Analyzing the Accuracy of Bite Mark Identification Used for Convictions

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INTRODUCTION/ABSTRACT

Forensic odontology refers to the examination of dental evidence when handling crime scenes, including the use of bite mark identification. A forensic odontologist will compare the bite mark on a victim to different suspects. However, recent evidence has revealed that bite mark analysis is ineffective when it comes to convictions. Bite marks can swell and become warped due to the elasticity of human skin, so the actual tooth marks are not accurate representations for a specific person.

METHODS

- Analyzed different court cases
  - Case 1 – Willie Jackson: convicted in 1989, conviction reversed in 2006
  - Case 2 – James O'Donnell: 2 yrs of wrongful conviction; exonerated in 2000
  - Case 3 – Theodore Bundy: convicted due to bite mark analysis; was not overturned
  - Case 4 – Ray Krone: in 2002, Krone proved innocent (after ~10 yr sentence served)
- Utilized qualitative and quantitative research done by the Innocence Project
  - Refer to figure 3
  - Innocence Project: works to free the innocent and prevent wrongful convictions
- Analyzed error rates of bite mark analysis
  - 3 different studies with error rates as follows: 91%, 63.5%, 11.9%-22%

Figure 1. Bite mark on victim, "Mississippi Death Row Case Faults Bite-Mark Forensics"
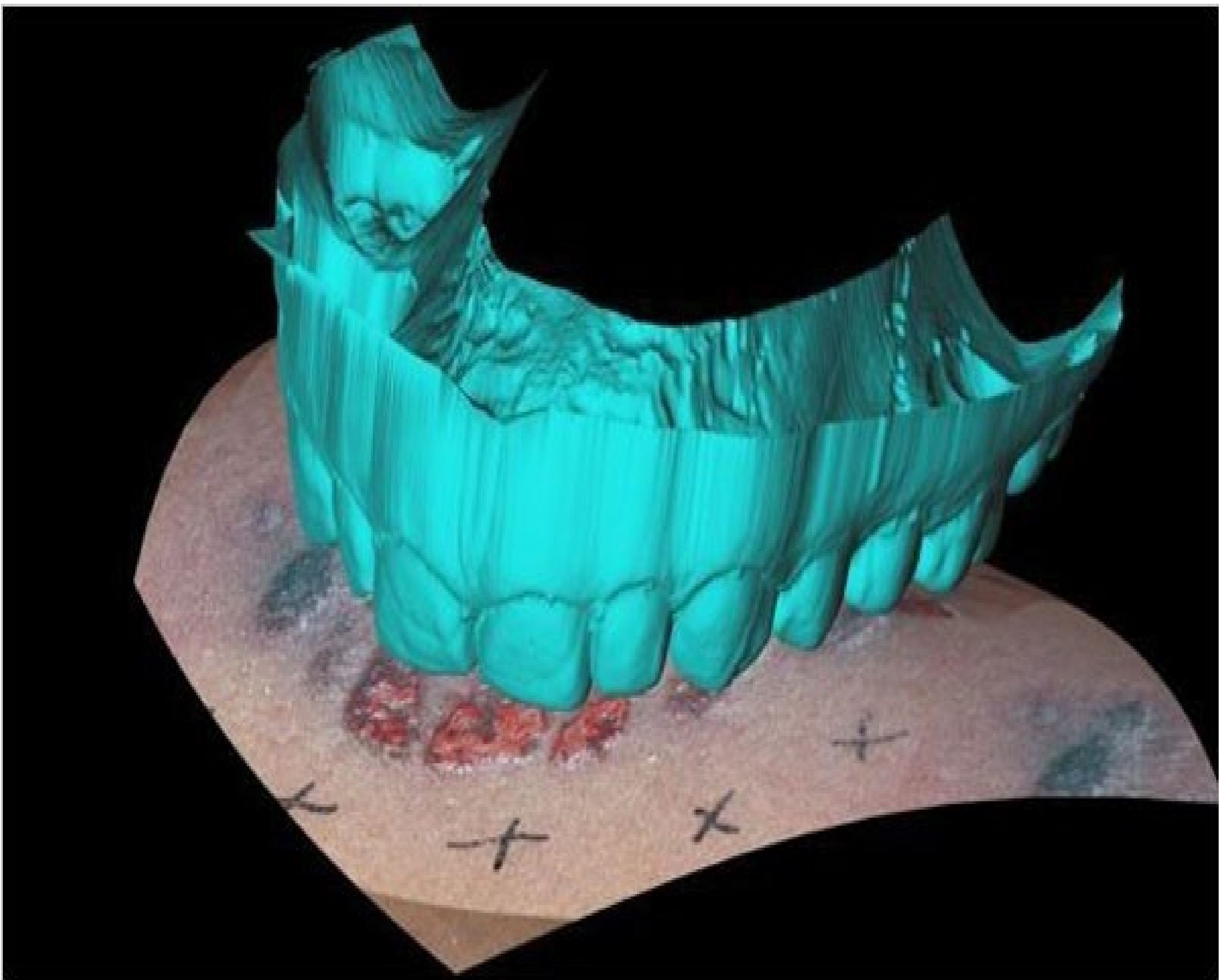

Figure 2. 3D Technology. (www.forensicmed.co.uk)

RESULTS

For this poster, four criminal cases and the instances of convictions were researched. The defendants in the cases are Willie Jackson, James O'Donnell, Theodore Bundy, and Ray Krone. These cases were chosen to offer a glimpse into the unreliability of bite mark analysis, as it was used in the conviction of each of these defendants. Three of the four cases (everyone but Bundy) were later overturned due to wrongful convictions based on bite mark analysis. According to *Modern Scientific Evidence: The Law and Science of Expert Testimony* and The Innocence Project, there is an error rate or rate of false identifications based on bite mark analysis ranging from 11.9% to as high as 91%. According to the same source, almost forty wrongful convictions were based on bite marks. Those forty wrongfully convicted people spent a collective 492 years in prison, and four of those forty cases were death sentences. This source says twenty-eight forensic dentists were involved in these wrongful convictions. Of these twenty-eight, twenty-two were diplomates or certified specialists. Research shows that bite marks analysis is extraordinarily unreliable and should not be used as sole evidence in court cases.

Total Wrongful Bite Mark Convictions and Indictments	39
Total Years of Wrongful Incarceration	492
Total Wrongful Bite Mark Death Sentences	4
Forensic Dentists Involved in Wrongful Bite Mark Convictions and Indictments	28
ABFO Diplomates Involved in Wrongful Bite Mark Convictions and Indictments	22
Non-Board Certified Odontologists Involved in Wrongful Bite Mark Convictions and Indictment Cases	6

Figure 3. The Innocence Project: Description of Bite Mark Exonerations

DISCUSSION/FUTURE WORK

Forensic odontology is aimed to evolve in several ways. Some potential future uses for forensic odontology:
- Advanced Imaging Technologies: Such as high-resolution 3D scanning and virtual reality simulations, will provide more detailed and accurate images of dental structures.
- Virtual Autopsies: The usage of non-invasive virtual autopsy technique offering clinicians the ability to conduct thorough dental examinations without invasive procedures. This preserves the integrity of remains while facilitating accurate identification.
- Age Progression Analysis: By examining dental development and changes over time, odontologists could provide insights into the aging process and assist in identifying missing persons.

Figure 4. Intraoral scanners, or digital scanners in dentistry, are tools that give dental practitioners a digital alternative to the traditional method of taking an analog impression. (www.carestreamdental.com)

CONCLUSIONS

When evaluating the amount of overturned convictions due to the misapplication of forensic odontology, it can be concluded that bite mark analysis should not be used as the sole evidence to convict a suspect. Bite marks are not solid evidence that a suspect is the perpetrator, and they should not be sentenced if they are innocent.

References

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Acknowledgments