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Human Age estimation by Dentin Translucency and Cementum Annulation Count: A light microscopic study

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Abstract:

Identification of living and dead persons is of paramount importance in routine forensic odontology. Age determination plays an important role in forensic medicine, not only in identification of bodies, but also in connection with crimes. Age estimation is a subtle discipline of the forensic sciences and it should be an important part of every identification process, especially when information which is related to the deceased is unavailable.

Keywords: Age estimation, Cemental lines, Secondary dentine, Human age identification

Introduction

Identification of living and dead persons is of paramount importance in routine forensic odontology. Age determination plays an important role in forensic medicine, not only in identification of bodies, but also in connection with crimes. Age estimation is a subtle discipline of the forensic sciences and it should be an important part of every identification process, especially when information which is related to the deceased is unavailable.

When subjects have undergone changes which are so extensive that external characteristics yield no information, teeth are often the only means of identification. The hard tissues of the human dentition are able to resist decay and degradation, long after other tissues are lost. This resistance

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has made teeth useful indicators for assessing variations in diet, expression of metabolic diseases, and calculation of age at the time of death.

Gradual structural changes which occur in teeth throughout life are the basis for age estimation. The enamel, dentin, and cementum that constitute teeth are used to estimate the chronologic ages of unidentified individuals. Cementum in humans increases in thickness with age, and new layers are deposited on the outside of the dentin throughout the life of the individual. Because of its position, cementumhas not been used to the extent that enamel and dentin were used. However, the counting of cemental annulations may offer a more accurate method for age estimation in human beings.

Cementum is a connective tissue that surrounds tooth roots in incremental layers, resulting in the appearance of concentric lines in the cementum, which are known as salter lines, which can be equated with years. Each pair of lines corresponds to one year of life and it constitutes a biological record that can be used to estimate the age of an individual.

With aging, the pulpal cavity becomes smaller, because of continuous deposition of secondary dentin. Secondary dentin forms continuously throughout life, after the completion of the primary dentine and it starts at the moment that the related tooth root is completed. Hence, its amount can be used to estimate the age of an individual. Secondary dentin deposition is regular when it is not under the influence of dental caries or other physical/ chemical insults to the tooth. Hence this study emphasizes that the correlation between age and number of incremental lines in human dental cementum and the thickness of secondary dentin can be done.

Materials & Methods

Main objectives of this project was to examine the correlation between age and the number of incremental lines in human cementum and to correlate age with thickness of secondary translucent dentin.

1. 100 subjects of different age groups were randomly selected for the study.
2. The sample was selected from the OPD of the institution amongst those patients who had exodontias procedures to be done for various reasons.

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3. Informed consent was obtained for the purposes of this study.
4. After the teeth were extracted under LA, the tooth specimen were preserved in formalin.
5. The tooth specimen were sectioned with carborundum disks and hard tissue microtome to obtain 10micron thickness sections.
6. The sections were dehydrated, cleared and mounted on glass slides and observed under light microscope.
7. Biowizard 2.0 software was used to capture and analyze the images and morhometric measurements.
8. The results obtained were tabulated and SSPS software was used to compare the findings and assess their significance..

Results

Presence of and thickness of translucent dentin was seen to be a less reliable indicator for age estimation. The difference in this case between the mean calculated age using dentin translucency criteria and the actual age of the study subject was observed to be ±8.2years.

With cementum annulation count, the results were more reliable and the mean difference in this case was ±4.8 years.

Discussion and Conclusion

Cementum annulation count was a better method to estimate the age as it was found to be more consistent with the actual age and less influenced by environmental factors.

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