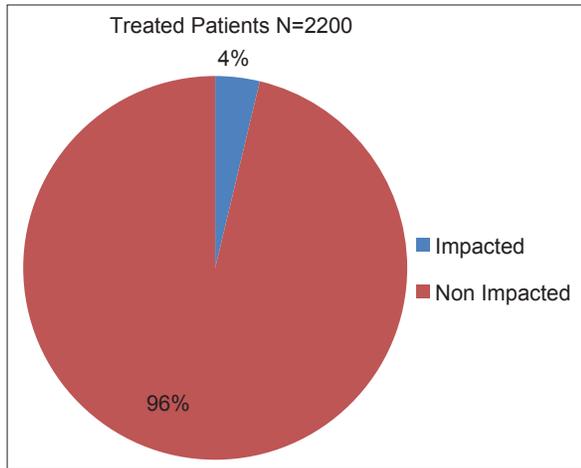


Figure 2: Proportion of patients with retention (blue) and without retention (brown)

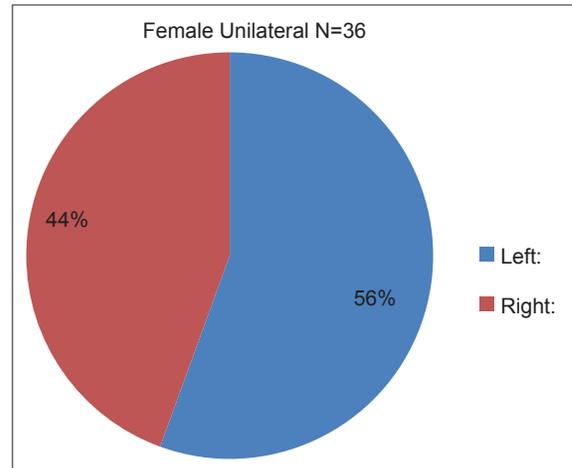


Figure 5: Proportion of unilateral retention by the side at female

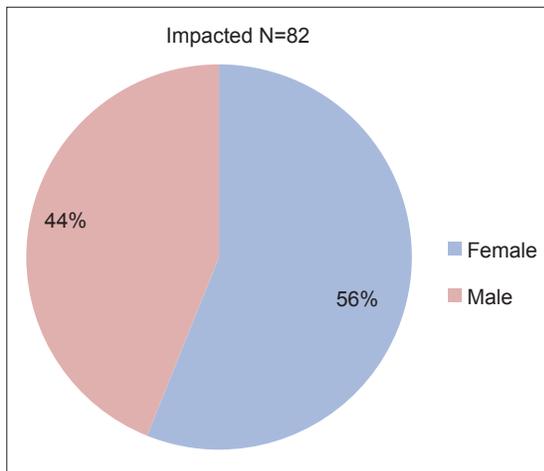


Figure 3: Gender distribution in retention

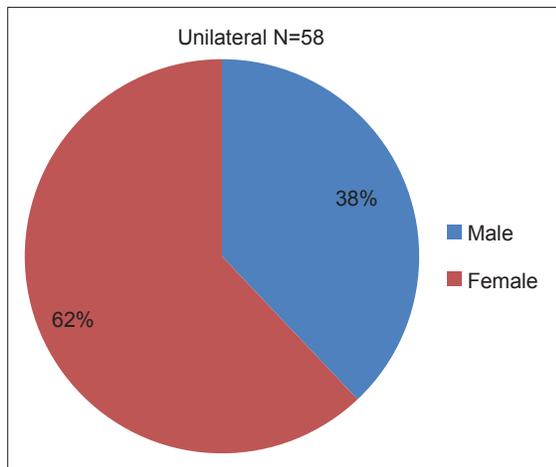


Figure 4: Gender distribution by the unilateral retention

Female unilateral	n=36	%	% Impacted (82)	% Treated (2200)
Left	20	55.6	24.4	0.9
Right	16	44.4	19.5	0.7

Impacted canine: n=82		
Male palatally		25
Male buccally		11
Female palatally		40
Female buccally		6
Total		82

Male unilateral	n=22	%	% Impacted (82)	% Treated (2200)
Left	16	72.7	19.5	0.7
Right	6	27.3	7.3	0.3

Male impacted	n=36	%	% Impacted (82)	% Treated (2200)
Buccally	11	30.6	0.13.4	0.5
Palatally	25	69.4	30.5	1.1

Table 8]. The localization of male impacted has been buccally 11 (30.65%) and palatally 25 case (69.4%) [Figure 8 and Table 9]. The most of these cases

occurred in female palatally 40 cases but in male palatally 25 cases, and in female buccally 6 cases, but male buccally just 11 cases [Figure 6 and Table 7], in general we are found in female unilateral left 20 cases, and right 16 cases, but in male unilateral left 16 cases and in right 6 cases. The impacted canine male bilateral has been 14 cases more, the female

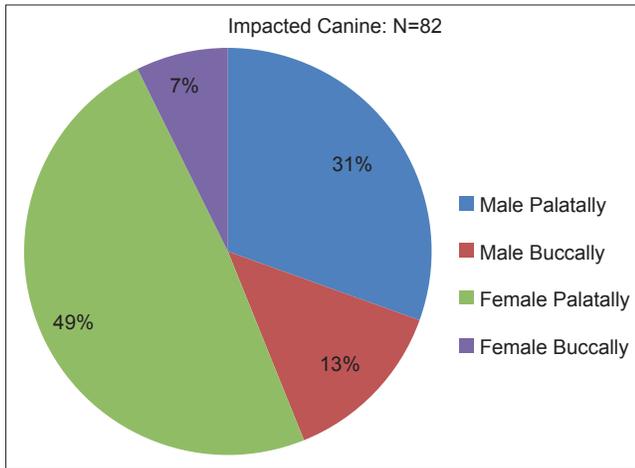


Figure 6: Distribution of retention by gender and location

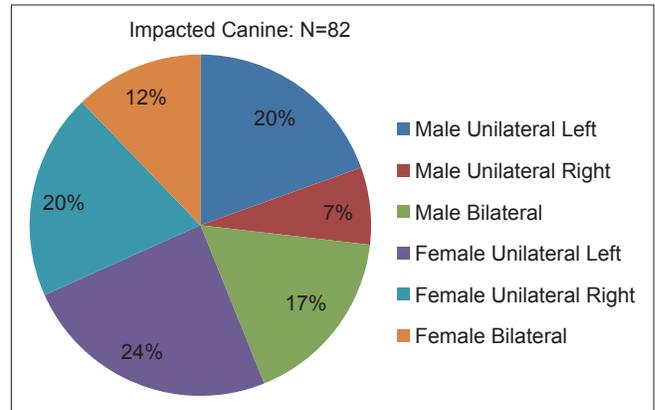


Figure 9: Distribution of retention by gender, side and location

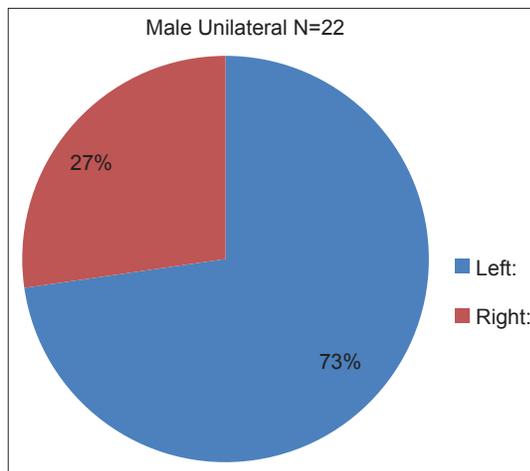


Figure 7: Proportion of unilateral retention by the side at male

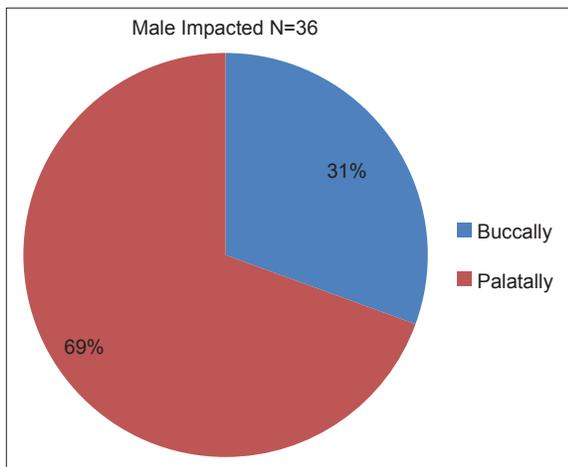


Figure 8: Proportion of unilateral retention by the location at male

Impacted canine: n=82	
Male unilateral left	16
Male unilateral right	6
Male bilateral	14
Female unilateral left	20
Female unilateral right	16
Female bilateral	10
Total	82

DISCUSSION

Many authors have studied the prevalence of impacted canine with a great degree of variation among their results, once they can vary from 0.92 to 2.2%,^[1,10,11,18,19] another ones show results from 0.8 to 2.4%,^[20] 0.9 to 2.5%^[21] and variation from 1 to 2%.^[10,11,18,22,23]

We can find in dental scientific literature many reports that describe the canines impaction prevalence as being 1.89% of all cases of dental impaction,^[24] some show them as being 3.8%,^[15] 5%,^[21] 2.6%,^[25] 1.44%^[26] and 1.40%,^[27] these values show the disagreement of results.

The data above, related to the prevalence found in the literature, don't agree with the results found on this present report, that shows a prevalence of 2.23% of impacted canine among the population [Table 11].

Some studies found that the most of cases of impacted tooth occurred in female.^[16,21,20,28,29] Some authors don't agree with them and with this report, showing in their researches that the most affected gender is male.^[30,24]

bilateral, which is 10 cases [Figure 9 and Table 10]. The prevalence for maxillary impacted canines in all the cases was found to be 3.7%, which suggest that it is much higher than previous studies.

The values found in each one of the genders bring significant differences. Some authors show 75% of cases in female,^[16,21,28] another ones relate the prevalence

Table 11: Research impacted canine among the population

Authors	Impaction prevalence (%)	Gender	More affected bone	Tendency
Fastlicht, 1954; Johnston, 1969		Female 75%		Unilateral
Dachi and Howell, 1961	1.66			
Bishara, 1992; Heydt, 1975; Fournier <i>et al.</i> 1982; Ericson and Kuroi, 1987	0.92-2.2			Maxilla
Mulick, 1979				
Gregori, 1988	5			Maxilla
Grover and Lorton, 1970	1.40			
Kramer and Willians, 1970	1.44			Maxilla
Nitzan <i>et al.</i> , 1981		Male		
Rohrer, 1999	2.06			Maxilla
Melo and Araújo, 1996		Female 63%		
Vasconcellos <i>et al.</i> , 2003	1.89	Male 55.24%		Bilateral
Garib, 1999	0.9-2.5	Female 75%		
Thilander and Jakobsson, 1968; Ericson and Kuroi, 1986; Lindauer and Rubestein, 1992	1-2			Maxilla
Farias <i>et al.</i> , 2003	3.80%			
Present work	0.80%	Female 56.1%		Unilateral

of 63% on female gender;^[29] on this present report is was found an index of 56.1% of female gender.

Dental impaction is more common in maxilla according to this report (62.1%), and in most of cases on the left side. Another study also says that maxilla is more affected.^[31,32,24]

There are also different opinions about the impaction be unilateral or in both sides of the arch. Some studies show that impaction occurring in both sides is more usual,^[21] others present a higher prevalence of unilateral impaction.^[2,9,20,31,32] This present report shows a prevalence of 0.66% of patients with impaction in both sides and 0.8% unilateral impaction. This fact demonstrates that in Arab Community in Israel, there is a higher prevalence of impacted canine occurring in just one side of the arch.^[33]

CONCLUSIONS

Ectopic and impacted canines represent serious disorders for the second dentition. On one hand an important element of occlusion and canine guidance is missing, on the other hand the ectopic tooth represents a potential danger for adjacent teeth with possible resorption, cysts and infections. Often neither the dentist nor the patient is concerned about a retarded eruption of the canine or a persisting deciduous teeth as an indicator for possible impacted canines. Thus the correction of an impacted canine falls into a treatment age, where the development of the dentition is completed or near complete.

The treatment of these patients requires a coordinated, interdisciplinary approach of the dentist, oral surgeon

and orthodontist to reach the functional and esthetic optimum, efficiently and reliable. At the same time, we have to ensure dental esthetics which is preminent of the patient.

This present report concluded that:

1. Impacted canine prevalence is of 3.7%
2. The most of cases occurs in female gender
3. The usual location is on the left of maxilla
4. The more common retention was in just on side of the arch.

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