SPECTRUM OF ASSOCIATED PATHOLOGIES WITH IMPACTED CANINES: A REVIEW OF CASES IN A SAUDI ARABIAN SUB-POPULATION

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ABSTRACT:

The main objective is to find out associated pathologies with impacted canines in an Arabian Sub population. This was a retrospective study carried out in a dental center between 2016-2018. Medical records were assessed for the diagnosis of impacted canines. Demographics such as age and gender, angulation, relationships to midline, lateral incisor and central incisors of the impacted canine were retrieved. Additionally, the associated pathologies were identified. A total of 97 patients were discovered with impacted canines out of which 43 (44.3%) were associated with pathologies. They include 17 (39.5%) males and 26 (60.5%) females with a M:F of (0.7:1). The age ranged from 14 to 62 years (mean ± SD, 28.5 ± 11.5years) with majority in the age group (21-30) years. Most of the cases without associated pathology were seen in the age groups 21–30 years and 31–40 years (17(17.5%) and 15 (15.5%) respectively). Cyst, pocket formation and rotation of the lateral incisor (13.4%, 11.3% and 10.3% respectively) accounted for the highest number of associated pathologies. This study has identified some associated conditions with impacted canines not been mentioned in the literature. High index of suspicion among attending clinicians in identifying these cases is paramount.
Keywords: canine, impaction, pathology, resorption

INTRODUCTION:

Tooth impaction has been defined generally as a tooth that is thwarted from completely erupting into a normal functional position within the predictable time, due to lack of space, blockade by another tooth or an abnormal eruption pathway.[1] The impacted teeth that fail to attain a functional position may be abnormal and or associated with pathological changes and should be considered for intervention.[2] Such intervention for impacted canines includes; observation, surgical exposure for orthodontic traction application or extraction and re-implantation if traction fails to total removal as the last option. Literature search showed that there is significant disparity in the prevalence and pattern of impacted teeth in different regions of the jaw and in different populations, even within same country.[2,3] Therefore, local studies have been encouraged to be able to channel resources to address such problems in different populations.[3,4]

Associated pathologies reported to be related to impacted canines includes: dentigerous cyst, adenomatoid odontogenic tumor, calcifying epithelial odontogenic tumor, ameloblastoma, odontogenic myxoma, external and internal root resorption of impacted teeth, external root resorption of

adjacent teeth, transmigration, ectopic eruption, periodontitis and referred pain.[5-7] While studies have reported prevalence and management of impacted canine, few have, however reported on the associated pathologies with these canine impactions. [2, 8]

Literature search did not reveal any studies on the associated pathology with impacted canines in Saudi Arabia. The aim of the present study therefore was to evaluate the types of associated pathologies with impacted canines and to find out if there is any relationship between age group of patients, the spatial position of the canine and associated pathologies.

MATERIALS AND METHODS:

This was a retrospective study carried out at a dental center in Najran city, Saudi Arabia between 2016-2018. Medical records were assessed for the diagnosis of impacted canines. Deficient records were disqualified from the study. Demographics such as age and gender, position, angulation, relationships to midline, lateral incisor and central incisors of the impacted canine were retrieved. Additionally, the associated pathologies were identified and recorded.

Data was analyzed using IBM SPSS Statistics for IOS Version 25 (Armonk, NY: IBM Corp) and results presented as simple frequencies and descriptive statistics. Pearson's Chi-square was used to weigh the association and level of significance among categorical variables such as age group of patients, gender and associated pathology. A p value ≤ 0.05 was considered statistically significant.

RESULTS:

A total of 2003 orthopantomographs were reviewed and 97 was discovered with impacted canines. Out of the 97 cases, 43 (44.3%) were associated with pathologies. They include 17 (39.5%) males and 26 (60.5%) females with an M:F of (0.7:1). The age ranged from 14 to 62 years (mean ± SD, 28.5 ± 11.5years) with the majority in the age group (21-30) years (Table 1). The bulk of the impacted cases was observed in the maxilla while only a few cases was seen in mandible. Cyst, pocket formation and rotation of the lateral incisor (13.4%, 11.3% and 10.3%, respectively) accounted for the highest number of associated pathologies, while multiple impaction and odontome accounted for the least (1.0% each). When associated pathology was compared with gender of patients there were no significant ($\chi 2$ =13.043, df=8, p value=0.110). Other associated pathologies were as shown in Table 2.

It was detected that most of the cases without associated pathology were seen in the age groups 21–30 years and 31–40 years (17 (17.5%) and 15 (15.5%) respectively) with a statistically significant difference of ($\chi 2$ =70.019, df=48, p value=0.02). Other distributions are as shown in Table 3.

DISCUSSION:

The occlusal movement of a tooth from its developmental location within the jaw bones to its useful position in the occlusal plane is termed eruption.[9] When a tooth fails to erupt before emergence into the occlusal plane is known as an impacted tooth. A number of factors can derange this complex axial eruption ranging from inadequate space in the dental arch, space closure due to early loss of primary dentition, excessive fibrous tissue covering an erupting tooth/teeth, eruption cysts and crowding of arches.[9] Other etiologies such as syndromes, metabolic, and hormonal disorders are also other causes of multiple impacted permanent teeth.

Several factors have put the canines into the risk of being the most commonly impacted tooth after mandibular molars.[10] Such factors include: develops deep within the jaws, late completion of development and last to emerge into the oral cavity.[10] When tooth becomes impacted, they are associated with other pathologies, therefore any impacted tooth should be closely reviewed. From the study it was shown that majority of canine impaction occurred in the maxilla. Studies have documented this finding and reported 2% of the population having this condition.[11,12] Similarly, there is a female preponderance which was also observed in this study.

The cyst was more commonly observed associated pathology in this current study (Figure 1). Other studies have reported resorption of lateral incisor as the commonest associated pathology. [13]

This was not common in this study. It's also surprising that resorption of the central incisor (Figure 1) was seen in this study which is a rare occurrence and literature search has not reported this associated pathology. It was observed that this condition occurred when the impacted canine was in close proximity to the midline and almost transmigrating. Closer look at this location of the impacted canine may reveal more cases of external root resorption of maxillary central incisor. Although transmigration of canine was not observed in this study, it is a documented phenomenon whereby a right canine crosses the midline into the left arch or vice versa.[14,15] Another uncommon associated pathology reported in the current study was the rotation of the lateral incisor. Though, it could not be substantiated whether the rotated lateral was as a result of impacted canine or whether it was the rotated lateral that resulted in the canine been misguided, this needs further investigation. However, if the guidance theory[16] that proposes that "the canine erupts along the root of the lateral incisor, which serves as a guide, and in the presence of a malformed root of the lateral incisor, the canine will not erupt" then the later hypothesis may be adopted.

Pocket formation was also frequently observed associated pathology from the current study. This was seen exclusively with partially erupted canines that have caused stagnation areas between it and either the retained deciduous/lateral incisor/first premolar or even

combination of all (Figure 2). This clinical condition has been reported in the literature.[12] Another unusual clinical condition observed in this study was the posterior migration of the impacted canine putting pressure on the premolars and molars. The cause of this posterior migration is still a misery that needs further investigation.

Presence of tumor such as odontome can cause failure of eruption of any teeth if it's on the way of eruption. Odontomes are seen to be the second most common type of odontogenic tumor worldwide (after ameloblastoma), accounting for about 20% of all cases [17]. This study has identified a case of odontome that was associated with an impacted canine preventing its eruption (Figure 3).

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CONCLUSION:

This study has identified some associated conditions with impacted canines that have not been mentioned in the literature. This will enable clinicians to be more vigilant in assessing all cases of canine impaction so as to give patient best treatment possible and to adequately advice on potential risk factors that may be associated with the impacted canine if left untreated.

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TABLES:

Table 1: Distribution of age group according to gender of patients

	Gender		
	Male (%)	Female (%)	Total (%)
11-20	8 (8.2)	19 (19.6)	27 (27.8)
21-30	10 (10.3)	24 (24.7)	34 (35.1)
31-40	13 (13.4)	11 (11.3)	24 (24.7)
41-50	1 (1.0)	6 (6.2)	7 (7.2)
51-60	1 (1.0)	2 (2.1)	3 (3.1)
61-70	0 (0.0)	1 (1.0)	1 (1.0)
71-80	0 (0.0)	1 (1.0)	1 (1.0)
Total	33 (34.0)	64 (66.0)	97 (100.0)

$\chi 2$ =7.14, df=6, p value=0.308

Table 2: Distribution of associated pathologies according to gender of patients

	Gender		
	Male (%)	Female (%)	Total (%)
Cyst	2 (2.1)	11 (11.3)	13 (13.4)
Resorption of lateral	2 (2.1)	0 (0.0)	2 (2.1)
Resorption of central	1 (1.0)	2 (2.1)	3 (3.1)
Pocket	5 (5.1)	6 (6.2)	11 (11.3)
Rotation of lateral	5 (5.1)	5 (5.1)	10 (10.3)
Multiple impaction	1 (0.0)	0 (1.0)	1 (1.0)
Posterior migration	0 (0.0)	2 (2.1)	2 (2.1)
Odontome	1 (1.0)	0 (0.0)	1 (1.0)
None	16 (16.5)	38 (39.2)	54 (55.7)
Total	33 (32.9)	64 (67.0)	97 (100.0)

$\chi2 =13.043$, df=8, p value=0.110

Table 3: Distribution of associated pathologies according to age group of patients

	Age group							
	11-20 (%)	21-30 (%)	31-40 (%)	41-50 (%)	51-60 (%)	61-70 (%)	71-80 (%)	Total (%)
Cyst	2 (2.1)	6 (6.2)	2 (2.1)	2 (2.1)	1 (1.0)	0 (0.0)	0 (0.0)	13 (13.4)
Resorption of lateral	0 (0.0)	1 (1.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.1)
Resorption of central	1 (1.0)	1 (1.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.1)
Pocket	2 (2.1)	4 (4.1)	5 (5.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	11 (11.3)
Lateral rotation	2 (2.1)	4 (4.1)	4 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10 (10.3)
Multiple impaction	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)
Posterior migration	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)	2 (2.1)
Odontome	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)
None	20 (20.6)	17 (17.5)	9 (9.3)	5 (5.1)	2 (2.1)	0 (0.0)	1 (1.0)	54 (55.7)
Total	27 (27.8)	34 (35.1)	24 (24.7)	7 (7.2)	3 (3.1)	1 (1.0)	1 (1.0)	97 (100.0)

$\chi2 =70.019$, df=48, p value=0.000

FIGURES:

Figure 1: OPG showing cyst around the crown of impacted canine, resorption of central incisor by the crown of impacted canine and a supranumerary tooth

Figure 2: OPG showing pocket formation between impacted canine, first premolar and lateral incisor.

Figure 3: OPG showing odontome related to the impacted canine