F30 **The Significance of Intercanine Distance in Bite Mark Analysis: A Critical Analysis of Juvenile vs. Adult Dimensions**

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The goal of this presentation is to demonstrate the importance of scientific study and careful analysis of features used in bite mark analysis. Assumptions that seem to be obvious may lead investigators to make erroneous assumptions. This information may be used by medical examiners, forensic odontologists, or other investigators to assist in the identification of the correct perpetrator, adult or juvenile, of human bite marks. It is the hope of the author that the study will incite further research and analysis into this subject matter.

This presentation will impact the forensic community and/or humanity by providing information to medical examiners, forensic odontologists, or other investigators to assist in the identification of the correct perpetrator adult or juvenile, of human bite marks.

The purpose of this paper is to collect data on the intercanine widths of children from age 3 to 18 and to compare that data to previously collected data from known adult populations. The authors' intent is to examine the reliability and validity of distinguishing adult from juvenile bite marks using metric analysis in general and intercanine dimension specifically.

Background Information: It is perhaps an intuitive assumption that adult arches and adult intercanine dimensions are larger than their juvenile analogues. Dental arch size is one of the primary considerations in evaluating a bite mark injury on human skin. However, using metric analysis of arch size or intercanine dimension as the sole determinant may lead to false conclusions in considering possible perpetrators.

There has been little research done since 1976 in analysis of dental arch form, specifically inter-canine distance in children. A study done at the Center for Human Growth and Development at The University of Michigan in 1976 has served as the foundation upon which standards in juvenile arch form are relied upon for orthodontic treatment. This study sampled 208 children from ages 3 to 18 with equal percentage of males to females. Extensive analyses of subject casts were preformed to aid the orthodontic investigators to formulate statistical measurements of development. Forensic Odontologists have not universally applied those measurements or standards in their analysis of bite marks. There are no recent studies in the forensic literature noted that examine the question of the intercanine dimensions of children as compared to adults.

Dorion states in bite mark Evidence (2004, Marcel Dekker Ltd) that the upper arch has an average intercuspid distance of 32.3mm to 33.6mm, and the mandibular intercuspid distance averages 25mm to 33.0mm in the adult population. He further states that the difference between males and females averaged 1.6mm for the maxilla and 1.0mm for the mandibular with considerable overlap. In children he states the mean maxillary intercuspid distance measures 28 – 29mm from ages 3 to 6, and the respective mandibular intercuspid distance is 22.6 mm. Given that canines are often a distinctive feature in bite mark analysis a larger study should be initiated which would allow conclusions to be made comparing juvenile to adult patterns.

Hypothesis: Comprehensive analysis of the variability in arch size and intercanine dimension will show that there is a statistically significant difference between the arches and intercanine distance of children and adults. The null hypothesis is, of course, that there is not a statistically significant difference.

Methods and Materials: Arch size and intercanine dimension information was collected from juveniles between the ages of three years and eighteen years old. Data was collected from private patients in general dentistry, pediatric dentistry and orthodontic practices. Data was also collected from orthodontic pre and post treatment diagnostic casts. The information was collected in one of two ways. 1. The fabrication of "wax exemplars" directly from the subject's mouths. These wax exemplars were then scanned and analyzed. 2. Pre and post treatment orthodontic models were scanned and analyzed. Both were analyzed using Adobe Photoshop 7.0. All personal information was redacted except age, race and gender.

Results: The results of this study demonstrate the importance of scientific study and careful analysis of features used in bite mark analysis. Assumptions that seem to be obvious may lead investigators to make erroneous assumptions. This information may be used by medical examiners, forensic odontologists, or other investigators to assist in the identification of the correct perpetrator adult or juvenile, of human bite marks.

Forensic Odontology, Bite mark Analysis, Human Bite Mark