

Role of Orthopantomogram as an Ancillary to Lateral Cephalogram in Diagnosis of Vertical Malocclusions

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Abstract

Aim and Objective

Vertical malocclusion is an important and commonly seen anomaly of craniofacial complex. In our study we will evaluate and compare the efficiency of orthopantomogram (OPG) over lateral cephalogram.

Methodology

A total of 60 radiographs were collected from patients. Independent reference planes were setup in maxilla and mandible. The inclusion criteria of the study in involved subjects in the age group of 20-25 years, class I skeletal and dental relationship with an overjet and overbite in the range of 2-4mm with orthographic profile.

Results

Significant values were obtained for effective length of ramus, effective length of corpus, effective height of corpus, inter-occlusal distance, PGOA, PCOI, PMPA, maxillary occlusal angle.

Conclusion

On completion of our study we can conclude that the OPG can be used in the assessment of vertical malocclusion quantitatively.

Keywords

(Orthopantomogram, LateralCephalogram, Open Bite, Deep Bite)

Introduction

In the field of orthodontics malocclusion can be found in different places like anteroposterior, sagittal and vertical. Since the time of Edward angle¹, orthodontists are mainly interested in antero-posterior malocclusion. But if we look back into the history we will find very little work on more disfiguring vertical malocclusion. Vertical malpositions of teeth are the most common malocclusions encountered and more difficult to treat as compared to anteroposterior malocclusion². Anterior open bite and deep bite are the two most common vertical malocclusion encountered.

Materials and Methods

Panaromic radiographs of 60 subjects (20-open bite, 20-deep bite, 20-control group) were included for the study. All digital panaromic radiograph were made by a standardized technique⁸ and used for analysis. Tracing was done on acetate paper using a 0.5mm lead pencil.

Landmarks

- 1.Orbitale(or)- the lowest point on the inferior rim of the orbit.
- 2.Mae- Meatus acusticus extemus : location of external auditory meatus.
- 3.ANS- Anterior nasal spine: anterior tip of the sharp bony process of the maxilla.
- 4.Me- Menton: lowest point on the symphysis shadow of the mandible.
5. Condylion (Co): most superior point on head of mandibular condyle.
6. Coronoid point (Cor): most superior point on coronoid process.
7. Sigmoid notch point (Snp): deepest point on sigmoid notch.
8. Gonion (Go): most posteroinferior point at the angle of mandible.
9. F Me: Foramen mentale

10. MC: mandibular canal: perpendicular to lower border of the mandibular canal
11. U6: mesiobuccal cusp on the upper first molar.
12. L6: mesiobuccal cusp on the lower molar mandible.

The following reference planes were then drawn-

Result

All statistical analyses were performed with Statistica software. students t-tests was used to evaluate groups comparability. The results were considered significant corpus, inter-occlusal distance , PGOA, PCOI, PMPA, maxillary occlusal angle.

Discussion

Multiple skeletal and dental components were deemed to contribute in the development of both deep bite and open bite malocclusions. When the contributions of the components to open and deep bite malocclusions were compared, the skeletal components had a more evident influence in the etiology of open bite. On the other hand, the dental discrepancies were more sharing in the development of deep bite. The mandibular skeletal parameters were shown to play a more important role in the development of open bite malocclusion compared to deep overbite. Accordingly, the orthopaedic control of the mandibular growth and rotation can have a more profound impact in the treatment of open bite malocclusion. Diagnosis of vertical malocclusion is not a complex process as that of skeletal asymmetry. It can also be done clinically and by lateralcephalograms⁹. Then “why the use of OPG for diagnosis of vertical malocclusion?” There are studies which says that the open mouth position allows more accurate tracing of the condyle because in habitual occlusion it gets obscured by temporal bone¹⁰. Panoramic radiograph is relatively accessible as compared to lateral cephalograms. Now high quality panoramic machines are being manufactured which

have greater versatility than the conventional machines. On completion of this study it was found that PGOA (panoramic alternative of gonial angle), PCOI (panoramic alternative condylar inclination), PMPA (panoramic alternative of mandibular plane angle) are increased in case of open bite and decreased in case of deep bite as compared to control group. Open bite patients have steep mandibular plane, so the gonial angle is increased in cases of open bite and decreased in deep bite.

Hapak(1964)¹¹, Subtelny(1964)¹², Nahoum(1971,1975)¹³ also noted steep mandibular plane and large gonial angle in open bite. Ramus is forwardly inclined in deep bite and conversely more posteroinferiorly inclined in open bite this gives a higher PCOI angle in open bite and lower in deep bite. A more downwardly inclined mandibular plane is expected in open bite and more horizontal mandibular plane in deep bite this results in a higher PMPA in open bite. Swimehart (1942)¹⁴ reported a short ramus in open bite, which was corroborated in our study as the effective ramal length was found to be decreased in open bite.

Thereby, based on the current findings, we can draw some guidelines elucidating the sharing components in vertical malocclusion as a whole and also clarifying some components that could differentiate between open and deep bite malocclusions. An anteroinferior tilt of maxillary alveolar plane is associated with deep bite and posterosuperior inclination is associated with open bite. The dentoalveolar compensation for this is made by curve of spee which results in anterior occlusal closure. This is why here we noticed increased maxillary occlusal angle in deep bite and decreased in open bite.

Anteriors are always extruded in deep bite and intruded in open bite. This results in decreased interocclusal distance in open bite. A consistent finding of our study is the oral orifice which is always elliptical in open bite. Aberrant

muscle growth and function, digit sucking are the etiological factors for open bite. Neff(1966)¹⁵ based on strain-gauge studies concluded that the reason for open bite is due to abnormal force pattern associated with swallowing and muscles of mastication. This may be the reason for elliptical oral orifice.

Conclusion

On completion of our study we can conclude that the OPG can be used in the assessment of vertical malocclusion quantitatively. On comparing the values of orthopantomogram and lateral cephalogram it was found that opg can be crucial for diagnosis of vertical malocclusion. However, they are not reliable enough to give acceptably accurate information like lateral cephalograms and further evaluation is necessary.

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