F61 A Comparison of Hollow Volume Overlays to Bitemarks in Vital Tissue When a Postural Change Is Effected

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After attending this presentation, attendees will become familiar with postural distortion of bitemarks and potential concerns of the forensic odontologist when presented with a bitemark for analysis.

This presentation will impact the forensic science community by adding to the scientific database of studies dealing with the coincidence of hollow volume overlays to bite indentations left in vital tissue.

It has been established in previous bitemark studies that distortion of skin itself, position of bite (relative to Langer lines), non-uniform height of the teeth, and other factors all contribute to the patterns which are left on skin and that these patterns are not necessarily identical to the overlays or the patterns left in inanimate recording media. It has also been shown that positional distortions of bitemarks occur.[1,2]

Displacement studies (sequentially altering the horizontal and vertical relative position of teeth to their neighbors) have indicated that the features of displacement are more pronounced in the bitemark than in the actual dentitions, adding to the possible distortion. However, they have also indicated that displacement of 5mm between teeth enabled distinction between the dentitions. [3]

Odontologists are often presented with a bitemark discovered on a decedent during examination prior to autopsy. These marks, on a subject now supine, may not have been inflicted while the decedent was in the selfsame position, thus we are faced with distortion of the mark due to both the viscoelastic properties of skin and to postural changes. It is the goal of this study to compare marks left by two distinctly different sets of dental casts (hereafter referred to as Biter A and Biter B) in vital skin to the hollow volume overlays of said casts for coincidence when those marks are photographically recorded both in the actual three-dimensional attitude in which they were made (hereafter referred to as the spatial position), as well as in the anatomic position, the position inwhich, very often, they are presented to the odontologist for evaluation.

Reproducible bitemark research, of necessity, has been carried out utilizing unembalmed human cadavers and casts of dentitions mounted on C-clamp-type locking pliers. This device is calibrated to deliver a known force upon closure. Actual bitemarks are generally caused during a struggle and rarely is the recipient of the wound passive. It is also reasonable to assume that said movement might create additional distortion. Another consideration is that the force of the musculature at the time of the bite is never known and, most assuredly, never universal. Thus, it is difficult, and may be impossible, to fully reconcile the reproducible science to the marks produced during violent encounters. This is an attempt to evaluate whether the distortions of bitemarks in human skin, caused by a variety of factors, can be so great as to allow for improper attribution of a bitemark when one is dealing with a very limited set of biters with dentitions which, even to the naked eye, are clearly dissimilar. That having been said, without a body of data to support our analyses, those analyses can, and perhaps should, be characterized as one's habit and intuition and not as logical conclusions based on research and the data generated by that research. This study wishes to contribute to that body of research.

Five "bites" were sequentially created on the subject's left arm using Biter A, the first four being parallel to the Langer lines, the fifth being perpendicular. Each bite was photographed immediately, with an American Board of Forensic Odontology (ABFO) scale present, in the spatial position and then in the anatomic position. The bites were also photographed in both positions at 10 minutes, 20 minutes, and 30 minutes. The initial photographs (time zero) were the only images utilized in this study. This process was repeated on the right arm of the subject, using Biter B. The respective hollow volume overlays, created as per ABFO guidelines, were compared to the bites in both the spatial and anatomic positions and vice-versa. The results will be discussed.

References:

1. Bush, M., Miller, R., Bush, P., Dorion, R. Biomechanical Factors In Human Dermal Bitemarks in a Cadaver Model J. Forensic Sci. 2009; 54 (1): 167-176
2. Miller, R., Bush, P., Dorion, R., Bush, M. Uniqueness of the Dentition as Impressed in Human Skin: A Cadaver Model J. Forencis Sci. 2009; 54 (4): 909-914
3. Holtkoetter, H., Bush, P., Sheets, H.D., Bush, M. Transfer of Dental Patterns to Human Skin AAFS 65th Annual Scientific Meeting 2013, Washington D.C. Presentation F29

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