BITE MARK ANALYSIS AT THE CROSSROADS!

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ABSTRACT

Forensic science errors are leading cause of wrongful convictions worldwide. Scientific errors, fraud or limitations are the factors mainly responsible for the same. Bitemark analysis is one such forensic analysis which was proved to be troublesome due to complete absence of validated rules, regulations or processes for acridation that establish standards for experts or the testimony they provide. As per the study conducted by American board of forensic odontology (ABFO), the rate of error in the bite mark analysis was found as high as 63.5%.

This paper throws light on the errors and limitations of bite mark analysis and further highlights the advances in bitemark analysis. The paper also stresses the need to scientifically standardize and acridate this methodology before it could be used in criminal cases where life and liberty are at stake so that, no innocent is convicted because of our wrongful analysis.

Key Words – ABFO, Bite mark analysis, Forensic Odontology, DNA testing.

Introduction

Bite marks have been defined by MacDonald as "a mark caused by the teeth either alone or in combination with other mouth parts."[1] Bite marks are usually associated with sex crimes, violent fights, child abuse and theft. Hence, bite mark analysis i.e. matching the bite mark to the suspect enables law to investigate crime. Just as no two fingerprints are alike, neither are two bite marks. It has been aptly described, "While the criminal may lie through his teeth but his bite marks reveal all and do not lie."[2] The application of official medical and other scientific investigative techniques to Criminal Law is not a new concept. First report on bite mark case appeared in the literature in 1874 by Skrzeczkar [3]

Forensic dentistry is a branch of Forensic Medicine and is defined by Keiser-Nielsen (1970) as that branch which in the interest of justice- deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings.[3] Although forensic odontology work involves comparing dental records, to the teeth of dead or accused, but comparing an accused person's teeth to marks on a victim's body is far more subjective, and far more prone to error.

Data of wrong reports [4]

Forensic errors are leading causes of wrongful convictions worldwide. The rate of errors in the bite mark identification, particularly the rate of false positive errors, appears to be quite high. Only three studies have been examined for the reliability of bite mark analysis. All three studies showed a serious problem. One study has documented the false reporting rate as high as 91%. Another study conducted by American Board of Forensic Odontology (ABFO) found 63.5% rate of false identification. While the third study showed an error rate of 11.9% to 22% in false identification. ABFO was organized in 1976 as a National Institute of Justice. The major cause of failure was limited expertise of the forensic odontologists, Inter-professional variation, limitations of the methodology and the fraud.

Examples of wrongful convictions [4]

Following were the people who were convicted based largely on bite mark analysis, and were proved to be innocent through DNA analysis years later.

- Willie Jackson was convicted in 1989 in rape case based on bite marks.

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Although several factors tied his brother to the scene of the crime he was not charged. 16 years later in 2005 he was released based on DNA test results. And also it was then found that the earlier findings were incorrect and that the bite mark actually matched his brother.

- Calvin Washington was convicted of robbery, rape, and murder and was sentenced to life imprisonment in 1987. An expert witness testified that simple bruises on the victim's body matched his teeth. He served 13 year in prison before DNA results exonerated him in 2001.
- Dan Young spent 12 years in prison before DNA testing cleared his name in a murder. Young was mentally compromised and could not even read or write. His conviction was based on a bite mark match and a false confession. The odontologist who aided in Young's conviction later said that the prosecution had pushed him to exaggerate his results.

Not only these four but many more were convicted based largely on bite mark analysis, and years later were proved innocent through DNA analysis. For all of them **Justice Delayed, was Justice Denied.** Can we give them back the precious years of their life they spent behind the bars suffering for no fault of theirs?

- One case of fraud done by the forensic dentist was reported, who used the upper jaw model of an innocent to make bite marks on the child's face during post mortem. This was proved by photographs which revealed no bite marks on the child before post mortem. [5]

It was long back in 1970 that bite mark evidence was accepted in the US and in 1971 it was accepted in Canada. [6] But because of the data of wrong reports, in 1990, Australian Court had almost led to a ban on the taking of dental impressions from the suspects, under any circumstances. There was a need for forensic dentists to agree on basic methodology so as to maximize the quality, completeness and validity of the collection. Fortunately the fish was not thrown out of the pond. The ABFO and members of American society of Forensic Odontology encouraged the establishment of uniform protocols including photographic procedures and impression techniques. ABFO in 1984 had given standards and guidelines for bite mark analysis which they updated in 1993 to overcome the drawbacks. [7]

Guidelines

- Description of the bite mark.
- Collection of evidence from victim.
  1. photography
  2. saliva swab
  3. impression
  4. tissue samples
- Collection of evidence from the suspected dentition.
  1. dental records
  2. photography
  3. clinical examination
  4. impression
- Comparing the bite marks.

The recently developed imaging software CAPMI AND WinID [8] and other image capturing devices such as scanners and digital cameras has further created an opportunity to better control the human errors. [48] Use of ABFO scale number 2 and alternate light imaging ALI helps in reducing the errors of bite mark analysis. ABFO scale number 2 helps us get 1:1 life like size of the photograph, 18% gray color and three circles help to rule out photographic distortion. With the help of ALI photography the marks, which are not visible, fluoresce and become distinct. Fibers which are not easily located under normal light can become like beacons as they fluoresce under alternate light. [9]

Bite marks can be on any object, but when they are on the skin the problem of

analyzing is compounded. The marks on the skin can be modified by its elasticity when the teeth are withdrawn. Skin not only is associated with curved surfaces but also is a poor medium for impression. The bite marks on skin can be associated with hemorrhage and post injury edema which together can alter bite marks. There is also a necessity to record the marks as soon as possible (10-20 minutes) both in living or dead. Also incomplete bite marks are inconclusive and minimum 4 to 5 teeth marks are needed for a reliable bite mark analysis.[10] When the substance is plastic, it should be refrigerated but not deep freeze because this will make the substance brittle. Fruits are to be preserved in Campden solution. [11]

Factors influencing appearance of bite marks. [12]

1. Vascularity of the tissue: Bruising of the loose and highly vascularised tissues around the eyes is more pronounced than skin in areas such as the palm of the hand or the soles of the feet.
2. Age: Children and the elderly bruise more easily because of loose delicate skin.
3. Metabolic rate: Women bruise more easily than men.
4. Medications: Such as aspirin can increase bleeding.
5. Normal skin color: The pigmentations on stain may affect the observation of a bruise.
6. Mass and velocity of the impact:
7. Time of injury: The time of appearance of bruise is related to the time required for the extravasated blood to reach the surface. This lag will allow the ante-mortem bruises to appear post-mortem.
8. Other factors that affect bruising: Rapidity of death after injury and environmental conditions.

One problem all bitemark experts encountered was the fact that they were not always complete, and they may be in the form of bruises, indentations, or lacerations. In recent time a complication has been added to what is already a murky situation. With the increasing access to desk top, images can be modified prior to any comparisons being made.

CONCLUSION

Forensic disciplines need to be scientifically validated before the methodologies are used in criminal cases where life and liberty are at stake. An opinion is worth nothing unless the supportive data is clearly describable and can be demonstrated in court. How does one weigh the importance of a single rotated tooth in a bite mark when the suspect has a similar tooth? The value judgements range widely on the value of this feature. This is not science, instead statistical levels of confidence must be included in this process. Until then, the DNA results are far superior to the odontologist's position. There is no honest way to deny this.

An opinion may be formed before the DNA results are in, but the majority of cases will be proven conclusively by the biological tests. If the two independent tests do not correlate, obviously odontologists will not rely on the theory that there were two assailants involved in the same case-one biting and the other spitting. A 19th Century French Medico-legalist truly said, "If the law has made you a witness, remain a man of science. You have no victim to avenge, no guilty or innocent person to convict or save you must bear testimony within the limits of science."

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