

TWO DIMENTIONAL LOCALIZATION OF IMPACTED MAXILLARY CANINES AND THEIR CORRELATION

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ABSTRACT

Comprehensive treatment planning is of paramount importance in leveling and aligning the impacted maxillary canines. In such cases, retrieval of all pertinent clinical information leading to proper diagnosis and prediction of treatment complexity weighs utmost importance. There are many factors including modalities of treatment, governing management of impacted canines.

The aim of our study was to correlate canine angulation and its vertical position. The study was conducted in the orthodontic department at Armed Forces Institute of Dentistry (AFID) Rawalpindi. Patients presenting to orthodontic department from June 2001 to April 2008 were included in the study. Orthopantomographs (OPGs) of 1956 consecutive patients were screened for impacted canines. OPGs were traced and angulations of canines to the mid sagittal plane (α) and vertical distance from the occlusal plane (d-mm) were determined and a correlation was sought.

47(n) 2.4% patients were found to have 57 impacted canines. 21% patients had bilateral impactions. 33 patients were male and 24, female. The mean angulation was 29.54° and the mean distance d was 13.1mm. Insignificant correlation was found between these two variables. Though these factors are important in management strategies their influence is deemed independent of each other.

Key words: Impacted Maxillary canines, Canine Angulation.

INTRODUCTION

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment¹. Maxillary canines are the most frequently impacted teeth, being second only to impacted third molars in either arch.² Maxillary canines are preferably impacted compared to mandibular, so much so as the previous is 20 times more frequently impacted compared to the latter.³

The etiology of canine impaction is multi-factorial, furthermore the developmental location of maxillary canines is such that it could be influenced at various levels hindering their uneventful eruption, rendering them either impacted or ectopic. Some of those factors

include, a high developmental position in the maxilla, a long path of eruption, and late sequence of eruption than any other tooth in the anterior maxilla.⁴

It is imperative to accurately locate and categorize impacted canines for their proper management whether orthodontic, surgical or a combination.⁵ There has been a recent surge in diagnosing impactions and other anomalies through computed tomography and more recently, three dimensionally. Most studies show that these new techniques are reasonably accurate in locating and categorizing anomalies.⁶

Despite all these advantages over conventional radiography, there are several drawbacks of these new modalities. The equipment is expensive, uncommon hence inaccessible to most clinicians, and there are

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issues regarding cost/risk benefit and lack of expertise in reading the scans.⁷

Considering all these factors it is safe to say it will be long before these diagnostic modalities replace conventional radiography in Pakistan. There are various methods of localizing the canines using conventional radiographs. Usually multiple radiographs are required. Parallax technique is used to locate the canine bucco-palatally.

It is generally accepted that in mesioangular impactions greater degree of angulation and the height of the canine from the occlusal plane governs the difficulty level of resolving canine impactions. This is controversial as various diversified opinions have been floated in this regard.⁸

Two dimensional orientation of canines on an Orthopantomograph (OPG) in our patients will give us a glimpse of the level of difficulty we can expect while attempting to resolve these challenging impactions.

MATERIALS AND METHODS

The study was conducted in the orthodontic department of Armed Forces Institute of Dentistry, Rawalpindi on 1956 consecutive patients presenting to our department from 2001 to 2008. They were analyzed for the presence of maxillary impacted canines. 56 patients were excluded based on inadequate records.

47 patients were found to have impacted maxillary canines. They were included in the study based on presence of at-least one maxillary canine impaction with closed root apices. Good dental records were also considered mandatory for inclusion.

Orthopantomographs (OPGs) were subsequently traced on an acetate sheet under illumination and magnification, where required. Two variables were analysed. The perpendicular distance between the tip of the canine and occlusal plane (d) in mm and the angle between the long axis of the canine and midline sagittal plane between the central incisors(α) in degrees. Fig 1.

Correlation between the two variables was assessed using SPSS version 11. The Pearson correlation co-efficient was seen. Statistical significance was set at the level of p d" 0.05.

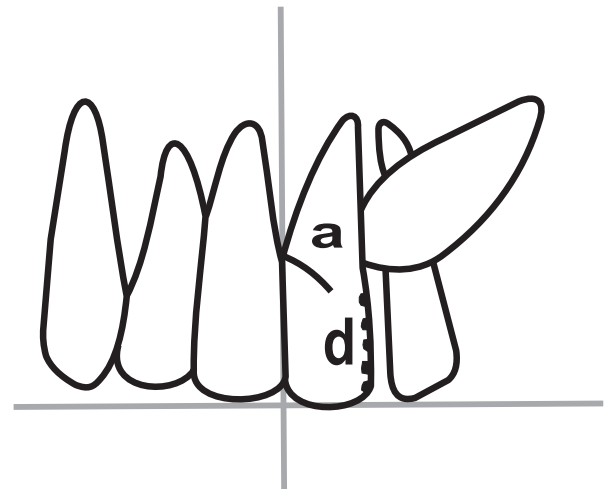


Fig. 1: Angle and distance

RESULTS

From a sample 1956 orthodontic patients 56 were excluded as they did not fit the inclusion criteria. From the 1900 patients 47(n), 2.4% were found to have impacted maxillary canines. Out of these 47, 10 patients 21% had bilateral impacted canine, making the total number of impacted teeth 57. Fig 2.

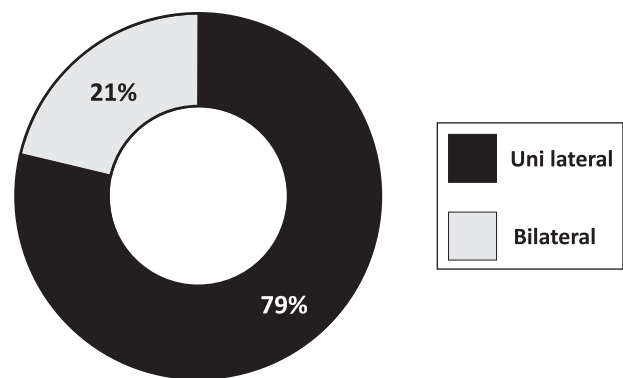


Fig. 2: Unilateral and Bilateral Impactions

Mean age of the patients was calculated to be 15.59 years. Males were affected slightly more than females, 33(n) and 24(n) respectively. Table 1. The mean distance (d) calculated for canines was 13.1mm and the mean angle α was 29.54°.

Males (n) %	Females (n) %
(33) 57.89%	(24) 42.1%

TABLE 1: GENDER DISTRIBUTION

Statistical tests revealed that there was no significant correlation between the angle of impaction and the vertical distance between the tip of the canine and occlusal plane, $p = 0.47$. It can be inferred from the results that vertically low placed impactions have an equal chance of being sharply angulated as higher placed impactions.

DISCUSSION

The overall frequency of impacted maxillary canines in our study was 2.4%. This value is comparable to most other occurrences seen so widely in literature, from 0.9-2%.⁹ The gender distribution however deviated widely from the generally seen in other studies. In our results we found that males were though insignificant yet more affected than females. Most studies agree that females are more affected than males.¹⁰

The frequency of bilateral impaction in our subset of patients was 21 %. There was considerable variability in the vertical position and angulation of canines. Angulation of impaction and vertical position affect the overall treatment strategy. It is observed that more highly and horizontally positioned impactions are considered more difficult to manage orthodontically.⁸

Palatal impactions are at-least three times more frequent than labial impactions¹¹, however we did not discriminate between palatal or labial impactions which also could have influenced treatment difficulty, as it is one of the important factors governing treatment planning and prediction.⁸

There are several other factors that influence treatment complexity⁶, that have not been catered for in our study. These factors include, presence or absence of lateral incisor root resorption, cystic change or follicular enlargement of the impacted canine, dilacerations of the canine's root, and ankylosis. Computed tomography (CT) is more accurate in terms of locating the impacted cuspid in 3 dimensions and for diagnosing associated lesions such as root resorption of adjacent teeth.¹² however, although CT is an asset in cases where root resorption is suspected, cost, time and increased radiation exposure restrict its routine use¹³.

We wanted to see a correlation between the angulation and vertical height of the impacted maxillary canine, whether highly placed canines have a greater chance of being steeply angulated or not.

Our results showed an insignificant correlation between the two variables. These results depict that these variables independently affect the complexity and management of impacted canines, both are individually and equally significant from clinical perspective.

CONCLUSION

Much work has been carried out on etiological factors, categorization and planning treatment strategies for the orthodontic management of impacted maxillary canines. This can be reflected by attributing vital importance to this tooth both functionally and esthetically in the oral cavity, which is why attempts to salvage a maxillary canine are more frequent than any other tooth.

Despite years of research, treatment complexity prediction is still as elusive. Many studies have been carried out observing various correlations with only a few conclusive.

Our results show no relation between the angulation and vertical distance of the canine. These factors however bear strong clinical significance on individual basis in governing more precise orthodontic diagnosis and effective treatment planning.

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