

Prevalence of congenitally missing upper lateral incisors in an Kanpur orthodontic adolescent population

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Abstract:

BACKGROUND: Congenital or non-congenital tooth absence results in dental asymmetries, alignment issues, and differences in arch length.

AIMS AND OBJECTIVES: To determine the prevalence of congenitally missing maxillary lateral incisors (LIs) and to find out its variability in relation to gender.

MATERIALS AND METHODS: A retrospective study was carried out between January 2021 and December 2023. Orthopantomograph (OPGs) record of all orthodontic adolescent patients aged 12 to 18 years were taken from the archival records of the department. Orthopantomographs helped to diagnose the presence of unilateral/bilateral maxillary lateral incisors. The statistical analysis was done using the Statistical Package for Social Sciences (SPSS version 17.0). The frequencies were compared with the help of the Chi-square test. $P < 0.05$ was considered statistically significant.

RESULTS: The frequency of missing upper laterals among the male patients was 1.00%, however, 2.8% of the female patients were having missing maxillary lateral incisors. Based on gender, 62.16% had a bilateral expression of missing upper laterals, 16.78% had left unilateral expression, and 21.62% had right unilateral expression.

CONCLUSION: The prevalence rate for congenitally missing upper lateral incisors in the orthodontic adolescent population aged 12 to 18 years was found to be 3.88% in the present study while females were found to have a greater percentage of agenesis of the upper lateral incisors (2.8%) as compared to the males (1.00%).

Keywords: Adolescent population, congenitally missing, lateral incisor, prevalence, space management, tooth agenesis

Introduction

The total absence of teeth is known as anodontia. Hypodontia means the absence of fewer than six teeth. Agenesis is defined as failure of development of teeth at birth. Congenital or non-congenital tooth absence results in dental asymmetries, alignment issues, and differences in arch length.^[1,2] The purpose of this study was to ascertain the prevalence and variability of congenitally absent maxillary lateral incisors (LIs) in relation to gender.

Materials and Methods

A retrospective study was conducted from January 2021 to December 2023. Records of orthopantomographs (OPGs) of orthodontic adolescents between the ages of 12 year and 18

years were extracted from the department's archives. Patients without a history of maxillary lateral incisor extraction, those without enameloplasty or maxillary lateral incisor prosthesis, and those without a history of prior orthodontic treatment met the inclusion criteria and were allowed to participate in the study; patients with cleft lip and/or palate and those with any other craniofacial anomalies were excluded. One thousand OPGs were analysed based on the inclusion and exclusion criteria. 300 radiographs from the chosen archive records were from male patients, and 700 were from female patients.

Statistical analysis

The statistical analysis was done using the Statistical Package for Social Sciences (SPSS version 17.0). The frequencies were compared with the help of the Chi-square test. $P < 0.05$ was considered statistically significant.

Results

In a sample of 1000 patients' radiographs were collected from the archival records for a retrospective survey, of which 300 (30%) radiographs belonged to male patients while 700 (70%) were of female patients. [Table 1] Out of the 38 (3.88%) patients with missing maxillary lateral incisors, 28 were females and 10 were males. [Table 2] The frequency of missing upper laterals amongst the male patients was 1.00% while 2.8% of the female patients were having missing maxillary lateral incisors. Based on gender, 62.16% had a bilateral expression of missing upper laterals, 16.78% had left unilateral expression and 21.62% had right unilateral expression. [Table 3]

Table 1: Gender distribution of patients in study

Gender	Male	Female
Number of patients	300/1000	700/1000
% of frequency	30 %	70 %

Table 2: Prevalence of missing lateral incisor amongst the patients

Gender	Male	Female
Number of patients of missing lateral incisor	10/1000	28/1000
% of frequency	1.00%	2.8 %

Table 3: Prevalence of missing lateral incisor in both genders side wise

Genders	Both		Left		Right		Total	
	n	%	n	%	n	%	n	%
Female	18	78.26	5	83.33	5	62.5	28	100
Male	5	21.73	2	17.01	3	37.5	10	100
Total	23	62.16	7	16.78	8	21.62	38	100

Table 4 reveals the statistical significance of prevalence of missing lateral incisor in both the genders side-wise.

Table 4: Statistical significance of prevalence of missing lateral incisor in both the genders side- wise

Gender	Both	Left	Right	Total
Female	18	5	5	28
X ²	17.41	4.54	6.05	28.00
P	0.02	0.05	0.18	0.00
Male	5	2	3	9
X ²	5.59	1.76	1.95	9.00
P	0.06	0.15	0.57	0.00
Total	23	7	8	38

*p<0.05 statistically significant

Discussion

The frequency of congenitally absent permanent maxillary lateral incisors varies greatly among the many studies that have been done to date.^[3-8] The racial and ethnic backgrounds of the individuals representing the various populations may be the cause of the variance in the prevalence and patterns of agenesis of the maxillary lateral incisors. In a study by Sofaer et al. ^[9], 17,000 high school students from Hawaii were selected as the representative population. The individuals' dentition ranged from having all their teeth to congenitally missing maxillary lateral incisors. A study of the literature on the agenesis of teeth indicates that, tooth agenesis is associated with several common abnormalities including ectopic eruptions, retained deciduous teeth, supernumerary teeth, microdontia, or peg-shaped incisors, along with taurodontism and teeth transpositions.

Up to 3.88% of missing maxillary lateral incisors were found to have agenesis in the current investigation. In addition, the current study revealed that females had a significantly higher percentage of missing maxillary lateral incisors than males did, with 2.8% of females having missing laterals compared to 1.00% of males. A comparable study by Horowitz^[4] on a sample of one thousand participants discovered that 1.11% of the group under investigation had missing lateral incisors.

A further investigation by Aasheim and Ogaard^[10] in a Nordic sample of 1953 participants undergoing orthodontic screening revealed an even greater prevalence of approximately 2% of missing lateral incisors in the population investigated, which was near the findings of the current study. In a Syrian population of 8000 schoolchildren (aged 12 to 15), Kabbani et al ^[11] assessed the prevalence of congenital absence of maxillary lateral incisors and found that the prevalence of isolated maxillary lateral incisor agenesis was 1.15 percent.

Srivathsa^[12] found that the overall prevalence of congenitally missing teeth ranged from 2% to 16.3%. The differences in outcomes between populations may be attributed to the influence of genetics and/or other environmental factors during the teeth's genesis and growth stages.

Teeth that erupt in the crucial terminal regions of the dental lamina are the ones that most frequently fail to erupt. The maxillary lateral incisors, second premolars, and third molars are the teeth that are most frequently affected. Agenesis can be explained as the absence of

innervations in the final stages of development of the teeth furthest from the innervations of the field.

Agenesis of the lateral incisors in the maxillary arch is closely related to the development of the second premolars. The formation of teeth during the developmental stages may be influenced, at the molecular level, by certain factors affecting the formation of neural structures. This could result in a defect in the molecular factors that influence neural growth, which could ultimately cause development to fail and impede the formation of teeth.

Furthermore, as evidenced by the results of the numerous studies that have been done to yet, females have been found to have agenesis of laterals in the maxillary arch more often than males.^[6,7,13, 14] The fact was also corroborated by the results of this investigation. The gender differences in teeth eruption and skeletal growth patterns between males and girls may account for the variation found in the finding.^[15] The amount of space left over after the central and canine teeth mature determines how much room the lateral incisor has during its early stages of development.

As the canines and central incisors develop before the lateral incisors, as suggested by the numerous studies that have been done in this area thus far, there may be rivalry for space between the lateral incisors and their neighbours. A related study by Sofaer et al.^[9] postulated that the tooth size asymmetry seen in their investigation was caused by environmental disruptions during the teeth's embryonic phases, by impoverished primordium, or by both.

In the current study, 62.16% of the patients had bilateral expression of missing maxillary lateral incisors on radiographs; 16.78% of patients had left unilateral expression and 21.62% had right unilateral expression. The treatment of missing maxillary lateral incisors can involve prosthodontic intervention, orthodontic space closure, mesial canine positioning, and/or contouring of the neighbouring teeth.^[17, 18]

Additionally, maxillary lateral incisors that are congenitally absent can be replaced with osseointegrated implants.^[19-22]

A study of the literature indicates that, in contrast to prosthetic rehabilitation, orthodontic space closure in cases of missing laterals produced stable results and was more well-received by patients.^[23]

Therefore, understanding the pattern and incidence of tooth agenesis is crucial for treatment planning in these circumstances. An interdisciplinary treatment approach may be able to shield the patient from functional and aesthetic disparities that could impede desired, appropriate growth and development and result in functional, occlusal, and aesthetic disharmony if such cases receive prompt intervention. As a result, the current study contributes to our understanding of the occurrence of maxillary lateral incisor agenesis and offers pertinent data and statistics on the condition. The authors stress the need of an early diagnosis and prompt, appropriate treatment in these situations to avoid or minimize the number of consequences that could impair function and appearance.

The study's main limitation, however, may be that the number of orthodontic patients does not always replicate the number of people in the population who have tooth agenesis because orthodontic treatment is dependent on accessibility and its uptake in each community.

Conclusion

In the orthodontic adolescent population aged 12 to 18 years, the prevalence rate for congenitally missing upper lateral incisors was found to be 3.88% in the current study. Additionally, females were found to have a higher percentage of upper lateral incisor agenesis (2.8%) compared to males (1.00%). Moreover, according to gender, 62.16% of people had bilateral, 16.78% had left unilateral, and 21.62% had right unilateral expression of missing upper lateral incisors.

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