ORAL AND CRANIOFACIAL CHARACTERISTICS OF UNTREATED ADULT UNILATERAL CLEFT LIP AND PALATE INDIVIDUALS

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Abstract:

Introduction: Cleft lip and palate anomaly being the common congenital defect having significant effects on the facial morphology, function and growth and development of the individual, requires a detailed study of the Dental and craniofacial characteristics.

Design and setting: The study is conducted in a hospital set up and the subjects were selected at random as per the inclusion criterion.

Objective of study was to evaluate the craniofacial and Dental morphology in untreated unilateral cleft lip and palate (UCLP) individuals.

Materials and Methods: A total of 64 individuals in the age group of 15-28 yrs were selected and grouped into two groups; Cleft group consisting of 13 males and 19 females having untreated UCLP and another group of 16 male and 16 female non cleft individuals. Study cast, lateral cephalogram and frontal cephalogram analysis were carried out. The obtained data were analyzed using ANOVA to compare the values between the groups.

Result: Significant differences in craniofacial characteristics were noted between the cleft and non cleft individuals. These differences were more pronounced in sagittal plane and less in transverse plane.

Conclusion: Significant differences exist in the craniofacial morphology between the untreated UCLP individuals and non cleft individuals.

Keywords: lateral Cephalogram, Frontal Cephalogram, Cleft, Craniofacial morphology

Introduction:

Cleft lip and palate anomaly is one of the most frequently encountered congenital malformations caused due to morphologic changes, altered growth factors, and absolute tissue deficiency in the hard palate and abnormal tissues in the Maxillo-palatal region.

The defects usually associated with cleft lip and palate patients are those of growth in all three planes i.e. vertical, sagittal and transverse plane. The most striking feature in a cleft patient is the sagittal deficiency of the mid face leading to a concave facial profile. The mid facial deficiency is progressive and can be observed in early ages. The major morphologic characteristic in complete cleft lip and palate individuals is the result of altered response of skeletal elements to muscular deformation tendencies. Studies comparing the craniofacial features among cleft individuals have demonstrated significant differences in various parameters when compared with that of the non cleft individuals.

The Comprehensive management of Cleft lip and palate cases requires a team effort, consisting of various specialists. The multitudes of problems associated with the unfortunate individuals include Growth defects, Dental arch abnormalities, and morphological defects and also the esthetic and psychological trauma that the individual undergoes. Orthodontic treatment involves alveolar molding, arch expansions, growth modifications and arch alignments at different stages of management. The appropriate treatment regimen has to be selected based on the individual cases keeping in mind the patient’s age and the growth status.
Aims and objectives:
The study was carried out to evaluate the facial morphology of untreated adult cleft lip and palate individuals and to compare them with that of non cleft individuals. The data obtained from the facial morphology of untreated adult cleft lip and palate individuals can be used as an aid in diagnosis and treatment planning and also as a standard guide for surgical and / or orthodontic intervention for cleft individuals.

Materials and Methods:
32 Untreated Adult Unilateral Cleft lip and palate (UCLP) individuals and 32 Non Cleft individualsmatched by age and gender were selected for the study as per the following inclusion criteria.

Group I: Control Group (15-28yrs); 16 males and 16females
- Adult Subjects with pleasing profile, Class I skeletal relationship, with near normal Occlusion
- No prior Ortho. / Surgical treatments

Group II: Untreated adult Cleft (15 -28 yrs); 13 males and 19 females
- Unilateral Cleft lip and palate individuals with No history of prior treatments what so ever for the defect

Upper and lower study casts were prepared after obtaining the informed consent. Lateral & Frontal cephalograms were made under the standard conditions using PlanmecaProline 2002 machine (Planmeca, Finland) and were traced on to an acetate paper using 0.5mm pencil andwere analyzed for the various craniofacial characteristics. A total of 7 parameters in lateral cephalogram [Fig.1] and 11 parameters in frontal cephalogram[Fig.2] were measured and analyzed. [Table1]

The Data obtained were subjected to ANOVA test to determine the statistical significance between the groups.

Result:
I. Study Cast analysis:
While the Inter canine width and Palatal height were significantly different in males, the palatal height and palatal distance were significantly different in females. [Table2]

The following observations were also made in cases of cleft lip and palate individuals.
- Missing Teeth- Lateral incisor (14) ;Central incisor (12) and Canine (4)
- Impacted Teeth- Canines (14);Lateral incisor(12) and Central incisor(3)
- Retained Deciduous Teeth- Canines (14) and Lateral incisor (8)
- Rotated Incisors – All the cases
- Peg Lateral - 2
- Supernumerary Teeth (Mesiodens) – 2
- Transpositions of canine and premolar – 2
- Generalized Spacing – 6

II. Lateral Cephalometric Analysis:
The craniofacialparameters, Go-Gn, Co-Go, Co-Gn, Co-Go-Me, facial height ratio, and SNB values showed statistically high to very high significant differences between the groups.Only the anterior cranial base measurement in female subjects was not significantly different. [Table3 &4]

III. Frontal Cephalometric Analysis :
The frontal analysis and comparison between the groups showed that only the lo1-Io1-/Lo-Lo measurement was significantly different between the groups, whereas the other parameters were statistically not significant between the groups. [Table 5 & 6]

Discussion:
Cleft lip and palate anomaly is one of the most frequently encountered congenital malformations. The defect usually associated with cleft lip and palate patients are those of growth in all three planes i.e. Vertical, Sagittal and Transverse planes. These patients are generally characterized as possessing abnormalities of the dental arch form, malocclusion, facial deformity and masticatory function. In terms of gonial angle width, the results obtained in the present study are in contradiction with the study done by Dixon in 1966, Ishiguro et al in 1976, Ross...
and Johnston in 1967. Dahl, in a study reported no significant differences in arch dimensions between cleft and non cleft groups.

The present study indicated that the cleft individuals had smaller anterior Cranial base length (SN); Short Mandibular body length (Go-Gn); Short Mandibular overall length (Co-Gn); Short Ramus height (Co-Go); Obtuse Gonial angle, steep Mandibular plane; Reduced posterior facial height, increased anterior facial height, Mandible rotating downwards and backwards and Midface deficiency (SNA) when compared to non cleft individuals.

Horswell and Lavent (1988) evaluated craniofacial growth in UCLP patients and reported reduced maxillary arch length in cleft individuals. Blanco, Brece et al., (1989) also showed significant reduction in all the arch dimensions in cleft palate patients. Omar Gabriel, Camargo et al (1992) in their study on the influence of cleft on maxillary arch morphology, concluded that maxillary arch is distorted in the presence of cleft. Similar results were also reported by Heidbuchel, Jagtman et al in 1997.

The data obtained from the present study may be used as an aid in diagnosis and treatment planning and also as a standard guide for Surgical and/ or Orthodontic interventions for Cleft individuals.

Conclusion:
Significant variations are observed in Dental and Craniofacial form in Untreated Adult UCLP individuals when compared to non cleft individuals. Facial characteristics were significantly different in sagittal plane when compared to that in the transverse plane. Significant differences were also observed in the dental characteristics between the untreated adult UCLP individuals and the non cleft individuals.

Further studies need to be carried out on different types of oro-facial clefts taking into account age and ethnicity of the individuals. Such investigations need to be conducted on a longitudinal basis to study the effects of cleft on the growth and development of the individual.
### Table 1: Parameters used in the study

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Study Cast analysis</th>
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<th>2 Inter Premolar width</th>
<th>3 Palatal Height</th>
<th>4 Palatal distance</th>
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</tr>
<tr>
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<td>Co-Go</td>
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</tr>
<tr>
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<td>Co-Gn</td>
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<td>mx-mx/ag-ag</td>
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### Table 2: Model Analysis – UCLP Vs Control

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<td>Inter Premolar Width</td>
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<td>Control</td>
<td>37.2000</td>
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<td>Palatal Height</td>
<td>Cleft</td>
<td>17.3846</td>
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<td></td>
<td></td>
<td>Control</td>
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<td>3.2470</td>
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<td>Palatal Dist</td>
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<td>26.8000</td>
<td>3.2338</td>
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### Table 3: Lateral cephalometric analysis-Cleft vs Control (Male)

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<th>Cleft</th>
<th>T</th>
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</thead>
<tbody>
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<td>1</td>
<td>S-N</td>
<td>78 ± 4</td>
<td>74.2 ± 4.2</td>
<td>3.50</td>
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<td>P=0.0009  VHS</td>
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<tr>
<td>2</td>
<td>Go-Gn</td>
<td>81.9 ± 5.1</td>
<td>75.3 ± 6.1</td>
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<td></td>
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<td></td>
<td>P&lt;0.0001 VHS</td>
</tr>
<tr>
<td>3</td>
<td>Co-Go</td>
<td>63.6 ± 4.5</td>
<td>55.7 ± 6.1</td>
<td>5.496</td>
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<tr>
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<td>P&lt;0.0001 VHS</td>
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<tr>
<td>4</td>
<td>Co-Gn</td>
<td>130.1 ± 6.7</td>
<td>122.6 ± 3.5</td>
<td>5.485</td>
</tr>
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<td>P&lt;0.0001 VHS</td>
</tr>
<tr>
<td>5</td>
<td>Co-Go-Me</td>
<td>124 ± 4.3</td>
<td>132.0 ± 4.5</td>
<td>6.61</td>
</tr>
<tr>
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<td>P&lt;0.0001 VHS</td>
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<tr>
<td>6</td>
<td>Facial ht. Ratio</td>
<td>65.5 ± 2.5</td>
<td>67.2 ± 3.5</td>
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<tr>
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<td>SNB</td>
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<td>76.5 ± 3.5</td>
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<td>P&lt;0.0001 VHS</td>
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### Table 4: Lateral cephalometric analysis-Cleft Vs Control (Female)

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<th>Cleft</th>
<th>T</th>
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<tbody>
<tr>
<td>1</td>
<td>S-N</td>
<td>72.5 ± 3.2</td>
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<td>Co-Go</td>
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<tr>
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<td>Co-Gn</td>
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<tr>
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<td>Co-Go-Me</td>
<td>125 ± 3.4</td>
<td>130.8 ± 5.6</td>
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<td>Facial ht. Ratio</td>
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### Nitte University Journal of Health Science

ORAL AND CRANIOFACIAL CHARACTERISTICS - M. S. Ravi

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### Table 5: Frontal Cephalometric analysis - Cleft Vs Control (Male)

<table>
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<th>Measurements</th>
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<th>'p' value</th>
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<td>Cleft</td>
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<td>Control</td>
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### Table 6: Frontal Cephalometric analysis - Cleft Vs Control (Females)

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