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RESEARCH ARTICLE

INCIDENCE OF IMPACTED MAXILLARY CANINE AND ASSOCIATED WITH MAXILLARY LATERAL INCISOR ANOMALIES IN RAMADI CITY

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ABSTRACT

Objective: To determine the incidence of impacted maxillary canine in Ramadi city and evaluate the existing relation between impaction of upper canine and anomalies of maxillary lateral incisors.

Materials and methods: Forty five patients with impacted maxillary canines the data take from the patients include sex, age, the status of missing permanent maxillary canines, side, number of impacted maxillary canines, anomalies in lateral incisor, and molar classification in addition of that take panoramic radiographic for each patient have impacted canine and examined the angulation, depth of the impactions and the present of the external apical root resorption in neighboring lateral incisor.

Results: The frequency of impacted canines in our study was 4.6%, a male to female ratio of 1:2. Right canine impaction 51.1%, left side impaction 37.7% and bilateral impaction 11.11% cases. 39% of cases are buccally impacted and 61% of cases are palatally impacted. The impacted maxillary canine have a significant correlation $p < 0.05$ with anomalies in lateral incisor or external apical root resorption. The patients have class I the higher percentage of impacted maxillary canine follow by class II division 2 then class II division 1 and the last one is class III patients.

Conclusion: The frequency of impacted canines in our study was 4.6%, higher than most other studies, it was found that unilateral impaction is much more common than bilateral impaction. There was a clear association between impacted canine and a missing or anomalous lateral incisor on the affected side. Impaction canine occurred most frequently in patients with a Class I malocclusion and less in class III malocclusion.

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INTRODUCTION

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment (Richardson *et al.*, 2000; Yavus and Buyukkurt, 2007). Permanent maxillary canine impaction has been reported in about 1% to 2% of the population. This makes the maxillary canine the second most commonly impacted tooth, after third molars (Schindel and Duffy, 2007; Bishara, 1992; Shapira and Kufinec, 1998; Ngan *et al.*, 2005; Bedoya and Park, 2009; Jacobs, 2011; Litsas and Acar, 2011). Maxillary canines are important aesthetically and functionally, but impacted canines are more difficult and time consuming to treat. Moreover, impacted canines vary greatly in the inclination and location and can lead to resorption of neighboring incisors, as well as cystic degeneration (Ericson and Kuroi, 2000; Ericson and Kuroi, 1988). Bishara (1992) suggested the following sequelae of canine impaction:

- Labial or lingual malpositioning of the impacted tooth
- Migration of the neighboring teeth and loss of arch length
- External root resorption of the impacted tooth as well as the neighboring teeth

- Infection particularly with partial eruption resulting in pain and trismus
- Referred pain.

Maxillary canines are among the last teeth to develop and have the longest period of development. They also have the longest and most devious path of eruption from the formation point lateral of the premaxillary fossa to the final position in the dental arch (Bishara, 1992; Shapira *et al.*, 1998; Ngan *et al.*, 2005). Panoramic radiographs are also widely used to locate the position of impacted canines. They are part of the fundamental imaging taken for dental records and treatment planning. The aim of this study to investigate the incidence of impacted maxillary canine in Ramadi city and evaluate the existing relation between impaction of upper canine and anomaly of maxillary lateral incisors.

MATERIALS AND METHODS

This study was conducted in the Orthodontic clinic in Ramadi city 975 (410 male and 565 female) were examined the age of the patient (15-36). All orthodontic patients in their permanent dentition with complete canine root development were included in the study. Adequate dental records and histories were considered. Forty five patients with impacted maxillary canines the data take from the patients include sex, age, the status of missing permanent maxillary canines, side, number of

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impacted maxillary canines, anomalies in lateral incisor, and molar classification in addition of that take panoramic radiographic for each patient have impacted canine and examined the following:

Angulation: mesioangular, distoangular, vertical, or horizontal.
Depth of the impactions: Level A, Level B, and Level C as follows:

Level A: The crown of the impacted canine tooth is at the cervical line of the adjacent teeth.

Level B: The crown of the impacted canine tooth is between the cervical line and root apices of the adjacent teeth.

Level C: The crown of the impacted canines is beneath the root apices of the adjacent teeth.

If the external apical root resorption appear in the adjacent maxillary lateral incisor.

Statistical Analysis

Data had been analyzed using SPSS version 15.0 descriptive statistics were used to describe the data.

RESULTS

Out of a total of 983 patients 8 were excluded because they had unsatisfactory records, therefore the total number of patients were 975. Forty five (4.6%) patients found to have one or more impacted canine in any quadrant. The mean age of the patients presenting with impacted canines was 23.35 years (SD=9.3). Female patients were 64.4% and 35.5% male, leading to a male to female ratio of 1:2. Right canine impaction 51.1%, left side impaction 37.7% and bilateral impaction 11.11% cases as show in table 1.

Table 1. The distribution of the patient according to sex and side of impaction

	Male		Female		Total	
	No.	%	No.	%	No.	%
left side	6	13.3	11	24.4	17	37.7
right side	8	17.7	15	33.3	23	51.1
bilateral	2	4.44	3	6.66	5	11.1
Total	16	35.5	29	64.4	100	45

In this study 39% of cases are buccally impacted and 61% of cases are palataly impacted canine. The angulation of the impacted canine and depth show in the Table 2.

Table 2. The angulation and depth of the impact maxillary canine

Angulation	No.		%		Depth	No.		%	
	No.	%	No.	%		No.	%		
Mesioangular	19	42.2	A	7	15.5				
Distoangular	7	15.5	B	20	44.4				
Vertical	10	22.2	C	18	40				
Horizontal	9	20							

The impacted canine have a significant correlation $p < 0.05$ with anomalies in lateral incisor or external apical root resorption as show in table 3.)

Table 3. correlation between the canine impaction and anomalies in maxillary lateral incisor

Anomalies in lateral incisor	No.	%	P value
Missing of maxillary lateral incisor	5	11.1	0.003*
peg shape maxillary lateral incisors	6	13.3	0.000**
Peg and missing	2	4.44	0.001*
With external apical root resorption	8	17.7	0.02*

* $p < 0.05$ (significant)

** $p < 0.001$ (highly significant)

From the table 4 the patient have class I (60%) the higher percentage of impacted maxillary canine then follow by class II division 2 (15.5% then class II division 1 (13.1%) and the last one is class III (11.1%)

Table 4. The malocclusion associated with canine impaction

Malocclusion	No.	%
Class I	27	60
ClassII division 1	6	13.3
ClassII division2	7	15.5
ClassIII	5	11.1

DISCUSSION

The frequency of impacted canines in our study was 4.6%, higher than most other studies a higher ratio could be attributed to the fact that our study sample comprised of orthodontic patients rather than general population.

Racial factors and familial trends also govern the prevalence of canine impaction (Yavus and Buyukkurt, 2007; Kuftevec *et al.*, 1995) and could be contributory to the disparity between results. Female patients were 64.4% and 35.5% male, leading to a male to female ratio of 1:2. This is agree with (Richardson and Russel, 2000; Hechler, 1987; Leifert and Jonas, 2003; Mesotten *et al.*, 2005; Sacerdoti and Baccetti, 2004; De Conto FSER, 2004; Becker *et al.*, 1981; Aktan *et al.*, 2010; Jacoby, 1983) studies but Aydin *et al.* (2004) found that males tend to have this condition more frequently. This difference could be explained by the fact that more females than males seek dental treatment but also still some controversy over the reason behind this trend. Among all patients with impacted canines, it was found that unilateral impaction is much more common than bilateral impaction (Bishara, 1992; Shapira and Kuftevec, 1998; Ngan *et al.*, 2005; Bedoya and Park, 2009; Peck *et al.*, 1996) in this study the right side is more than left as show in table 1 this agree with Yavus and Buyukkurt study but other reported that the left canine was more often involved than the right (Shapira and Kuftevec, 1998; Camilleri and Scerri, 2003; Aktan *et al.*, 2010; Peck *et al.*, 1996). 39% of cases is buccally impacted and 61% of cases is palataly impacted this agree with (Richardson and Russel, 2000; Bedoya and Park, 2009; Jacoby, 1983; Ericson and Kuroi, 1987). The reason of that the excessive space in the maxilla could be a contributory factor in the palatal displacement, for it enables sufficient space for the canine to move and deviate from its direction for labial eruption. Also, the absence of guidance from the lateral incisor, allows a new course to a way further down and to the palatal side. Another reason is the possible biological relation between impacted canine and tooth size reduction. As show in table 2 the most common angulation is mesioangulation and less one are horizontal angulation and the depth B which the crown of the impacted canine tooth is between the cervical line and root this agree with Yavus and Buyukkurt (2007), Gunduz *et al.* (2011).

From the table 3 we show anomalies in lateral incisor in the affected side, external apical root resorption is the most common squeal of impacted canine .In our result there 17.7 % of patient have root resorption of maxillary lateral incisor neighboring the impacted canine the cause of that the impacted canine may increase the risk of infection and cystic follicular lesions and compromise the lifespan of neighboring lateral

incisors due to root resorption. This agree with (Richardson and Russel, 2000; Gunduz *et al.*, 2011; Rayne, 1969; Power and Short, 1993; Caminiti *et al.*, 1998). A statistically significant results ($p < 0.05$) were found when association tests were performed between teeth with shape anomaly and presence of impacted canine. These findings concur with the other study (Sacerdoti and Baccetti, 2004; De Conto FSER *et al.*, 2004; Becker *et al.*, 1981; Jacoby, 1983; Peck *et al.*, 1996; Brin *et al.*, 1986; Langberg *et al.*, 2000; Paschos *et al.*, 2005; Oliver *et al.*, 1989; Mossey *et al.*, 1994). And disagree with Jena study (Jena and Duggal, 2010) that reported there was no positive association between lateral incisor anomalies and maxillary canine impaction. The theory is that anomalies of number, tooth size reduction and impacted canine may possible that the gene or genes responsible for the control of the eruption and consequently for the displaced canines are connected to the gene or genes causative of hypodontia/incisor agenesis.

Pediatric dentists and general practitioners should familiarize themselves with this dental anomaly and be trained to detect teeth at risk for impaction. In a table 4 the most common impacted canine with class I then class II div 2 and less one is class III this agree with (Brin *et al.*, 1986; Milosevic *et al.*, 2009) and disagree with Al-Nimri and Gharaibeh (2005), Baccetti (1998) who reported impacted maxillary canine has been most frequently in Class II division 2 malocclusions while Basdra *et al.* (2000) study show the impacted canine to be associated with an increased transverse dimension of the maxillary arch, less crowding and smaller tooth sizes than other forms of malocclusion. Canine impaction is a relatively frequent clinical presentation in dentistry, with challenges that should be resolved. A good understanding by the clinician of the situation and treatment options may have a significant impact on the treatment outcome. Therefore, clinicians should be competent to do the proper investigation, provide a correct diagnosis, develop an optimum treatment plan, and render appropriate treatment for each individual patient so each patient realizes the best outcome possible.

Conclusion

- Impacted maxillary canine have a male to female ratio is 1:2.
- impacted canines, it was found that unilateral impaction is much more common than bilateral impaction
- 39% of cases is buccally impacted and 61% of cases is palataly impacted
- There was a clear association between impacted canine and a missing or anomalous lateral incisor on the affected side.
- Impaction canine occurred most frequently in subjects with a Class I malocclusion and less in class III malocclusion.
- Canine impaction is a relatively frequent clinical presentation in dentistry, with challenges that should be resolved. A good understanding by the clinician of the situation and treatment options may have a significant impact on the treatment outcome.

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