

Dental Anomalies In Cleft Lip And Palate Patients

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INTRODUCTION

The most frequent oral anomaly is the congenital absence of one or more permanent teeth. The present investigation will discuss the frequency of congenitally missing bicuspid in cleft lip and palate patients. A second portion will briefly discuss other anomalies of the dentition.

The prevalence of congenitally missing teeth in the general population has been reported to occur within a range of 1.5 to 6.6% of the patients examined.

Brehkus, Oliver and Montelius¹ in a study of 11,487 persons found 184 patients or 1.5% had one or more missing teeth. This low figure probably indicated that they did not have a good random sample. The average age of their patients was 22.9 years and with this age-group it would be difficult to determine whether teeth had been extracted or were congenitally missing.

Valinoti² examined 300 patients and found 20 patients or 6.6% with missing bicuspid. He found the most frequently missing tooth to be the second bicuspid, especially in the mandibular arch.

Dolder³ in Switzerland on 10,000 Swiss school children reported 3.4% had congenitally missing teeth.

Clayton⁴ in a study of 3,557 full-mouth x-rays revealed 214 or 6.01% had congenitally missing teeth. He too found the mandibular second bicuspid

to be the most frequently absent.

In Brown's⁵ recent study, a group of 5,271 patients were examined at the State University of Iowa. Of this group 231 or 4.382% had missing teeth. The study did not include third molars. The most frequently missing teeth were the mandibular second bicuspid followed by the maxillary second bicuspid.

Studies in various areas of the world also show that the rate of congenitally missing teeth varies greatly in different localities. The changes in the dentition of man are not taking place at the same rate in the various geographic and racial groups.

Hellman⁶ found that 49% of the individuals in Hungary had missing third molars, while other population groups were lower. The West African Negro was lowest with only 2.6% having missing third molars.

Dahlberg⁷ states: "The dentition of man is changing in form, size and number. The general trend is towards simplification of the patterns and a reduction in measurement of the 32 teeth found in early man. The selectivity of maxillary laterals, second bicuspid, and third molars for absence must be significant." Dahlberg modified the field concept of development by Butler⁸ which originally was devised to explain the problem of morphodifferentiation of teeth. Tooth characteristics, according to this theory, are manifested to a maximum degree in certain teeth. In each of the incisor, canine, and molar groups and proceeding from tooth to tooth away from the key members, a decreasing prominence of charac-

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teristics is revealed. Dahlberg includes the first bicuspid as a key tooth as well as the original first incisor, cuspid, and first molar. He then uses his concept to explain a rarity of absence of these teeth and a fairly high incidence of missing maxillary lateral incisors, second bicuspid and third molars.

Many words have been written regarding the etiology of congenitally missing teeth. Scarlet fever was considered a cause of missing teeth by Evans.⁹ In another investigation by Frahm¹⁰ it was found that a higher incidence of missing teeth was present in families with a history of syphilis. Radiation has been reported by Brown¹¹ to affect the growth and development of teeth.

Itlis¹² found in reviewing the literature many case reports of dominant, irregular dominant, and sex-linked modes of inheritance of congenital absence of teeth. He presents cases of recessive inheritance to complete the entire scale of possible inheritance. The method of inheritance does not explain the origin of an anomaly but only its transmission, incidence and variability.

Downs¹³ also made a study of the possibility of the occurrence of a genetic factor in the production of dental anomalies. He found it to be fairly certain that anomalies in the dentition are recurrent in families as a result of the operation of genetic or hereditary factors. Endocrine disturbances have been considered by some writers as a possible cause of peg-laterals, missing and supernumerary teeth.

PRESENTATION OF DATA

The complete histories and full-mouth, intraoral radiographs of 175 cleft lip and palate patients were examined and tabulated. The age range was three years, four months to twenty-three years, two months; the average age was nine years, seven months. There

were 101 males and 74 females with mixed ancestry and social background. Eighteen had cleft lip only, 22 cleft palate only and 135 had both. The subjects were patients of the Department of Otolaryngology and Maxillo-facial Surgery at the State University of Iowa. The age was listed as that at the time of the examination of the intraoral radiographs. If there was any question regarding the presence or absence of any tooth, additional x-rays were examined. These patients have had full-mouth x-rays annually since approximately two and one-half years of age.

The normal time of beginning calcification of the bicuspid is two and one-half years. The formation of the maxillary bicuspid begins slightly earlier than that of the mandibular bicuspid; however, the crowns are completed at approximately the same time, between five and six years of age for the first bicuspid and between six and seven years of age for the second bicuspid. By four and one-half or five years of age we are usually able to determine the presence or absence of all bicuspid.

In a recent study by De Gooyer¹⁴ of 741 patients from the files of the dental clinics at the State University of Iowa, 26 or 3.5% of the patients did not show roentgenographic evidence of calcification until after sixty-six months.

In 1957 a study was conducted under Grant M-1158 from the National Institute of Mental Health at the State University of Iowa by the author¹⁵ after observing many patients with missing bicuspid. One hundred five cleft lip and palate patients were examined. Of this total 36 or 34.28% had missing bicuspid.

The present investigation is a follow-up and more thorough investigation. A small number of patients from the original investigation were included in the present study.

The results of the present study revealed that 42 patients or 24% of 175 patients examined had missing bicuspid. The most frequent tooth missing was the maxillary second bicuspid. A total of 82 missing bicuspid was noted, 60 in the maxillary arch and 22 in the mandibular arch. Twenty-nine patients had missing maxillary bicuspid, eight missing mandibular bicuspid and five were missing bicuspid in both the maxillary and mandibular arches.

A further breakdown was made according to the cleft classification used at the State University of Iowa, Figure 1. The first classification is cleft lip only. In these patients the cleft does not extend through the alveolar ridge. A total of 18 patients was included in this group. Only one patient was found to have a missing maxillary bicuspid.

The second classification is cleft palate only. This group includes posterior clefts only — clefts that do not involve the alveolar ridge but extend only as far anteriorly as the junction of the premaxilla and the maxilla. A total of 22 patients was included in this group. Five patients had a total of 13 missing bicuspid, six in the maxillary arch and seven in the mandibular arch. Two patients had missing maxillary bicuspid, two had missing mandibular bicuspid and one patient had bicuspid missing in both the maxillary and mandibular arches.

The third classification is cleft lip and palate with the alveolar ridge involved in all cases.

One hundred thirty-five patients were examined in this group. Thirty-six patients had a total of 68 missing bicuspid; 53 in the maxillary arch and 15 in the mandibular arch. Twenty-six patients had missing maxillary bicuspid, six had missing mandibular bicuspid and four had bicuspid missing in both arches.

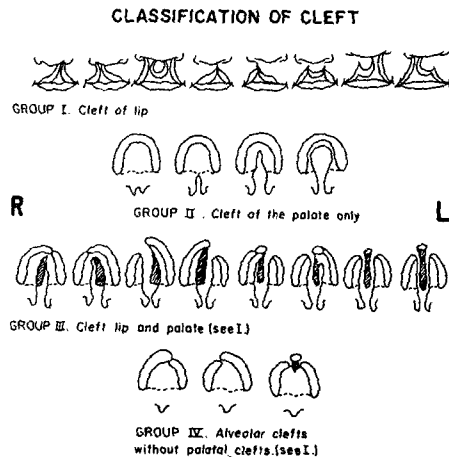


Figure 1 Classification of clefts used at the State University of Iowa.

DISCUSSION OF OTHER ANOMALIES

Bohn¹⁶ in 1950 reported on the anomalies of the lateral incisor in patients with harelip and cleft palate.

In his Group A, patients with cleft lip only, not involving the alveolar ridge, Bohn reported three-fourths of the patients with overproduction (i.e., supernumerary, and/or hyperplasia of the deciduous lateral). In the permanent dentition nearly one-half showed overproduction but in this group underproduction (i.e., absence or hypoplasia) was equally numerous.

In his Group B, patients with cleft lip including the alveolar ridge, overproduction in the deciduous lateral was less frequent than in Group A. In about one-fourth of the cases underproduction was observed. In the permanent dentition a few had overproduction while about three-fourths showed underproduction. In both dentitions the majority of the laterals were found distal to the cleft. These were, however, more frequently hypoplastic than laterals medial to the cleft.

The author,¹⁵ in 1957, observed 73 patients with cleft lip and palate and found the entire sample with some



Figure 2 Supernumerary lateral incisors — one on each side of cleft.

degree of deformity of one or more maxillary anterior teeth.

It is primarily the lateral incisor in the cleft area in which the irregularity prevails — supernumerary, congenitally absent, hypo and hyperplastic variations, malformations and displacements. Many of the adjacent teeth will also exhibit deviations from the normal, the central more frequently than the cuspid on the affected side.

In the present investigation a total of 46 patients had one or more missing lateral incisors or approximately one-fourth of the total number of patients examined. Forty-one patients, approximately one-fourth of the total number of patients examined, had one or more supernumerary lateral incisors.

All 18 Group I patients and all 135 Group III patients had some degree of deformity of one or more maxillary anterior teeth. Of 22 Group II patients

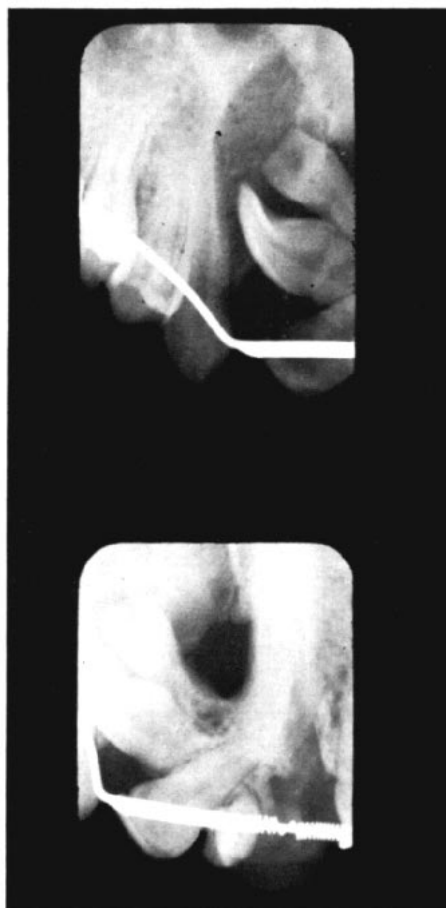


Figure 3 Deformity of anterior teeth and improper eruption.

18 had normal anterior teeth while four had some degree of deformity of one or more maxillary anterior teeth.

The severity of the deformity of the anterior teeth appears to correspond to the severity of the original cleft, Figures 2 and 3.

CONCLUSIONS

From the findings of this investigation and a previous one in 1957 we can conclude that the incidence of missing bicuspid is considerably higher in cleft lip and cleft palate patients than in general populations.

Valinoti reports an incidence of miss-

ing bicuspid to be 6.6% in the general population while the present study reveals 24% of the cleft lip and palate patients with missing bicuspid.

The etiology of the increased incidence of missing bicuspid in these patients is unknown. However, two possible causes may be (1) the over-all insufficiency of certain tissue and (2) surgical destruction of tissue.

Due to the high incidence of missing bicuspid it is extremely important to determine at an early age the presence or absence of teeth and plan treatment accordingly.

All patients with cleft lip only or cleft lip and palate were found to have some degree of deformity of the anterior teeth in the area of the cleft.

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BIBLIOGRAPHY

1. Brekhus, P. J., Oliver, C. P., and Montelius, G.: A Study of the Pattern and Combination of Congenitally Missing Teeth in Man, *J. D. R.*, 23: 117-131, 1944.
2. Valinoti, J. R., Jr.: The Congenitally Absent Premolar Problem, *Angle Ortho.*, Vol. XXVIII, January 1958.
3. Dolder, A. A.: A Statistical Survey of Deficient Dentition (Abstract), *Dent. Rec.*, 57: 56, July 1936.
4. Clayton, J. M.: Congenital Dental Anomalies Occurring in 3,557 Children, *J. of Dent. for Child.*, 23: 206-208, Third Quarter 1956.
5. Brown, R. V.: The Pattern and Frequency of Congenital Absence of Teeth, Master's Thesis, State University of Iowa, June 1955.
6. Hellman, Milo: Wisdom Teeth in Lower Jaw, *Arch. of Clin. Oral Path.*, 4: 171-186, September - December 1940.
7. Dahlberg, A. A.: The Changing Dentition of Man, *J. A. D. A.*, 32: 676-690, 1945.
8. Butler, P. M.: Studies of Mammalian Dentition, Differentiation of Post-Canine Dentition, *Proc. Zool. Soc.*, London 109: 1-36, 1939.
9. Evans, M. W.: Further Observation on Dental Defects in Infants Subsequent to Maternal Rubella During Pregnancy, *Med. J. of Australia*, 1: 780, 1947.
10. Frahm, F. W.: Two Cases of Partial Anodontia, *Dent. Items of Int.*, 57: 278, 1937.
11. Brown, W. E., Jr.: Oral Manifestations Produced by Early Irradiation, *J. A. D. A.*, 38: 754, June 1946.
12. Iltis, Hugo: Inheritance of Missing Incisors, *J. of Hered.*, 39: 363-366, December 1948.
13. Downs, W. G.: Studies in the Causes of Dental Anomalies, *Genetics*.
14. DeGooyer, J. J.: A Study of Retarded Tooth Development, Master's Thesis, State University of Iowa, February 1957.
15. Olin, W. H.: *Cleft Lip and Palate Rehabilitation*, Thomas Publishing Company, Springfield, Illinois, 1960.
16. Bohn, Arne: Anomalies of the Lateral Incisor in Cases of Harelip and Cleft Palate, *Acta Odont. Scand.*, Vol. IX, March 1950, pp. 41-59.