

Clinical study of impacted maxillary canine in the Arab population in Israel

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Abstract

The objective of the present study was to determine the prevalence of impacted maxillary canine in patients in Arabs Community in Israel (ARAB48,Israel) visiting our Center For Dentistry,Research & Aesthetics,Jatt,Almotalath,Israel, 4250 patients . This study comprises data from patients who attended the O.P.D.2200 patients between Jun. 2006 to Dec 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

Impacted Canines, Prevalence, Clark's Rule, Panoramic, Radiography

1. 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% (3,12,13) 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 (2,4,16). 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 (28,32). 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.(5,6,17,26)

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 (5,6,7). Most of the time, palatal displacement of the maxillary canine results in impaction. With early detection, 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(1,8,9,22,28).

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 & 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.

2. 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 ? 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*
5. Depth of the impaction
6. A-P position of the apex of the canine.
7. Existence of coexistent An D-M or of complications (eruption cyst).
8. location of the crown of the canine as against IL.
9. Axis (orientation) of the respective canine - angulation of
10. the canine or angle of the impaction.
11. Degree of overlapping on IL
12. 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.

*Note: The possible M3 impactions will not be taken into consideration.

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.

3. Clinical Protocol

This study comprised data from 2200 patients who attended the O.P.D. of Center For Dentistry Reaserch & Aesthetics,Jatt,Hamisholash,Israel, , between Jan 2006 to Dec 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 two 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 was 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 CT 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 permanent dentition.

Data was 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.

4. 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 (Fig. 1, Table 2). There were 82(3,7%) cases of impacted canine (Fig. 2, Table 2), being 36(43,9%) from male and 46(56,1%) from female (Fig. 3, Table 3). ($P < 0.0001$)

Ages were in the range of 10,2 to 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 36cases being 20cases (55.6%) on left and 16(44,4%) on right in female (Fig. 4, Table 5, Fig. 5, Table 6). The localization female impact has been 46 (56%),buccally 6 (13%) and palatally 40 (57%) (Fig. 6, Table 7). In the male unilateral 22 cases (27%), left 16 (72,7%) and right 6 (27,3%) (Fig. 7, Table 8),The localization of male impacted has been buccally 11 (30,65%) and palatally 25 case (69,4%) (Fig. 8, Table 9). The most of these cases occurred in female palatally40 cases but in male palatally 25 cases,and in female buccally 6 cases ,but male buccaly just 11 cases (Fig. 6, 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 bilateral which is 10 cases (Fig. 9, 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 (Fig. 10, Fig. 11, Fig.12).

Table 1. Distribution of patients

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

Table 2. The distribution of the canine impaction

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

distribution of patients by gender and retention vs. non-retention

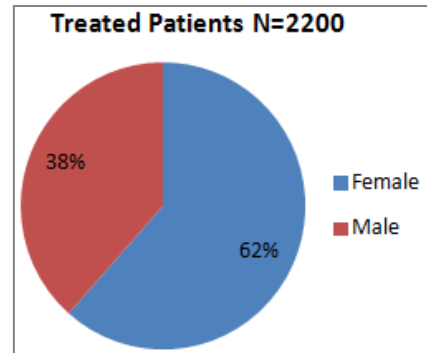


Fig. 1. Gender distribution of patients treated

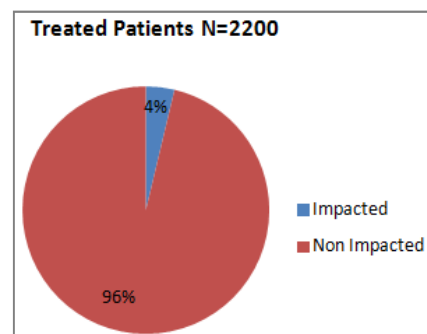


Fig. 2. Proportion of patients with retention (blue) and without retention (brown)

Table 3. Prevalance of impacted maxillary canine

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

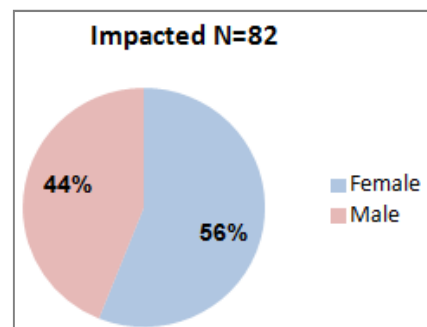


Fig. 3. Gender distribution in retention

Table 4. Means age impacted

Age, Impacted	Min	Max	Avg
	10.2	39.5	16.2

Table 5. Canine impaction distribution according to gender

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

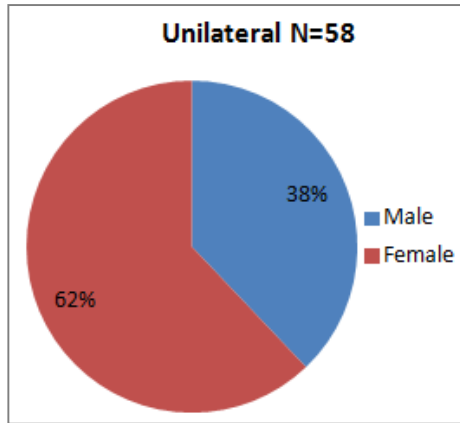


Fig. 4. Gender distribution by the unilateral retention

Table 6. Localization of canine impaction site

Female Unilateral	N=36	%	%Impacted (82)	%Treated (2200)
left:	20	55.6%	24.4%	0.9%
right:	16	44.4%	19.5%	0.7%

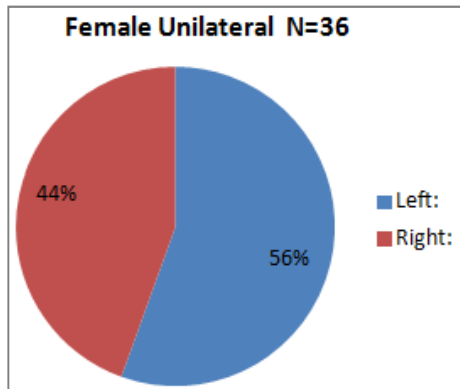


Fig. 5. Proportion of unilateral retention by the side at female

Table 7. Anatomomics localization of canine impaction according to the gender

Impacted Canine: N=82	
Male Palatally	25
Male Buccally	11
Female Palatally	40
Female Buccally	6
Total	82

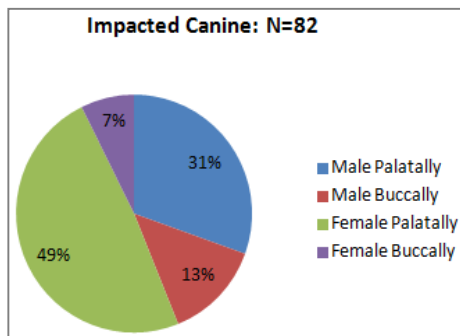


Fig. 6. Distribution of retention by gender and location

Table 8. Prevalnce of unilateral male canine according to the site impaction

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

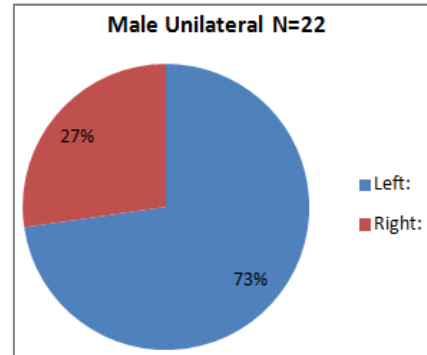


Fig. 7. Proportion of unilateral retention by the side at male

Table 9. Localization of canine impaction

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%

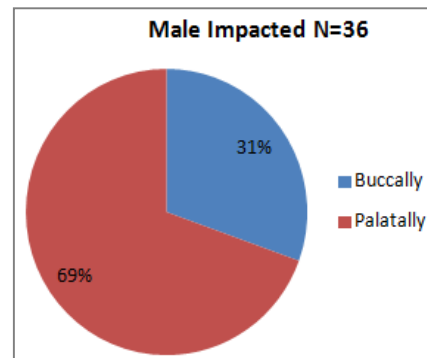


Fig. 8. Proportion of unilateral retention by the location at male

Table 10. Site localization of canine impaction according to the gender

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

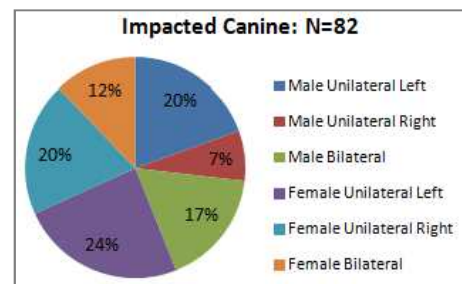


Fig. 9. Distribution of retention by gender, side and location

Table 11. Research impacted canine among the population

Authors	Impaction prevalence	Gender	More affected bone	Tendency
FASTLICHT, 1954; JOHNSTON, 1969	1.66%	Female 75%	Maxilla	Unilateral
DACHI; HOWELL, 1961				
BISHARA, 1992; HEYDT, 1975; FOURNIER; TURCOTTE; BERNARD, 1982; ERICSON; KUROL, 1987	0,92 a 2,2%			
MULICK, 1979	5%			
GREGORI, 1988	1.40%			
GROVER; LORTON, 1970	1.44%			
KRAMER; WILLIANS, 1970				
NITZAN; KEREN; MARMARE, 1981		Male		
ROHRER, 1999	2.06%			
MELO; ARAÚJO, 1996		Female 63%		
VASCONCELLOS; OLIEIRA; MELO LUZ et al, 2003	1.89%	Male 55,24%	Maxilla	
GARIB, 1999	0,9 a 2,5%	Female 75%		Bilateral
THILANDER; JAKOBSSON, 1968; ERICSON; KUROL, 1986; LINDAUER; RUBESTEIN, 1992	1 a 2%			
FARIAS; SANTOS; CAMPOS et al., 2003	3.80%			
PRESENT WORK	0.80%	56,1% Female	Maxilla	Unilateral



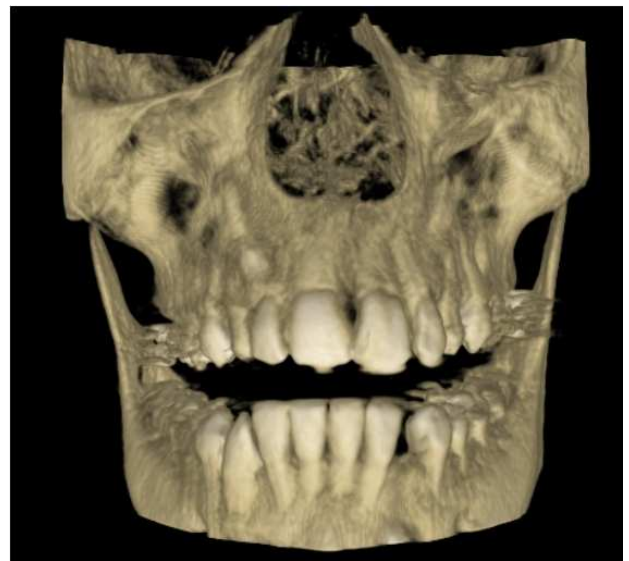
a



a



b



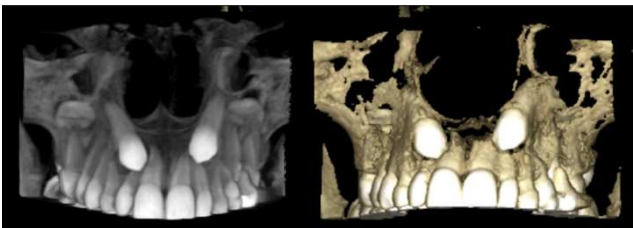
b

Fig. 10a, b. Unilateral palatally impacted canine

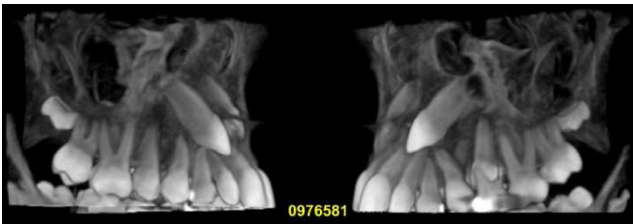


c

Fig. 11a-c. bilateral palatally impacted canine



a



b

Fig. 12a, b. bilateral buccally impacted canine

5. 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% (1,5,6,10,15), another ones show results from 0,8 to 2,4% (30), 0,9 to 2,5% (11) and variation from 1 to 2% (5,6,17,20,29).

We can found in dental scientific literature many reports that describe the canines impaction prevalence as being 1,89% of all cases of dental impaction (31), some show them as being 3,8% (8), 5% (11), 2,6% (27), 1,44% (19) and 1,40% (14), 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 (9,11,18,21,30). Some authors don't agree with them and with this report, showing in their researches that the most affected gender is male (24,31).

The values found in each one of the genders bring significatives differences. Some authors show 75% of cases

in female (9,11,18), another ones relate the prevalence of 63% on female gender (21); 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 (23,25,31).

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 (11), others present a higher prevalence of unilateral impaction (3,29,30,32,33). 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.

6. Conclusions

Ectopic and impacted canines represent a serious disorders for the second dentition. On the one hand an important element of occlusion and canine guidance is missing, an the other hand the ectopic tooth represent 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 teethm 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 preeminent 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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