

## CASE REPORT

### Fabricated bite bark in a case of assault

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#### ABSTRACT

Identifying a perpetrator by bite mark analysis is generally based on the detection of tooth impressions that correspond to unique and rare odontological traits.

A 34-year-old female presented with a history of assault where she also claimed that the assailant bit her during the struggle. There was a well defined bite mark on her left forearm along with blunt force injuries on the head. During forensic odontological examination, the wax bite registration of the victim showed several common dental irregularities which were also represented in the bite mark. The location and orientation of the injury also favoured the possibility of self-infliction and no inconsistencies could be found to exclude this bite mark as a fabricated injury in the setting of an assault.

The lack of population specific studies and objective methods of analysis are significant limitations in bite mark analysis. When providing opinion on the identity of the biter, the general recommendation is to use unique features or uncommon irregularities. However, even where only common dental irregularities are seen, a reasonably valid opinion could still be provided using a holistic and deductive approach, if there is sufficient concordance among multiple irregularities with no inconsistencies.

**Keywords:** Bite mark analysis, Fabricated injuries, Clinical forensic odontology, Injury interpretation

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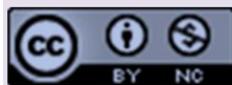
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psychiatric patients<sup>3</sup> or as a reactionary response to severe pain.<sup>4</sup> There have also been instances of child abuse<sup>5</sup> and homicide<sup>6</sup> where it is likely that the victim's arm has been pushed against the mouth resulting in bite marks by the victim's own dentition. However, reports on self-inflicted bite marks to fabricate assault are extremely rare.<sup>7</sup>

This case report discusses a recent forensic investigation conducted by the authors where the bite mark analysis and odontological examination of the victim detected a self-inflicted bite mark that was alleged as assault.

#### CASE REPORT

#### INTRODUCTION

Bite marks are frequently encountered in forensic practice as hostile bites inflicted mostly during cases of homicide, sexual assault and child abuse.<sup>1,2</sup> Self-inflicted bite marks are occasionally reported either as a component of deliberate self-harm especially in

A clinical and odontological forensic examination was conducted on a 34-year-old female with a history of assault four days prior to the date of examination. She claimed that another female had forcibly entered her home and inflicted multiple blows to her body with a hammer as well as slaps and fist blows to the head and face.

She also claimed that the assailant had pinned her down to the floor and when the victim had tried to push her away, had bitten her left arm. On examination, the alleged victim was conscious and rational. She complained of headache and dizziness and had two lacerations, each 1.5 cm long, on the top of the head and another laceration, 1cm long on the left side of her head. Few scratch abrasions were seen on the chest and lower limbs. A distinct bite mark was noted on the left forearm (Figure 1 and 2).

The bite mark was on the dorsal aspect at mid forearm level. The injury was circular in shape and had a dried brown-red scab. Two arches were distinctly seen orientated obliquely to the longitudinal axis of the forearm.

The arches were separated at their bases with an open space. The radial arch (the arch towards the thumb) consisted of 5 separate indentations with clear separations. A mesial angulation was noted on one indentation. The ulnar arch (the arch towards the ulnar border) consisted of 5 indentations which had tight contact with each other. There were two distinctly deeper indentations with greater scabbing. There were no abrasion marks in relation to the indentations to suggest dragging of teeth across the skin and no overlapping indentations to suggest repetitive biting.

The victim's dentition was recorded and a wax bite registration was obtained (Figure 3).



Fig. 1: The bite mark located on the dorsal surface of the left forearm. No other injuries visible on this arm.

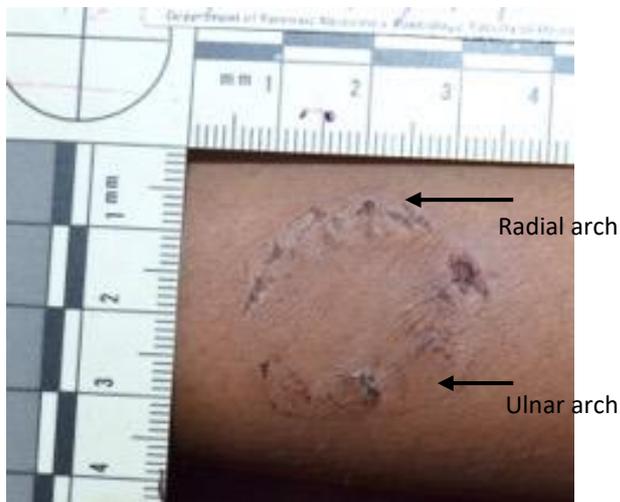


Fig. 2: The bite injury showing two opposing arches with distinct tooth

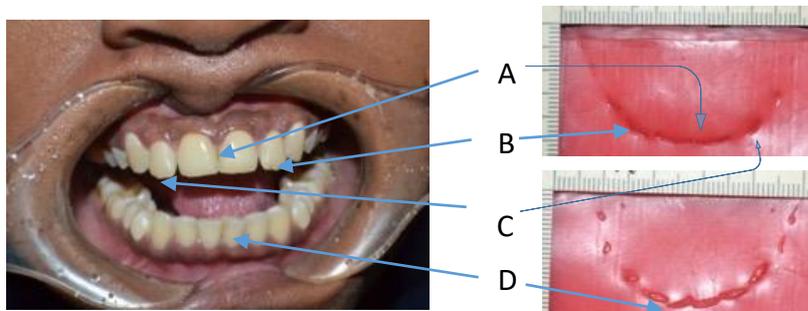


Fig. 3: The victim's dentition and wax bite registration.

*A - Tight contact between the central incisors. B & C - Irregular sharp points in the incisal edges of lateral incisor teeth. D - Mesio-angulation of the left central incisor tooth resulting in crowding of the anterior segment*

Images of the injury and wax bite registration were imported into the computer programme Adobe Photoshop® and digital transparent overlays were prepared for both upper and lower arches using the wax bite registration. Subsequently the overlays were superimposed over the photograph of the injury. The following comparisons were noted (Figure 4).

1. The curvatures of the maxillary and mandibular arches were similar in shape and size

2. The mesioangulation of the mandibular left central incisor tooth overlapped the angular imprint on the radial arch
3. The two deeper imprints on the ulnar arch overlapped with the sharp points on the incisal edges of the maxillary lateral incisors
4. Compact imprints were noted in the center of the ulnar arch corresponding to the tight contact of the maxillary central incisors.
5. There were no indentations or teeth impressions on the bite mark that did not correspond to the dentition of the victim.



Fig. 4: The bite mark with superimposed overlays of the dental arches. The wax bite registration is also included in the top right hand corner orientated in the same direction as the injury.

The investigators concluded that while the injuries on the head were consistent with an assault, the bite mark showed no inconsistency with a self-infliction. As the injury was more than four days old, no attempt was made to perform a bite mark swab for DNA. Advice was given to the Police to produce the alleged assailant for forensic odontological examination but there was no further communication from either the victim or the law enforcement authorities regarding this case.

## DISCUSSION

This is a case where the victim presented with a bite mark claimed to have been inflicted by an assailant during a struggle. She also had other blunt force injuries which were consistent with an assault. However, several dental irregularities found in the victim's own dentition were compatible with the bite mark on her arm and the location and orientation of the injury on the forearm favored a self-infliction which raised the possibility that this was a fabricated bite mark.

Determining whether a bite mark on the skin is self-inflicted or hostile needs careful consideration of

the exact location of the injury, its appearance and comparison with the perpetrator's dentition. A large proportion of bite injuries in assaults are inflicted on the arms and hands<sup>1,2</sup> which unfortunately are also a common site for self inflicted injuries. Identifying a perpetrator by a bite mark is considered a difficult and challenging exercise<sup>8,9,10</sup> particularly as there are many published cases of false positives leading to wrongful convictions.<sup>11,12</sup> In general, positive identification is only recommended where there are unique and rare dental anomalies<sup>8,10,11</sup> with no inconsistencies. Testifying on bite mark patterns in courts is often challenging and the use of metric analysis is recommended to provide more objective evidence of dental irregularities.<sup>13</sup>

In this case, the dental irregularities seen in this bite mark would not be considered unique or rare, and there are no population studies in Sri Lanka that provide any quantifiable data on the prevalence of these irregularities. However, the predominant factors here were that the pattern association and the relationship of the irregularities within the dental arch were quite similar between the bite mark and the victim's dentition and no inconsistencies were found. In the authors'

experience, hostile bites on the forearms are often ill defined, haphazardly placed closer to or overriding the ulnar border. Other associated features, such as abrasions resulting from relative movement of the teeth across the skin caused by the victim trying to pull the arm away or overlapping bite marks due to repeated bites are usually seen.<sup>14</sup> However, in this instance, the bite mark was well defined with no abrasion marks or overlapping (bite on bite) marks to suggest that the biting occurred during a struggle. The oblique orientation of the bite mark with the arches being located closer to the radial border are characteristic of an individual biting oneself on the dorsal aspect of the left forearm. The impressions of the radial arch correspond with the dentition of the mandibular arch further supporting this possibility.

Even though these irregularities are common and non-specific on their own, the concordance among all of these features in a single bite mark greatly increases its evidential value. Therefore, based on this collective evidence, we believe that the victim had inflicted this bite mark on herself and subsequently fabricated the history of the biting to escalate the gravity of the assault.

Standard protocols on bite mark analysis rarely emphasize the importance of excluding self-infliction of the bite mark as a preliminary step.<sup>15</sup> This case report is a good example for forensic odontologists to exclude the possibility of self-infliction as early as possible in the investigation process. Guidelines recommend the use of dental impressions to record the features of the suspected perpetrator's dentition in bite mark analysis. However, in this case, the authors found that comparing the wax bite registration with the bite mark was more beneficial in matching the dental irregularities. Obtaining wax bite registration is relatively easy compared to obtaining dental impressions and has demonstrated a high level of accuracy in reproducing common irregularities such as anterior tooth rotations.<sup>13</sup>

Another method that has been proposed, especially in criminal cases, is the use of an integrated technique where, in addition to pattern association, a metric analysis is also performed and compared with population specific data.<sup>16</sup> Such a method would provide more objectivity to the interpretation and minimize observer bias, thereby making the opinion more admissible in court. In countries like Sri Lanka, however, where population specific data are unavailable, the ability of forensic investigators to provide evidence-based opinions especially in situations like this, is greatly restricted. Although

there is a high degree of certainty on the identity of the biter in this case, it would be an extremely challenging exercise to prove it in a court of law.

## LIMITATIONS

The delay in presentation limited the possibility of DNA testing. The alleged assailant was also not produced to us which would have helped us to further support our interpretation, especially if the assailant had any features which did not correspond with this bite mark. It should be mentioned though, that even if the assailant's features also matched this bite mark, we would still have to state that the bite mark analysis is inconclusive and that we would not be able to exclude this injury as a self-infliction.

## CONCLUSION

This case report is an example where a combination of multiple common dental irregularities on a bite mark showed concordance with the victim's own dentition. The location, orientation and appearance of the bite mark also favoured self-infliction more than assault. The alleged assailant was not produced for comparison which was a major limitation in this case, however, even if the assailant was examined, it would not be possible to exclude this injury as a fabricated bite mark since there were no features characteristic of a hostile bite during a struggle and no inconsistencies with the victim's own dentition.

## ETHICAL ISSUES

None

## CONFLICTS OF INTEREST

The authors do not have any conflicts of interest in developing and publishing this manuscript.

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## AUTHOR CONTRIBUTIONS

**SAG:** Conceptualization, literature review, forensic analysis, initial draft, and revision; **JBW:** Odontological data collection, bite mark analysis, literature search and revision of draft.

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