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Assessment of Airway Passage in Patients with Cleft, Lip and Palate and its Comparison to Children without Oral Clefts: A Review

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ABSTRACT

Background: Cleft, lip and palate is one of the more severe diseases of the oral cavity and other oronasal structures. A lot of craniofacial and crainiomorphological deviations have been observed in children diagnosed cleft-lip and palate. With the help of cephalometry, it is possible to evaluate these deviations and research better modalities to diagnose, treat and further knowledge about the condition. This review aims to study, evaluate and summaries the deviations found with the help of cephalometric analysis between patients suffering from cleft-lip and palate and non-cleft category.

Material and methods: An electronic database search was done on search engines PubMed and Medline and 10 articles were selected and reviewed.

Key words: Cleft, Lip Palate, Airway passage, Airway analysis, Cephalometry, Cephalometric analysis

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INTRODUCTION

Cleft- lip and palate are considered more severe form of genetic developmental disorders affecting oral cavity and related structures. It is a deformity in which the patient suffers from a cleft or gap between the lip, alveolus and/or the palatal region. It occurs due to failure of merging of both shelfs of the palate or the processes of maxillary during the developmental stages. Due to this, the patient suffering from this condition can suffer from a variety of problems such as difficulty in speech, weaning and psychological problems. The most common type among cleft-lip and palate is isolated cleft-palate comprising 25% of all cases [1].

To differentiate skeletal and dental features of the skull, cephalometry is used. The applied form of cephalometric analysis is called cephalometry, it is considered an ideal way of visualizing hard and soft structures of the skull, cephalometry analyses the interrelationship between the hard and soft structures. Cephalometric radiography is an important technique for diagnosing facial development anomalies and evaluating therapy progress and outcomes, a very important tool for orthodontists [2].

Apart from these problems, the patients may also suffer difficulty in eating, speech, the patient also suffers from a deviation in the nasal anatomy, and this leads to difficulty in breathing due to a compromised nasal passage [3]. A variety of abnormal cephalometric features has been associated with and has been proven in the study conducted by Chaisrisookumporn et al. [4]. On the basis of cephalometric analysis of the skull, basic differences in the dimensions of the facial structures between children suffering from unilateral and bilateral cleft-lip and palate and non-cleft patients has also been reported in the literature [5].

Studies

Bengisu Akarsu-Guven et al. Studied 212 lateral cephalograms of children diagnosed with bilateral cleft-lip and palate and the normal (healthy) group which comprised of healthy children who were not suffering from the condition, they found out that the patients with cleft-lip and palate had certain features which differed from the control group. The differing features included retroclination of the incisors of the maxilla, the gonial angle of the mandibular arch was obtuse, the facial height in both-upper and lower dimensions was found to be increased. 68 of the persons had bilateral cleft-lip

and palate while there were 114 subjects being part of the control group. Each group was divided further into 4 separate groups on the basis of the stage of maturation, they were–early childhood (10), pre pubertal (2), pubertal (3), and post pubertal (4) and cephalometric analysis was done. There were no major deviations in the maxilla in the male groups while certain differences were seen in the female group where it was forwardly placed in stage 2 and backwardly placed in stages 3 and 4. As for the mandible, it was more retrognathic in stage 3 and 4 in females and stage 1 for males. Vertical growth was seen with patients irrespective of sex and age did not impact this parameter. In almost all stages regardless of sex, except in the case of stage 1 in females, posterior airway passage was found the be narrower than normal. While middle airway passage was found to be wider except for stage 1 in both sex patients. Inferior airway passage was found to be narrow in males in stage 1 and 3. One of the drawbacks of this study was 2-d techniques were used to record 3-d structures of the pharynx [6].

In the study by Miranda Corbo et al. which aimed to evaluated cranio-facial proportions of unilateral cleft-lip and palate patients using Malek technique, 21 patients were selected. The anterior and posterior dimensions of both groups were measured and analysed. There were no significant changes in palate method correction between the two groups, however, there were substantial disparities in craniofacial dimensions between normal and cleft-lip and palate patients. In the cleft-lip and palate group, the maxillary arch and mandible were backwardly placed with respect to base of cranium on a skeletal level. Backward rotation of the plane of the palate was seen, which had an impact on the location of the mandible and maxilla. Maxillary arch was also shorter than in the population not suffering from the condition, while the mandibular arch was characterisitc in form. The maxillary anterior were backwardly placed, and they were in linguoversion with the mandibular anterior. The respiratory compartment had a posterior skeletal deficiency, which was offset by greater and prominent back region maxilla bone development. Face development in cleft-lip and palate sufferers displayed a similar trend, although it was slow when contrasted with healthy control group [7].

Schultes et al. studied 30 children with total unilateral cleft-lip and palate and 30 patients who had cleft lip and palate and those had received orthodontically guided treatment along with interventions with surgical approaches, all of whom were 18.9 years old on average. An average of 76.8 SNA angle was seen in cephalometric x-rays of patients with complete fissure, suggesting maxillary retrusion and a decrease in anterior facial height, implying a lack in the vertical dimension of the middle third. The sagittal measurements were also found to be reduced in the patients that were studied [8].

The study by Zbynek Smahel et al. cephalometric analysis of nasopharynx and related structures was done, the study consisted of two groups, in the first group 30 boys of which 15 had complete clefts, while the other had incomplete clefts. The second group included 28 boys who were suffering from unilateral, cleft-lip and/or palate, these children had also underwent palatoplasty Along with characteristics of soft palate, nasopharynx and related structures to ascertain if there is any airway limitation, adenoid dimensions were also measured. When the two groups were compared, the cranial base angle (NSBA) and clivus length (SBA) were unchanged. There was shortening of the cranial base length in the anterior dimension while the maxillary arch measurements and analysis revealed displacement posteriorly along with reduction in depth of the nasopharynx. The nasopharyngeal airway in the AP dimension was reduced indicating a compromised state of the airway passage in these patients. The posterior nasopharyngeal airway was also reduced greatly along with reduction in the height of the face in the posterior region. The reduction in height of the maxilla resulted in a reduced nasopharyngeal apparatus which resulted in a smaller airway passage.

This study had a completely morphological approach [9].

Renkai Liui et al. studied morphological changes in kids from china who got the treatment for unilateral cleft-lip and palate and contrasted the statistics gathered with physically sound kids as a control group, the kids were aged between 7 and 11 years, the sample size was 48 children which consisted of 25 males and 23 females [10].

CONCLUSION

The cephalometric analysis studies in all the studies revealed morphological changes in cleft-lip and palate diagnosed children when compared to patients without the condition. All 5 studies reported a reduction in the airway passage due to the craniofacial deformity caused by the developmental disorder. The reduction in the morphological dimensions of the skeletal structures like the maxilla affects the structural and functional capabilities of the nasopharyngeal apparatus which results in diminished functioning of the nasal passage in these children.

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