

Evaluation of Dental Anomalies and its Relationship with Malocclusion and Growth Pattern in Orthodontic Patients

Dental Anomalies and its Relationship with Malocclusion and Growth Pattern

Visiting Avicenna Dental Hospital

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ABSTRACT

Objective: To evaluate dental anomalies and its relationship with malocclusion and growth pattern in orthodontic patients visiting Avicenna dental hospital.

Study Design: Retrospective descriptive study

Place and Duration of Study: This study was conducted at the Avicenna dental hospital, Lahore from August 2018 to October 2020.

Materials and Methods: Pre-treatment records of 200 patients visiting the orthodontics department of Avicenna Dental Hospital, including history, clinical examination, photos, study casts and radiographs were retrospectively studied to determine the presence and frequency of dental anomalies. Relationship of each dental anomaly was done with malocclusion and vertical pattern was recorded as well.

Results: Mean age of the patients was 12.32 ± 5.42 years with more (65%) patients being females. 21% patients exhibited dental anomalies with most showing a single anomaly. Hypodontia (9%) was the commonest followed by impactions (4%), peg laterals (3%), supernumerary teeth (2%), transpositions (2%) and dilaceration (1%). Dental anomalies were most prevalent in patients with Class I malocclusion (57%), followed by Class II div 1 (19%). Most dental anomalies were found in hyperdivergent cases (57%) followed by normodivergent (28.5%) and least in hypodivergent cases (14.2%).

Conclusion: Dental anomalies represent a significant cause of patients reporting to the orthodontics department with most patients suffering from a single dental anomaly. Hypodontia, impactions and peg laterals are the most common dental anomalies in our setup. Dental anomalies were most commonly associated with class I malocclusion and hyperdivergent cases.

Key Words: Dental anomalies, hypodontia, malocclusion, orthodontic, growth pattern

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INTRODUCTION

Dental anomalies in the individuals are caused by genetic or environmental factors.^{1,2} They occur due to disturbances in the tooth formation process.¹

The clinical manifestations of dental anomalies include disturbances in the number, size, shape, position, and

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structure of the teeth.^{3,4} The prevalence of these anomalies has a wide range varying from 4.74 % to 74.7%, depending on the population.^{3,5-9}

Dental anomalies usually occur together with dentofacial and occlusal problems.¹⁰⁻¹² These dental anomalies cause disturbances in the arch length of maxilla and mandible. This in turn leads to complexity in the orthodontic therapy¹² requiring a combined orthodontic, restorative, periodontal and surgical approach.¹³ Furthermore, dental anomalies also cause esthetic and functional problems^{11,14} which impairs the oral health.¹⁵ Once the association of these dental anomalies to malocclusions is known, a better and timely approach to diagnosis and treatment planning can be made.¹⁶

There are only a few studies regarding associations of dental anomalies to various malocclusions.^{4,17-20,28} Some researchers suggest correlation between dental anomalies and growth pattern of the individuals. Peck et al¹⁷ found Class II div 2 malocclusions related to microdontia. Basdraet al⁴ also found out close

association of Class II div 2 malocclusions with various congenital tooth anomalies. Dermauetet al¹⁸ reported the association between tooth agenesis and anteroposterior and vertical growth patterns. Another study found out a high frequency of maxillary canine impaction with the horizontal growth pattern.¹⁹ Ali B et al found out higher frequency of hypodontia in Angle's Class III malocclusion than in other types of malocclusion.²⁰

It is important to know the frequency and distribution of the various dental anomalies in a specific population for the purpose of early diagnosis and intervention.¹⁶ Association of various dental anomalies and malocclusions may give us a new approach to the way malocclusions are diagnosed and planned.¹⁴

Only a few studies have investigated the relationship between various dental anomalies and malocclusions in our population.²⁰⁻²² So, the purpose of this study is to calculate the prevalence of various dental anomalies (hypodontia, supernumerary, tooth impactions, transposition, dilaceration) and assess the relationship of these dental anomalies with different malocclusions and vertical growth patterns of the individuals.

MATERIALS AND METHODS

This cross-sectional study was performed retrospectively at the Department of Orthodontics, Avicenna Dental College and Hospital, Lahore from August 2018 to October 2020. 200 patients visiting the orthodontic department of Avicenna dental hospital during this period were included in the study. Sample size was formulated by Open-epi software, taking expected frequency of dental anomalies as 59.3%* and confidence interval as 95%. Non-probability consecutive sampling was done.²⁴ The study was approved by institute's ethical committee.

Patients, irrespective of gender, having age between 8 and 30 years of age, visiting the Orthodontics Department of Avicenna dental hospital, were included in the study. Patients without any craniofacial syndromes, absent cleft lip and palate, history of orofacial trauma, previous orthodontic or restorative treatment were excluded from the study to overcome bias and confounding factors.

Pre-treatment records of patients which included complete history, clinical examination, photos, study casts and good quality panoramic and lateral cephalometric radiographs were retrospectively studied to determine the frequency of each dental anomaly. Dental anomalies that were included in this study were hypodontia, peg laterals, supernumerary teeth, impacted teeth, transpositions and dilacerations. Correlation of each dental anomaly with the malocclusion was done. The vertical pattern of these patients was also recorded.

Characterization of Growth Pattern and

Classification of malocclusion:

To characterize growth patterns, the values of the mandibular plane angle measured in the cephalometric radiograph (SN-GoGn) were used according to Steiner²³.

SN-GoGn angle < 32 is hypodivergent,

SN-GoGn angle = 32 is normal,

SN-GoGn angle > 32 is hyperdivergent.

The malocclusions were divided into three classes according to Angle classification of malocclusion²⁴.

Class I: Normal relationship of the molars, but line of occlusion incorrect because of malposed teeth, rotations, or other causes

Class II: Lower molar distally positioned relative to upper molar, line of occlusion not specified

Class III: Lower molar mesially positioned relative to upper molar, line of occlusion not specified

All clinical data was collected by a single calibrated investigator.

Statistical analysis: SPSS version 22 was used to analyze the data. The frequency and percentage distribution of each dental anomaly among the sample was calculated.

RESULTS

Mean age of the patients was 12.32 ± 5.42 years with ages ranging between 08 to 30 years. 130 (65%) of the patients were female while 70 (35%) were male.

Out of the 200 patients that were evaluated, 42 patients (21%) exhibited 48 (24%) dental anomalies. 36 patients showed a single dental anomaly whereas 6 patients demonstrated more than one dental anomaly. Hypodontia (9%) was the most common followed by impactions (4%), peg laterals (3%), supernumerary teeth (2%), transpositions (2%) and dilaceration (1%). Amongst hypodontia, the most frequently missing teeth were maxillary lateral incisors (33.3%), out of which 22.2% were unilateral and 11% were bilateral and mandibular lower incisors (33.3%), followed by missing maxillary second premolars (22.2%), with the missing mandibular second premolars (11%) being the least in frequency. Among the supernumerary teeth, mesiodense was the most common. Canines were the most frequently impacted teeth with the prevalence of 4%, with similar frequency for both maxillary and mandibular canines. Transpositions in the maxillary arch were prevalent, with the maxillary lateral incisor canine and maxillary first and second premolars being common (2%). Dilacerations in the maxillary arch was also common, with the maxillary central incisor being the most affected (1%).

In this sample, the total number of Class I cases were 104, Class II div 1 were 64, Class II div 2 were 8 and Class III were 4. Of the total patients, 78 were

hyperdivergent, 98 were normodivergent and 28 were hypodivergent.

Dental anomalies were most prevalent in Class I (57%), followed by Class II div 1 (19%), with the least being in Class II div 2 (9.5%) and Class III (14.2%).

Regarding vertical patterns, most dental anomalies were found in hyperdivergent cases (57%) followed by normo divergent (28.5%) and least in hypodivergent cases (14.2%).

Table No.1: Frequency of each dental anomaly and malocclusions

Dental anomaly	No. of patients	Class I	Class II div1	Class II div2	Class III	Vertical Pattern
Hypodontia	18 (9%)	8 (44.4%)	4 (22.2%)	4 (22.2%)	2 (11%)	Hyperdivergent=12(66.6%) Normodivergent=4 (22.2%) Hypodivergent=2 (11%)
Supernumerary	4 (2%)	4(100%)	—	—	—	Normodivergent=2 (50%) Hyperdivergent=2 (50%)
Peg laterals	6 (3%)	2(33.3%)	2(33.3%)	—	2(33.3%)	Hyperdivergent=2 (33.3%) Normodivergent=2 (33.3%) Hypodivergent=2 (33.3%)
Impactions	8 (4%)	8 (100%)	—	—	—	Hypodivergent=2 (25%) Hyperdivergent =6 (75%)
Transpositions	4 (2%)	2 (50%)	—	—	2 (50%)	Hyperdivergent =2 (50%) Normodivergent=2 (50%)
Dilaceration	2 (1%)	—	2 (100%)	—	—	Normodivergent=2 (100%)

Table No.2: Number of cases of malocclusion in patients with these dental anomalies

Number of anomalies	Number of Patients	Class I	Class II div1	Class II div2	Class III	Vertical pattern
48 (24%)	42 (21%)	24 (57%)	8 (19%)	4 (9.5%)	6 (14.2%)	Hyperdivergent=24 (57%) Normodivergent=12 (28.5%) Hypodivergent=6 (14.2%)

Table No.3: Number of cases of malocclusion in patients with these dental anomalies

	Unilateral	Bilateral
Missing maxillary lateral incisors	4=left (22.2%)	2 (11%)
Missing maxillary 2premolars	—	4 (22.2%)
Missing lower incisors	2=right (11%) 4=left (22.2%)	—
Missing lower 2premolars	—	2 (11%)

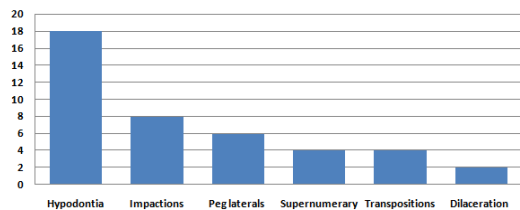


Figure No.1: Frequency of Dental Anomalies

DISCUSSION

Dental anomalies are abnormalities involving the dentition, resulting from genetic, metabolic, biologic,

nutritional, or environmental factors. They range from macrodontia (large sized teeth), microdontia (small sized teeth), hyperdontia (increased number of teeth), hypodontia (lesser number of teeth), odontoma (abnormality of calcified dental tissue), peg lateral (small upper lateral incisors with reduced mesiodistal dimensions) or dilacerations (curve in the root or crown).Peg lateral also describes an anomaly.

In our study, 21% of the patients exhibited dental anomalies with hypodontia (9%) being the commonest followed by impactions (4%), peg laterals (3%), supernumerary teeth (2%), transpositions (2%) and dilaceration (1%). Amongst hypodontia, most frequent were maxillary lateral incisors (33.3%) and mandibular lower incisors (33.3%). Canines were the most frequently impacted teeth, with similar frequency for both maxillary and mandibular canines. Among the supernumerary teeth, mesiodense was the most common. Transpositions were most common in the maxillary lateral incisor canine and maxillary first and second premolars being common (2%). Dilacerations was most common in the maxillary central incisor being the most affected (1%).Dental anomalies were most prevalent in patients with Class I malocclusion (57%), followed by Class II div 1 (19%), with the least being in Class II div 2 (9.5%). Most dental anomalies were

found in hyperdivergent cases (57%) followed by normodivergent (28.5%) and least in hypodivergent cases (14.2%).

A prospective cross-sectional study was carried out regarding the prevalence and associations between dental anomalies in a large sample of non-orthodontic subjects.⁷ Dental anomalies showed a prevalence of was 20.9% with most frequent anomalies being the displacement of maxillary canine (7.5%), hypodontia (7.1%), impacted teeth (3.9%), tooth ankylosis (2.8%), and tooth transposition (1.4%). Most commonly missing tooth was the lower right second premolar. Mesiodens was the most common type of supernumerary tooth (0.66%). Tooth transpositions were observed in 1.4% while displacement of maxillary canine was recorded in 7.5%.

Another study recorded 43.3% dental anomalies in a sample of population.²⁵ Class II and Class III malocclusions demonstrated the highest frequency of dental anomalies. The most common dental anomaly was the rotation of teeth followed by hypodontia.

Another similar study was done to calculate the prevalence of dental anomalies in orthodontic patients, showed that 28.4% patients were suffering from dental anomalies presented with at least one anomaly.²⁶ 23% patients exhibited single anomaly while 5.4% showed more than one anomalies. The most common anomalies were impaction (14.32%), and hypodontia (7.03%) followed by microdontia (1.08%), dilacerations (0.27%), and generalised enamel hypoplasia (0.27%). Maxillary right lateral incisors and canines were involved most frequently.

A study was conducted in two health districts in Punjab, Pakistan, to record the frequency of peg laterals incisors amongst orthodontic cases. The frequency came out to be 6%, being more common unilaterally and in females.²⁷

The results of the abovementioned researches are in agreement with the results of our study and hence reinforce our study. Few differences in results are observed, which may be due to variation in the sample size or changes in the sample population. The limitation of our study is that this is an institution based study thus; the results cannot be applied at a national level.

CONCLUSION

Dental anomalies represent a significant cause of patients reporting to the orthodontics department with most patients suffering from a single dental anomaly. Hypodontia, impactions and peg laterals are the most common dental anomalies in our setup. Dental anomalies were most commonly associated with class I malocclusion and hyperdivergent cases.

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