

Development of Bitemarks with Different Materials and their Comparison

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Abstract: Dentistry is a vast field and the use of it in forensic science makes it more important. Forensic odontology plays a very crucial role in crime scene investigations. There are many aspects of forensic dentistry, one of which is bite marks. Bite marks are very important evidence found on the crime scene. Study of them helps to identify a person based on the uniqueness of specific characteristics and arrangement of teeth. Arrangement of teeth in every individual differs and that defines its individuality. Also, there are some characteristic patterns that differ from one tooth to another of the same individual. Along with these, there are chances of getting saliva samples which can help in extraction of DNA revealing a person's identity. The bite marks are helpful not only in the cases of humans but also in animals. They help to determine whether it belongs to an animal or a human. In addition to it, bite marks also helps in individualizing that to which animal the mark belongs to depending upon the differences in the structure of teeth of animals. To analyse and examine these bite marks, there is a requirement of proper cast. Casting is a method that actually helps to obtain the model of a particular mark and it is important that the formation of cast is proper for accurate results. The use of candle wax, wax beads and glue gun as casting materials is one of the ideas for developing the cast. All of the three are very convenient in use as they have high tolerance to water and temperature. All of the three materials are easy to use as they require very less setting time and are easy to remove from the sample. By comparing the results of all of the three casts, the best can be identified and used. Although all of the three casts are very beneficial in use as they are cost effective, easily available, easy to carry and yet the results obtained are very proper and accurate.

Keywords: Forensic Odontology, bite marks, casting, casting materials, comparison.

1. Introduction

Bite mark is one of the most important aspects of forensic odontology. Bite mark is defined as a patterned injury on the skin or other surface caused by biting the surfaces of human or animal teeth with minimum amount of force. The ABFO manual defines the bite mark as "(1) a physical alteration in a medium caused by the contact of teeth, and (2) a representative pattern left in an object or tissue by the dental structures of an animal or human" [1]. It is the scientific link which combines perpetrator to the crime scene [2]. In a series of high-profile cases, including DNA exonerations, bite mark identifications

have been exposed as erroneous. The forensic dentists have claim that they can accurately associate a bite mark to the one and only set of teeth in the world that could have produced the crime scene bite marks. Forensic scientists, researchers, lawyers, judges, and policymakers must all now grapple with the legacy of decades of unreliable forensics used in our courtrooms [3]. Focusing on bite marks, there is a difference seen between teeth marks and bite marks. The teeth can also leave marks without the act of biting, as is seen when the skin or the objects contact the teeth instead of the biter intentionally closing his jaws. So, the teeth marks are reflexive, as there is no intentional, active, or reflexive jaw movement. These teeth marks are different from the bite marks where the muscles of the jaws are active causing the teeth to move into the bitten substrate, which can be skin or any other object [1]. Bite mark analysis method have evolved over the years to give more reliable and reproductive results [4]. During the process of bite mark analysis, the class and individual characteristics of the suspected biter's dentition is compared with the bite mark from the scene of crime [5]. Characteristics like structure of jaw, teeth involved in bite, their basic structure can be classified under class characteristics. Several characteristics such as missing teeth, gaps between teeth, malposed teeth or rotated teeth, tooth width, tooth thickness, jaw width etc. can be used to establish the identity of an individual [5].

2. Aim and Objectives

To develop the bite marks with the help of candle wax and glue gun and it's comparison.

- This experiment will help us to discover an effective method by which the cast is properly prepared without the destruction of the sample.
- The setting time taken by the material should be less comparatively to others used.
- The material used requires to be cost effective and easily available.

3. Requirements

To carry out this experiment, there is a requirement of few

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items like:

- Candle wax
- Double boiler
- Forceps
- Sample on which bite marks are present
- Flame
- Glue gun
- Glue sticks

4. Methodology

For the casting of bite marks, there is a particular method which is required to be followed for different materials.

1) *With the use of candle wax*

- First of all, take the sample and clean it with the help of cotton.
- Take the candle wax and cut it into small pieces.
- Now, put this piece into a bowl and put it on the double boiler.
- Melt the candle wax till it is properly heat and in proper pouring consistency.
- Once melted properly, pour it into the sample where bite marks are present.
- Pour it in such a way that wax reaches each and every corner of mark.
- Let it set for a while till it solidifies.
- Now, carefully remove it with the help of forceps.
- The cast is ready for examination.

2) *With the use of glue gun*

- First of all, take the sample and clean it with the help of cotton.
- Take the glue stick and insert it into the glue gun.
- Heat the glue gun till the glue stick is properly melted.
- Once it is properly heated, apply the glue onto the mark.
- Make sure to start from the deep areas and then come on surface.
- Once applied, wait till it settles properly.
- Remove the cast with the help of forceps.
- The cast is ready for examination.

5. Observation



(a) Lower jaw



(b) Upper jaw

Fig. 1. Cast developed from candle wax



(a) Lower jaw



(b) Upper jaw

Fig. 2. Cast developed from glue gun

Table 1
Comparison

	Candle wax	Glue gun
Setting time	Not more than 30 seconds	Around a minute
Visibility	Patterns are clearly visible	Structure of tooth is clearly visible
Conveniency	It is completely convenient	Requires electrical supply

6. Result

With the comparison of both the samples, Candle wax is proven to be convenient and appropriate method. Casts show that minute patterns are also very clearly visible with use of candle wax. The setting time taken by candle wax is less than glue gun. It is proved to be very convenient and easy to use method.

7. Conclusion

From the above experiment, it can be concluded that candle wax can be used as the method for casting. The cast obtained from the candle wax are clearly visible. It takes less time in setting than glue gun. This method is very convenient and easy to use. Candle wax is such a material which is easily available and cost effective. This method is non destructible and doesn't

require any sophisticated equipment's. Thus, this research justifies all it's objectives and is appropriate for future use.

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