

CASE REPORT

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Lack of Dental Uniqueness Between Two Bite Mark Suspects

REFERENCE: Pretty IA, Turnbull MD. Lack of dental uniqueness between two bite mark suspects. *J Forensic Sci* 2001;46(6): 1487–1491.

ABSTRACT: The central dogma of bite mark analysis is based upon two assumptions. The first is that human teeth are unique, and the second is that sufficient detail of the uniqueness is rendered during the biting process to enable identification. Both of these assumptions have been challenged over recent years, and a healthy scientific skepticism surrounding bite mark analysis has developed. The case presented features two suspects whose dental arrangement was similar and, when compared to the bite mark, both demonstrated consistent features. Within a closed population of possible biters, one of the two suspects was responsible for the injury. The case is illustrated with photographic and overlay detail of the suspect's teeth and demonstrates the complexity of such cases. The authors call for greater caution when drawing conclusions from such cases and highlight the need for further research into the replication of dental features on human skin.

KEYWORDS: forensic science, forensic dentistry, human bite mark, dental uniqueness, case report

Bite marks continue to represent important physical evidence in violent crimes (1). While the use of salivary DNA evidence is important, oftentimes this is unavailable to the investigator. Reasons for this include biting through clothing, injury site washing, failure to swab injury site, and financial considerations (2). The representation of the dental characteristics of the biter onto victim offers an evidential link that two individuals have been in violent contact. The uniqueness of the suspect's dentition is often a crucial factor in the level of conclusion that can be drawn from bite mark analyses and the weight that can be afforded to them by the trier-of-fact (2,3). The case presented here demonstrates a closed population of possible biters (2), both of whom shared many dental characteristics resulting in a complex bite mark analysis. The case raises again the question not only of dental uniqueness but the registration of such features on human skin.

Case Circumstances

This report concerns a violent physical attack of a male victim followed by a robbery of 340 pounds sterling and several items of

clothes. The victim accused two men of attacking him and identified the individuals as those whom he had shared a taxi with following heavy drinking in North Wales. Among numerous physical injuries, a wound consistent with a bite mark was present on the victim's left shoulder (Fig. 1). One suspect (Suspect A) pleaded guilty to robbing and assaulting the individual, while the other accused man (Suspect B) insisted that, while present, he had no involvement in either assault or robbery. Suspect A did not admit to biting the victim and the investigating officers wished to link Suspect B to the crime via the bite injury. Two forensic dentists analyzed the case, one on behalf of the North Wales police, and the other represented Suspect B's solicitors.

Evidence

The injury was determined to be a bite mark and treated as such. The bite injury on the victim was of moderate forensic significance, with some individual teeth marks identifiable. Class characteristics of a human lower dental arch could be seen. Unique characteristics were also present within this arcade of teeth. The anatomical location was favorable with only minimal skin distortion and little underlying adipose tissue. The back is a common site for bite marks on both male victims and suspects (4).

Mandibular and maxillary casts for both suspects were provided and are shown in Fig. 2. Similar features were visible on the lower left (canines both lingually displaced and disto-lingually rotated) and on the upper right (both lateral incisors displaced palatally and rotated mesio-palatally). Overlays were produced using a modified method described by Naru in 1996 (5) and are shown in Fig. 3. Despite the similarities noted above, both of the overlays demonstrated unique features, and it was not until the overlays were applied to the bite mark (Fig. 4) that the similarities became apparent.

Analysis

Both forensic dentists carried out metric and overlay analyses of the suspects. The prosecution forensic dentist determined that the responsible biter was Suspect B. He concluded that: ". . . limited information available in the bite mark . . . consistent with Suspect B . . ." The other forensic dentist (authors) determined that, from the two suspects, the teeth were more consistent with Suspect A than B.

Discussion

This case demonstrates that, within a closed population of suspects, it is possible to have insufficient unique features represented

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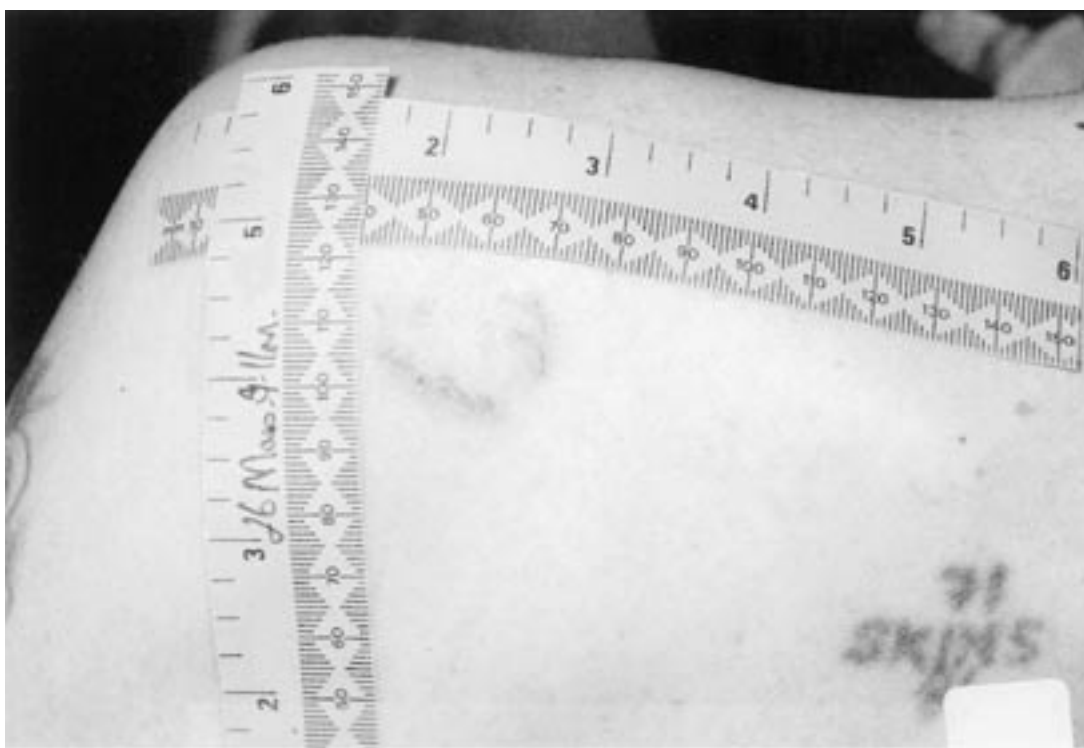


FIG. 1—Human bite mark on the victim's left shoulder. The inferior aspect of the injury was thought to have been caused by the lower teeth. Note: The flexible scales used in this case are not standard practice. A rigid lateral scale, such as the ABFO No. 2, should be employed.

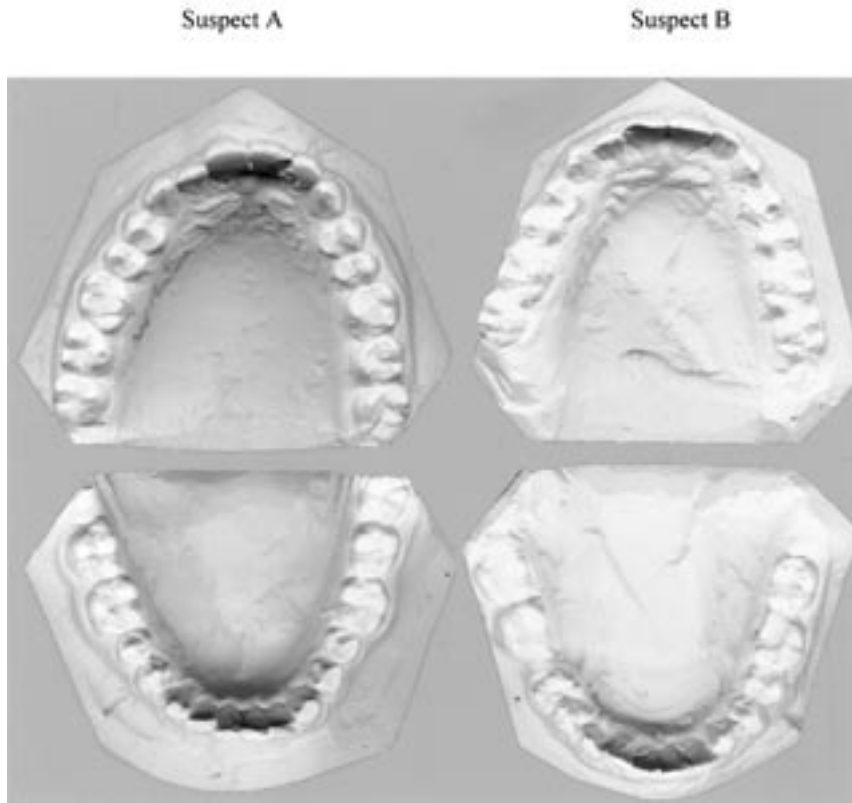


FIG. 2—Mandibular and maxillary casts from Suspects A and B

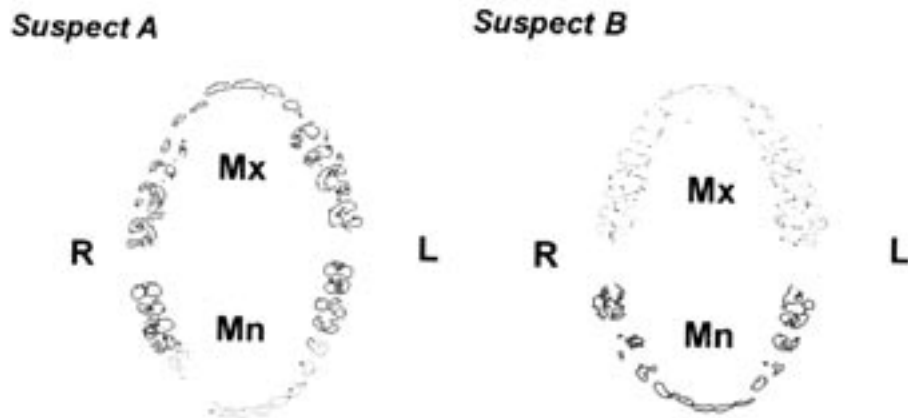
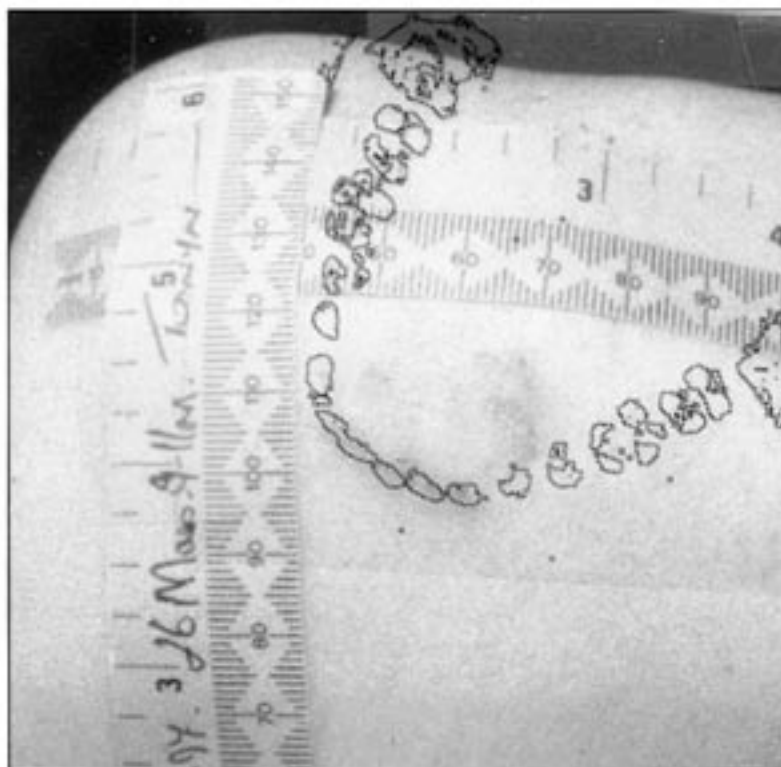


FIG. 3—Maxillary (Mx) and Mandibular (Mn) overlays from both suspects.

Suspect A



Suspect B

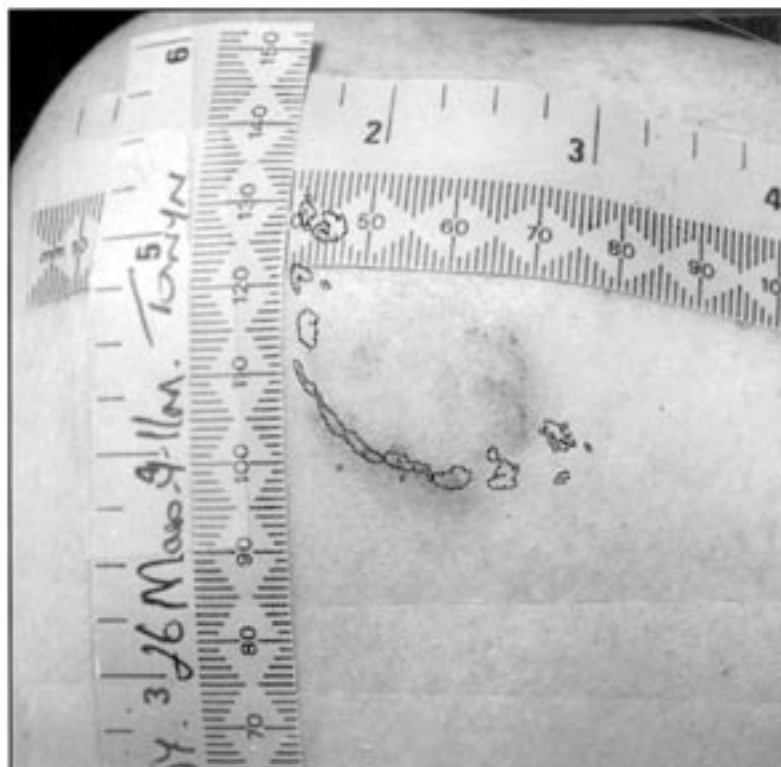


FIG. 4—Mandibular transparent overlays of both suspects placed over scaled image of the bite mark.

within the injury to easily determine the biter. It is true that both of these suspect's teeth are unique, however, the features of the bite mark did not represent sufficiently such features to enable a consensus of opinion. The polarized views of the odontologists in this case are not unusual. Indeed, American case law is littered with cases in which several experts have presented contrary conclusions, in some cases even disagreeing that an injury is a bite mark or not (6).

The case highlights the larger issue of dental uniqueness. Several authors have examined this issue. The most widely cited article that claims to determine dental uniqueness is Rawson's work in 1984 (3). Rawson assumed independence of dental features and applied the product rule to determine the number of matching points within bite marks to reach a positive conclusion. The independence of dental features has not been established; indeed, a largely forgotten article by Devore (7) in 1971 claimed to establish that dental features are not unique. The example given in this paper was that a mesio-lingual rotation of an upper central incisor is likely to result in a similar rotation of the adjacent central incisor. Assuming that these are individual events would invalidate the use of the product rule. Despite this, Rawson's data are compelling in terms of proving the uniqueness of the dentitions examined, although it is unlikely that it is as statistically strong as claimed. Indeed, it could be argued that most biological features are unique if measured with sufficient resolution.

It is important to return to the central dogma of bite mark analysis described at the beginning of this report, i.e., that the asserted uniqueness of the dentition is sufficiently registered to allow a comparison to be made. In this case, despite unique features, it is not possible to positively determine the biter within the closed population of two suspects.

The authors of this report call for a renewed interest in researching the replication of dental features on human skin and raise a cautionary note on claiming individuality in terms of the suspect's teeth, rather than the pattern they make on the bitten substrate. The work of the ABFO in furthering the scientific nature of bite mark analysis should be commended and extended to this area of research.

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