Review Research Paper

Analysis of Bite Mark Evidence

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Abstract

Bite mark analysis casework strives to connect a biter to the teeth pattern present on an object linked in some way to a crime or event. The general public and some law enforcement may consider any “bite mark” case they develop to be a certainty in the quest to identify the biter. The ability of skin to register sufficient detail of a biter’s teeth is highly variable. Bite mark casework indicates that many bite marks are not well defined in detail and possess distortion due to the physical nature of skin itself.

The current opinion is that bite mark can be useful in including or excluding possible suspects and ability to identify only one person as the biter. In mortal combat situations, such as the violence associated with life and death struggles between assailants and victims, the teeth are often used as a weapon. It is well known that assailants in sexual attacks, including sexual homicide, rape and child sexual abuse, often bite their victims as an expression of dominance, rage and animalistic behaviour. The teeth are a significant component of our natural arsenal.

Key Words: Bite mark, Recognition, Documentation, DNA analysis

Introduction:

Bite marks may possess individual tooth marks that appear as a jagged or intricate pattern or show as an amorphous bruise with diffuse detail. In mortal combat situations, such as the violence associated with life and death struggles between assailants and victims, the teeth are often used as a weapon. Indeed, using the teeth to inflict serious injury on an attacker may be the only available defensive method for a victim. [1] Alternatively, it is well known that assailants in sexual attacks, including sexual homicide, rape and child sexual abuse, often bite their victims as an expression of dominance, rage and animalistic behaviour. [2]

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The teeth are a significant component of our natural arsenal. It is suspected that many dentists have seldom considered their patients’ teeth as such effective weapons! The aim of this paper is to provide information about this form of forensic evidence and to demonstrate how human bite marks are used by courts to answer important questions that may arise during the prosecution of accused suspects.

Sequence of Events in a Bite Mark Investigation:
1. Recognition:

The extra-oral and intra-oral structures are examined and significant findings are noted on a dental chart. Special attention is focused on the status of the general dental health, occlusion and mandibular articulation. [3] A human bite mark may have a variety of characteristics and so considerable variation due to incomplete marks; the surface bitten does not register physical indentations accurately. The fundamental steps in a bite mark analysis are the determination of which make specific mark e.g. six upper front teeth, two central incisors are wide & lateral incisors are narrower and the cuspids are cone shaped and lower central incisors and lateral incisors are uniform in width and cuspids are lesser conical than upper.

2. Documentation of Bite Mark:

It includes photography of the bite site before and after taking impression marking full facial and profile photographs are produced in addition to intra-oral exposures to depict the upper and lower dental arches and frontal and
lateral views of the teeth in occlusion. [4] A reference scale to enable measurements to be taken from the photographs should be included in the same plane as the teeth.

The impression material used in bite mark case must be given reinforced packing before it is removed from the object. This is to prevent twisting or other inaccuracies from being introduced through physical distortion. It is necessary to produce extremely accurate study casts of the teeth that record all of the physical traits and characteristics of the dentition. Accurate dental impression materials, such as vinyl polysiloxane or polyether should be used, although custom special trays are seldom fabricated for the suspect. It is recommended that two sets of study casts be produced using a hard stone, such as dental die stone. [5]

3. Laboratory Analysis of Bite Mark:

Serology or DNA lab work focuses on the swabbing taken from the possible bitten are. The best way to establish proper protocols is to contact the lab in your jurisdiction that will handle your casework. The best way to succeed is to plan ahead and establish collection and transport protocols that meet proper standards. During the process of biting and also during kissing and sucking, saliva is deposited on the skin's surface. It has been shown that this trace evidence is present in sufficient quantity and quality to enable PCR-based typing of the DNA that is present in saliva from white blood cells and possibly from sloughed epithelial cells. [6]

Significantly, since high-intensity alternative light sources and lasers are now widely used by the police to locate stains from bodily fluids at the crime scene, saliva stains deposited on skin even in the absence of marks from teeth can be found and recovered. After analyzing the salivary DNA and establishing the depositor's DNA profile, this result can be compared with the DNA profile of any suspects obtained from buccal swabs containing saliva or whole blood taken using a lancet. [7]

Discussion:

The most common methods to determine the suspect's teeth bite mark include techniques to compare the pattern of the teeth (shape, size, position of teeth, individually and collectively) with similar traits and characteristics present in life-sized photographs of the injury using transparent overlays. These overlays have been produced using various techniques. [8] The most accurate technique has been found to be a method using a computer. [9] Other comparison methods include the direct comparison of the suspect's study casts with photographs of the bite mark, comparison of test bites produced from the suspect's teeth with the actual bite mark, and the use of radiographic imaging [10] and scanning electron microscopy. Some effort has been made to standardize the comparison procedures but, unfortunately, the conclusions are often based on the expert's level of personal experience and judgment. [11] The American Board of Forensic Odontology has established guidelines for independent examination of the same evidence by second and third odontologists before the primary expert submits a final report. Regardless, many cases have been disputed because of differing expert opinions, attacks on the scientific basis of physical comparisons because of the elasticity of skin and the question of uniqueness of the human dentition. [3]

Conclusion:

The bite mark analysis by dentist has 50yrs of use. The best match possible between a suspect and a bitten object has been mentioned as “the bitter has teeth like the suspect because …….” where in an explanation is also necessary regarding the relative weight or value of the connection between the evidence and a person. This article hopefully provides the steps and rationale in the recognition, collection and preservation of this type of forensic physical evidence to person in law enforcement or other branches of investigation.

References:

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