



## Prevalence of Canine Impaction in Chennai Population

Pooja Umaiyal M, Sri Rengalakshmi\*, Jaiganesh Ramamurthy

Department of Orthodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences,  
Saveetha University, Chennai, India

### ABSTRACT

Impacted tooth is a pathological situation in which a tooth cannot or will not erupt into its normal functioning position. Canines are of higher frequency among impaction after the impaction of third molars. They play an important role in the functional and aesthetic view of a person. The aim of this study is to assess the prevalence of impacted canines in the Chennai population. A retrospective study was conducted in a hospital setting at Saveetha Dental College and Hospitals evaluating and analyzing 912 patient case records visiting a dental hospital from June(2019) to March(2020) who have impacted teeth and among which 45 patients had impacted canines. The data was collected after reviewing 86000 patients' records. Documented information included patients' age, gender, dental status and orthodontic status. The collected data was then tabulated and analysed using SPSS software. Among the participants 4.9% had impacted canines. It was most predominant in the age group of 10-20 years (60%) followed by 21-30 years with 24.4%. It was higher in prevalence among males with 55.5%. The prevalence of maxillary canine impaction was 77.8% with upper right maxillary canine being most predominantly impacted (33.3%), unilateral impaction being the most common among them. Mandibular canine impaction consisted of 22.2% of the population. Within the limits of this study, the incidence of impacted canines was found to be reported more among the age group of 10-20 years. Male predilection was present in the current study. Maxillary canines were highly prevalent for impaction when compared to the mandibular canines.

**Key words:** Canine, Impaction, Unilateral, Bilateral

**HOW TO CITE THIS ARTICLE:** Pooja Umaiyal M, Srirengalakshmi, Jaiganesh Ramamurthy, Prevalence of Canine Impaction in Chennai Population, J Res Med Dent Sci, 2021, 9 (1): 8-14.

**Corresponding author:** Sri Rengalakshmi

**e-mail:** srirengalakshmi.sdc@saveetha.com

**Received:** 02/11/2020

**Accepted:** 08/12/2020

### INTRODUCTION

Tooth impaction is the pathological situation in which teeth erupting into position is prevented due to different causes such as lack of space in the dental arch, dental trauma in the primary dentition state, malposition and other impediments [1]. The canines are the most predominant teeth in the dental arch as the form of foundation and pillar of an aesthetic smile and functional occlusion [2]. It stands at the corner of the dental arch forming the canine eminence for support of the alar base and upper lip. Functionally, the disarticulation in lateral movement in certain individuals is contributed by the canine supporting the dentition [3]. Canine makes the most outstanding abutments

for prosthetic replacement of other maxillary teeth when the need is present due to its root length and particularly its volume [4].

Tooth impaction can be defined as the infraosseous position of the tooth after the expected time of eruption, whereas the anomalous intraosseous position of the canine before the expected time of the eruption can be defined as displacement [5]. Most palatal displacement of the maxillary canine results in impaction [6].

Canine being the longest teeth in the oral cavity and its position and shape of canines contribute to the guidance of the teeth into the intercostal position [7]. There are various canine anomalies occurring due to the disturbances during eruption and development like canine transmigration, ectopic eruption, agenesis, impaction, etc. Among which canine impaction prevails the most [8].

Aqeel Ibrahim Lazim has enlisted few common causes of canine impaction, that includes

ankylosis, abnormal position of tooth bud, tooth length and size discrepancy, cyst and tumors, delayed shedding or early loss of deciduous canine, iatrogenic, dilaceration and idiopathic [9] Except for third molars, canine impactions are the most common [10,11]. Overall, the incidence of impacted maxillary canine is suggested to be 0.9-2.2% [12]. But mandibular canine impaction shows an incidence of at least 20 times lower than the maxillary canine impaction. The reported incidences of canine impaction vary from 0.8% to 5.2% in normal populations. 1.7% to 4.5% of the cases had bilateral impaction and females had more impacted canines than the males [13].

The extractions of deciduous canines, in specific cases when the condition is identified early would allow the impacted canines to correct their paths of eruption to erupt into the mouth in relatively good alignment [14]. This interceptive treatment may further reduce complications associated with palatally impacted canines including root resorption of the lateral incisors and the need for complex surgery and orthodontic intervention [15]. Previously our team had conducted numerous clinical trials [15-17], in-vitro studies [3], comparative studies [18-19], case reports [20,21] and reviews [2,7,22] over the past many years. Now we are focusing on epidemiological studies. The idea for this study stemmed from the current interest in our community. With this in mind, the aim of this study was to assess the prevalence of impacted canines in the chennai population.

#### MATERIALS AND METHOD

A retrospective study was conducted in a hospital setting at Saveetha Dental College and Hospitals evaluating and analysing 912 patient case records visiting a dental hospital from June(2019) to March (2020) who have impacted teeth and among which 45 patients had impacted canines. The data was collected after reviewing

86000 patients' records. The advantage of conducting this study in a hospital setting was the ease of Data Collection containing similar ethnicity with the involvement of both the genders. The unavailability of location specific data was the disadvantage of this study. Ethical approval for conducting the study was obtained from the Institutional Scientific Review Board, Saveetha Dental College and Hospitals.

The collected data from the dental status and oral surgery status of the patient records were then tabulated in excel and then imported into SPSS software. Incomplete data was verified with the concerned department or patient or excluded from the study. Sampling bias for the study was minimized by including all the required data. Internal validity being strict inclusion and exclusion criteria followed for all eligible samples and the external validity is the study being epidemiological.

The collected data included age, gender, skeletal malocclusion, treatment suggestion and treatment done.

A statistical test was done using a chi-square test with SPSS by IBM. Independent variables included age and gender of the participants, whereas the dependent variables included the patients undergoing fixed appliance treatment, skeletal malocclusion cases, patient undergoing orthognathic surgery, patient undergoing both orthognathic and fixed appliance treatment. All of these were analyzed using correlation and association.

#### RESULTS AND DISSCUSSION

In this retrospective study a total of 912 patients had impacted teeth, among which 56.8% were males and 43.2% were females (Table 1). Among the study population a total of 45 (4.9%) patients had impacted canines. The prevalence of impaction was higher among the age group

Table 1: Describes the distribution of study population based on age and gender.

Age in Years	Gender		Total
	Male	Female	
20-10	61(6.7%)	62(6.8%)	123 (13.5%)
21-30	274(30%)	209(22.9%)	483 (52.9%)
31-40	125(13.7%)	97(10.6%)	222(24.3%)
41-50	47(5.1%)	17(1.9%)	64(7%)
51-60	10(1.1%)	7(0.8%)	17 (1.9%)
60 and above	1(0.1%)	2(0.2%)	3 (0.3%)
Total	518 (56.8%)	394(43.2%)	912 (100%)

of 10-20 years (60%) followed by 21-30 years (24.4%) with an overall male predilection of 55.5% (Table 1). Female predominance of 51.8% was seen in 10-20 years of age and a male predominance of 81.8% was seen in 21-30 years of age (Figure 1). However, it is statistically insignificant with a p value >0.05. The frequency distribution of impacted teeth in the Chennai population consisted of 4.95% canine impactions in total with a higher prevalence of upper right impacted canine (2.2%) followed by upper left impacted canine with 1.65% (Figure 2). Among the population with canine impaction, prevalence

of maxillary canine impaction was 77.8%, in which 33.3% had upper right maxillary impacted canine. And 22.2% had impacted mandibular canine (Figure 3). Unilateral impacted maxillary canines were the highest in prevalence followed by bilaterally impacted canine, mandibular impacted canine being the least. According to the position of the impacted canine, maxillary palatal impaction of canine has the highest prevalence of 50% followed by buccally placed maxillary impacted canine (33.3%) and 16.7% of them had mandibular buccal impaction of canine (Figure 4).

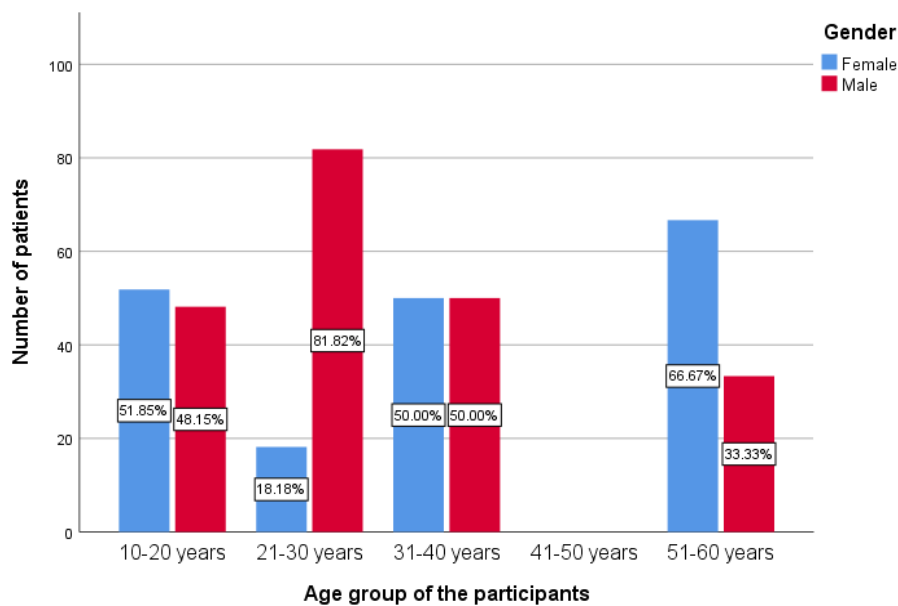


Figure 1: Bar chart showing association between gender and age group of the participants with canine impaction. X axis represents the gender of the participants according to their age group and Y axis represents the number of participants with canine impaction. Among 4.9% of the participants who had impacted canines, 55.5% constitutes male (red) and 45.5% constitutes female (blue). Prevalence of canine impaction was more among the males compared to females. However, it is statistically not significant (Pearson's Chi Square value: 4.323, df: 3, p value: 0.229 (>0.05)) Hence there is no association between the gender and age group of the participants.

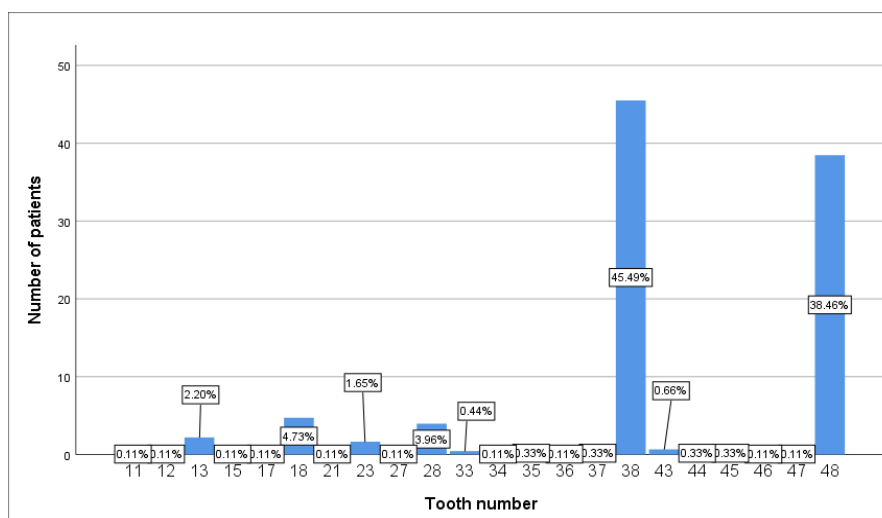


Figure 2: Bar chart representing the frequency distribution of impacted teeth in the Chennai population. Among the study population, canine impaction totals to 4.95% and the most predominantly impacted canines are upper right impacted canine (2.20%) followed by upper left impacted canine (1.65%).

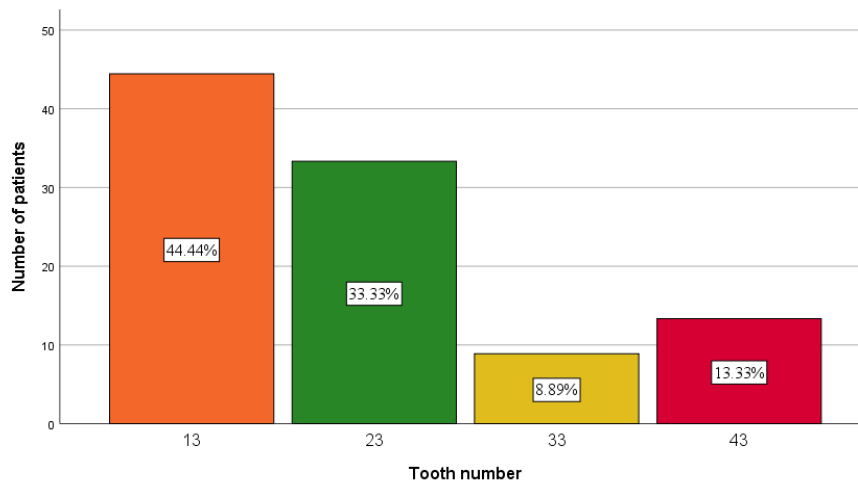


Figure 3: Bar chart representing the frequency distribution of canine impaction in the Chennai population. Among the impacted canine population, higher prevalence of the population had upper right impacted canine (orange), followed by upper left impacted canine (green), lower right impacted canine (red) and lower left impacted canine (yellow).

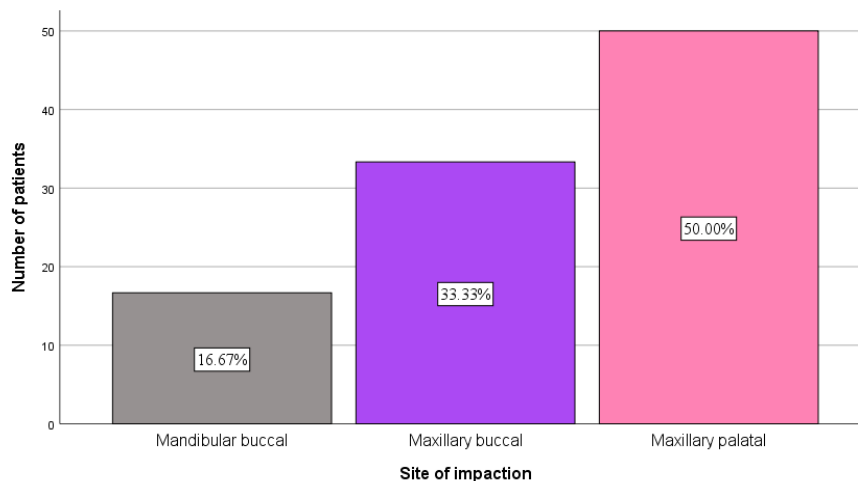


Figure 4: Bar chart showing the frequency distribution of the site of canine impaction. The highly prevalent site of canine impaction being maxillary palatal (pink), followed by maxillary buccal canine impaction (violet) and then mandibular buccal (grey).

The management of impacted canines is important in terms of esthetics and function [19]. Clinicians must formulate treatment plans that are in the best interest of the patient and they must be knowledgeable about the variety of treatment options [23]. When patients are evaluated and treated properly, clinicians can reduce the frequency of ectopic eruption and subsequent impaction of the maxillary canine [17,21].

The simplest interceptive procedure that can be used to prevent impaction of permanent canines is the timely extraction of the primary canine [16]. This procedure usually allows the permanent canines to become upright and erupt properly into the dental arch, provided sufficient

space is available to accommodate them [22].

Various surgical and orthodontic techniques may be used to recover impacted maxillary canines [20]. The proper management of these teeth, however, requires that the appropriate surgical technique be used and that the clinician be able to apply measured forces in a favorable direction [17,18]. This allows for complete control in efficient correction of the impaction and for avoidance of damage to adjacent teeth [24]. Careful selection of surgical and orthodontic techniques is essential for the successful alignment of impacted canines.

In the present study the prevalence of impacted maxillary canines among the overall population was 3.85% and among the canine impacted

population it was 77.8% which is similar to the study by Sharmila R et al. [25] that showed 82.35% of maxillary canine impaction. 16.7% had impacted mandibular canines similar to 17.65% of it in Sharmila.R et al., study. Whereas a study by Chu et al. [26], showed 2.1% of prevalence of impacted maxillary canine among the caucasian and chinese populations, A study by Sandhya Jain et al. [8], showed 0.94% of impacted maxillary canine among the central indian population.

The prevalence of impacted mandibular canine in this study was found to be 22.2% among the overall population and 1.1% among the impacted canine population. This is supported by Sharmila R et al. [25], study showing 17.65%, Grover and Lorton [27] reported 0.22%, Chu et al. [26], reported 0.07% among 7486 patients. Aydin et al. [28], showed 0.44% of mandibular canine impaction among 4500 patients of turkish population.

Most of the studies published on impacted maxillary canines have dealt with characteristics of unilateral impactions [29-31], although others conclude that bilateral impaction is more usual [32]. Our findings are in line with previous results suggesting that unilateral impaction is more prevalent than bilateral. Takahma and Aiyama showed the most common finding as the unilateral impaction and studies by Stahl et al., and Sacerdoli. R et al. [33,34] showed the higher incidence side being the right side which in contradiction, according to Harzer et al. the side mostly affected was the left quadrant. Study by Sandhya Jain et al. [8], also supported our present study's findings, whereas Bass et al. [35], contradicted it by bilateral impaction being the highest of prevalence. Furthermore, the position of the impacted maxillary canines varied greatly. In a European population, palatal canine impaction was around five times more frequent than in an Asian population [36]. In contrast, Kim et al. [37] argue that there is a threefold greater tendency for labial impaction in a Korean population. These differences likely relate, at least in part, to racial differences in jaw bone structure. The report by Zhong et al. [38] strongly supports this opinion, finding that the Chinese also exhibit a greater prevalence of labial impactions (2.1 times more than palatal). In the present study, 70.23% of canines were palatally impacted, with 13.74% impacted labially.

When it comes to the distribution of the prevalence of impacted canine according to the gender, in the present study females had a lesser prevalence than the males. Whereas in other studies by Gunduz K et al. [39], and Dachis F et al. [10] showed higher prevalence among females. But equal occurrence of impacted canine in both females and males was reported by some studies [8,40].

The limitation of the study conducted includes the reduction or the availability of the amount of data obtained, the unequal distribution of cases and the unavailability of the location specific data. Hence, the results of this study must be interpreted within the limitations of this study and further cohort studies must be done including larger sample size. Such study should also include other associated factors like the treatment plan, surgical intervention, etc.

#### CONCLUSION

Within the limits of this study, the prevalence of impacted canines was found to be reported more among the age group of 10-20 years with a male predominance. Maxillary canines were highly prevalent for impaction when compared to the mandibular canines.

Canine being the most important teeth in the oral cavity, knowledge on the impaction of it is necessary for the orthodontists to diagnose these at an early age in order to treat efficiently. As the prevalence of canine impaction varies from one population to another, it is of paramount importance that there should be data from all population groups.

#### ACKNOWLEDGMENTS

I am sincerely thankful to Saveetha Dental College and Hospital, Chennai for providing me with the opportunity to write a research paper in the form of a dissertation on the topic "Prevalence of canine impaction in chennai population".

I am also thankful to Dr. Srengalakshmi for guiding me in every stage of this research paper. Without her support it would have been very difficult for me to prepare the paper so meaningfully.

I also would like to thank the department of Information Technology of Saveetha Dental

College and Hospital, who had helped me during the course of this research paper for the collection of required datas of the patients.

### CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

### REFERENCES

- Walters H. Lower third molar treatment. *Brit Dent J* 1997; 182:207–207.
- Vikram NR, Prabhakar R, Kumar SA, et al. Ball headed mini implant. *J Clin Diagn Res* 2017; ZL02–3.
- Kamisetty SK, Verma JK, Arun, et al. SBS vs inhouse recycling methods-An invitro evaluation. *J Clin Diagn Res* 2015; 9:ZC04–8.
- Mulick JF, James F. Mulick on impacted canines. *J Clin Orthod* 1979; 13:824–834.
- Rubika J, Felicita AS, Sivambiga V, et al. Gonial angle as an indicator for the prediction of growth pattern. *World J Dent.* 2015; 6:161–163.
- Power SM, Short MB. An investigation into the response of palatally displaced canines to the removal of deciduous canines and an assessment of factors contributing to favourable eruption. *Br J Orthod* 1993; 20:215–223.
- Viswanath A, Ramamurthy J, Dinesh SPS, et al. Obstructive sleep apnea: awakening the hidden truth. *Niger J Clin Pract* 2015; 18:1–7.
- Jain S, Debbarma S. Patterns and prevalence of canine anomalies in orthodontic patients. *Med Pharm Rep* 2019; 92:72–78.
- Shapira Y, Kuftinec MM. Maxillary tooth transpositions: Characteristic features and accompanying dental anomalies. *Am J Orthod Dentofacial Orthop* 2001; 119:127–134.
- Dachi SF, Howell FV. (1961). A survey of 3874 routine full-mouth radiographs. II. Study of impacted teeth. *Oral Surg Oral Med Oral Pathol* 1961; 14:1165–1169.
- Thilander B, Myrberg N. The prevalence of malocclusion in Swedish schoolchildren. *Scand J Dent Res* 1973; 81:12–21.
- Röhrer A. Displaced and impacted canines A radiographic research. *Inter J Orthod Oral Surg Radiog* 1929; 15:1003–1020.
- Abu-Hussein M, Watted N, Hussien E, et al. Maxillary impacted canines. *Clinical Review* 2017; 1:10–26.
- Becker A, Zilberman Y, Tsur B, et al. Root length of lateral incisors adjacent to palatally-displaced maxillary cuspids. *Angle Orthod* 1984; 54:218–225.
- Felicita AS. Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach. *Dental Press J Orthod* 2017; 22:47–55.
- Jain RK, Kumar SP, Manjula WS, et al. Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch. *J Clin Diagn Res* 2014; 8:ZC21–4.
- Samantha C, Sundari S, Chandrasekhar S, et al. Comparative evaluation of two bis-GMA based orthodontic bonding adhesives-A randomized clinical trial. *J Clin Diagn Res* 2017; 11:ZC40–4.
- Ramesh Kumar KR, Shanta Sundari KK, Venkatesan A, et al. Depth of resin penetration into enamel with 3 types of enamel conditioning methods: A confocal microscopic study. *Am J Orthod Dentofacial Orthop* 2011; 140:479–485.
- Sivamurthy G, Sundari S. Stress distribution patterns at mini-implant site during retraction and intrusion—A three-dimensional finite element study. *Prog Orthod* 2016; 17:4.
- Felicita AS. Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction-A case report. *Saudi Dent J* 2017; 29:185–193.
- Felicita AS. Orthodontic extrusion of ellis class VIII fracture of maxillary lateral incisor-The sling shot method. *Saudi Dent J* 2018; 30:265–269.
- Krishnan S, Pandian S, Kumar SA, et al. Effect of bisphosphonates on orthodontic tooth movement-an update. *J Clin Diagn Res* 2015 9:ZE01–5.
- Felicita AS, Chandrasekar S, Shanthasundari KK, et al. Determination of craniofacial relation among the subethnic Indian population: A modified approach-(Sagittal relation). *Indian J Dent Res.* 2012; 23:305–312.
- Dinesh SPS, Arun AV, Sundari KKS, et al. An indigenously designed apparatus for measuring orthodontic force. *J Clin Diagn Res* 2013; 7:2623–2626.
- Sharmila R. Incidence of impacted canine using orthopantomogram. *J Pharm Sci* 2016; 8:921.
- Chu FCS, Li TKL, Lui VKB, et al. Prevalence of impacted teeth and associated pathologies-A radiographic study of the Hong Kong Chinese population. *Hong Kong Med J* 2003; 9:158–163.
- Grover PS, Lorton L. The incidence of unerupted permanent teeth and related clinical cases. *Oral Surg Oral Med Oral Pathol* 1985; 59:420–425.
- Aydin U, Yilmaz HH, Yildirim D, et al. Incidence of canine impaction and transmigration in a patient population. *Dentomaxillofac Radiol* 2004; 33:164–169.
- Aktan AM, Kara S, Akgünlü F, et al. The incidence of canine transmigration and tooth impaction in a Turkish subpopulation. *Eur J Orthod* 2010; 32:575–581.
- Sajnani AK, King NM. Prevalence and characteristics of impacted maxillary canines in southern Chinese children and adolescents. *J Investig Clin Dent* 2014; 5:38–44.

31. Nagpal A, Pai KM, Setty S, et al. Localization of impacted maxillary canines using panoramic radiography. *J Oral Sci.* 2009; 51:37-45.
32. Marzola C. *Fundamentals of maxillofacial surgery* 2008.
33. Ahl F, Grabowski R. Maxillary canine displacement and genetically determined predisposition to disturbed development of the dentition. *J Orofac Orthop* 2003; 64:167-177.
34. Sacerdoti R, Baccetti T. Dentoskeletal features associated with unilateral or bilateral palatal displacement of maxillary canines. *Angle Orthod* 2004; 74:725-732.
35. Bass TB. Observations on the misplaced upper canine tooth. *Dent Pract Dent Rec* 1967; 18:25-33.
36. Peck S, Peck L, Kataja M, et al. Prevalence of tooth agenesis and peg-shaped maxillary lateral incisor associated with palatally displaced canine (PDC) anomaly. *Am J Orthod Dentofacial Orthop* 1996; 110:441-443.
37. Kim Y, Hyun HK, Jang KT, et al. The position of maxillary canine impactions and the influenced factors to adjacent root resorption in the Korean population. *Eur J Orthod* 2012; 34:302-306.
38. Zhong YL, Zeng XL, Jia QL, et al. Clinical investigation of impacted maxillary canine. *Chin J Stomatology* 2006; 41:483-485.
39. Gündüz K, Çelenk P. The incidence of impacted transmigrant canines: A retrospective study. *Oral Radiol* 2010; 26:77-81.
40. Leifert S, Jonas IE. Dental anomalies as a micro symptom of palatal canine displacement. *J Orofac Orthop* 2003; 64:108-120.