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A Systemic Relationships Between Endodontic and Orthodontic

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Abstract

Background and Objectives: Fixed orthodontic treatment is a long process that causes chronic tension and pressure on the root and alveolar bone. This when done during the root formation and completion stage can cause changes that can affect the radiographic age estimation if done in orthodontically treated individuals.

Method: Pre- treatment and post- treatment panoramic radiographs were collected from the archives of department of Oral medicine and radiology.

Results: The present study to evaluate any changes caused by fixed orthodontic treatment on the developing roots that can potentially affect the dental age estimation resulted that the age showed difference between the EA and CA post orthodontic treatment was significant compared to the difference between the EA and CA calculated from the pre-treatment radiographs which were non-significant.

Conclusion: In the current to evaluate, if orthodontic treatment causes any changes in age estimation done over 100 post orthodontic radio graphs, using difference between EA and CA which is significant and the difference in age various across different age group and different gender.

Keywords: Orthodontically, Human Body, Physiological Age, Panoramic Radiographs.

Introduction

Initial development and growth of various parts of the human body determines the biological age of the individual. Though the development and growth stages vary in each, these can be categorized into various mile-

stones which is evident in most individuals of the population.

Physiological age is based on the degree of maturation of different biological tissue. Determining the bio logical age using various parts of the body with their stage of development is an esteem for science.

One of the easiest body parts that can be used is teeth. Age estimation is an important part in human identification, apart from teeth, many other body parts are used to determine age.

Hence along with dental age other bio logically determined age will provide a much closer value to the morphological age.

The selected age group of 12-18 is the most common group to undergo orthodontic treatment. Orthodontic treatment during this age overlaps with the process of root formation, root completion and apex closure in its various stages.

This study can observe if there is any change in root completion due to orthodontic treatment which can be considered during age estimation to arrive at a considerable report.

Aims and Objectives

Aim: To compare CA and dental age in fixed orthodontically treated individuals using pre-treatment and post treatment radiographs

Objectives

1. To assess dental age using pre-treatment radiographs.
2. To assess dental age in orthodontically treated individuals using post treatment radiographs
3. To compare the difference between the dental age and CA using post treatment radiographs

Material and Methods

Source of Data: Panoramic radiographs from the Department of Oral Medicine and Radiology.

Method of Collection of Data: Radiographs of the age group between 11- 14 years, of both sex and age group between 15- 18 years, of both sex.

Inclusion Criteria

1. Post orthodontic treated patient's radiographs of both sexes.
2. Between 11-18 years.

Exclusion Criteria

1. Not undergone complete fixed orthodontic treatment,
2. Congenital anomalies,
3. Missing tooth,

Study Duration: 18 months

Study Design: A cross-sectional analytical study.

Sample Design: Prospective study

Sample Size: 100 subjects

Statistical Analysis

Data was entered into Microsoft Excel and statistical analysis was carried out in SPSS software version 17.0. Quantitative variables like estimated age and chrono logical age were presented as mean (standard deviation). Bar diagrams and scatter diagrams were used for graphical representation of data. The mean difference between estimated and chronological age in different age groups was calculated using a paired t test. Difference in mean of estimated age and difference in mean of chronological age was compared using independent t test.

Methodology

After obtaining approval and clearance from the institutional ethical committee, Pre- and Post-Treatment Panoramic radiographs of fixed orthodontically treated patients within the decided age group from the dept of Oral Medicine and Radiology was collected. 25 radio graphs were collected under each selected group.

Corres ponding values for the development stage is noted for each tooth in the thyroid quadrant from 31 to

38. Indian regression Values of maturity scores are substituted in the root development stages for each tooth. The sum of all the values of maturity scores was calculated to get the 'S' value. Same 'S' value to use in the formula for male and female separately, to arrive at the estimated dental age of each individual.

The obtained estimated dental age from post orthodontic treatment were compared with the CA of the same patient to find the difference, if any.

25 radiographs from post orthodontic treatment were randomly selected and the same procedure was repeated after 15 days to observe any intra-observer.

variations. Same 25 radiographs were assessed by 2 other observers namely 'observer 2' and 'observer 3' to assess inter observer bias. All the observers were blinded from the CA of the individual during assessment of the radiographs to avoid Bia.

Results

Data was entered into Microsoft Excel and statistical analysis was carried out in SPSS software version 17.0. Quantitative variables like estimated age and chronological age were presented as mean (standard deviation). Bar diagrams and scatter diagrams were used for graphical representation of data.

The mean difference between estimated and chrono logical age in different age groups was calculated using a paired t test. Difference in mean of estimated age and difference in mean of chronological age was compared using independent t test. Agreement in the measurements of estimated and chronological age between the same observer at different time points and between the observers were calculated using Man- Whitney U test or Bland Altman plots.

Randomly selected 25 radiographs were re-evaluated for inter and intra observer difference. Wilcoxon sign rank test was used to assess the inter and intra observer difference, and concluded no significance. The test showed mean age as 16.6 with SD of 2.6 years (P=0.31).

Distribution of age group

A total sample of 100 post treatment radiographs were grouped into 4 groups each with 25 samples.

Group 1: Female- 11-14 years

Group 2: Male - 11-14 years

Group 3: Female 15-18

Group 4: Male 15-18

Group 1(Female 11-14)

Comparison of EA and CA in post treatment of female 11-14 years.

In comparison of EA and CA in post treatment of 11-14 years were evaluated with paired t-test. The mean age in EA is 14.9 with SD 1.8 years and the mean in CA is 13.1 with SD of 0.8 years. P value was calculated as <0.001 which is statistically significant.

Comparison of EA in pre and post treatment in females 11-14 years

On comparison, EA in pre-treatment and post treatment of 11-14 years were evaluated with paired t-test. The mean age in post treatment is 14.9 with SD 1.8 years and the mean in pretreatment age is 11.6 with SD of 0.8 years. P value was calculated as <0.001 which is statistically significant.

GROUP 2 (Male 11-14)

Comparison of EA and CA in post treatment of male 11-14 years

On comparison of EA and CA in post treatment of 11-14 years were evaluated with paired t-test. The mean age in EA is 14.4 with SD 1.9 years and the mean in CA is 12.7 with SD of 1.2 years. P value was calculated as <0.001 which is statistically significant.

Comparison of EA in pre and post treatment in males 11-14 years

The mean age calculated in post-treatment is 14.4 years with SD of 1.9 years and the mean age in pre-treatment is 11.2 years with SD of 1.0. Paired t-test was done (<0.001) which was significant

Comparison of difference between EA and CA in the post treatment between 11-14years males and females

Post treatment difference between estimated and CA in males calculated mean age as 1.7 years with SD 1.2 years. Same in females calculated mean as 1.8 years with SD 1.3 years. The p value (p=0.7) was calculated with independent t-test, which is not significant.

GROUP 3 (Female 15-18)

Comparison of EA and CA in the post treatment in females 15-18 years The mean in EA is 19.0 years with SD as 1.2 years and the mean of CA is 16.5 years with SD as 1.0 years. The test used was paired t-test (<0.001) is significant.

Comparison of EA in pre and post treatment in females 15-18 years

The comparison of pre and post treatment age is done using paired t-test (<0.001), The mean post treatment EA is 19.0 years with SD 1.2. Pre-treatment mean EA as 14.5 with SD 1.4.

Table 10: Comparison of EA in pre and post treatment in females 15-18 years

GROUP 4 (Male 15-18)

The mean EA in post treatment is 17.4 with SD 1.3. The mean CA in post treatment is calculated as 16.2 years with SD 1.1. The test used is paired t-test showed no significance.

The mean age in post-treatment is 17.4 years with SD as 1.3 and in pre-treatment mean age is 14.8 with SD 1.1 years. Paired t-test resulted in p value <0.001 was non-significant

Comparison of difference between EA and CA in the post treatment between males 15-18 years and 15-18 years of females

The mean age in males is 1.2 years with SD 0.8 in the difference between estimated and CA in post treatment. And the mean age in females is 2.5 years with SD of 1.2 years calculated using independent t-test showed P value as <0.001 and not significance.

Discussion

Dental age estimation is an important part in the human profiling triad. And there are various applications of it depending on the material retrieved. Can be done in postmortem, alive individual and skull or jaw bone remains. Separated tooth can also be used to estimate the age of the individual at the time of death. Dental DNA fingerprinting is the next level of recent molecular biology, which shows that an isolated tooth can be used to isolate DNA even after 80 years of burial [17]. Also, other factors like chemical and physio logical com position of the soil do enhance the shelf-life of the tooth DNA. And hence the importance of teeth, forensic odona to logist in identifying an individual.

Conclusion

Detention is a very important anatomical structure in estimation of age alongside other techniques such as radio graph and clinical methods such as hand-wrist bone calcification and mineralisation, pelvic bone, cervical bone and physical changes. As the present study showed increased age in dental estimation compared to chronological age post orthodontic treatment, the importance of age estimation is high. It is important to consider increased error range during assessment of dental age in individuals who had undergone fixed orthodontic treatment for more than 1 year.

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