

TECHNICAL NOTE

J. Curtis Dailey,¹ D.D.S.

A Practical Technique for the Fabrication of Transparent Bite Mark Overlays

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ABSTRACT: A quick, inexpensive, and accurate technique for generating transparent overlays, using office photocopy machines, for use in bite mark case analysis is presented. The critical step in the fabrication process involves determination of the accuracy of the product produced by the photocopy machine. A reliable method for making such a determination is discussed.

KEYWORDS: odontology, bite marks, overlays

Over the years, numerous methods for producing bite mark overlays have been advocated. A few examples of previously suggested techniques include radiographic techniques utilizing metal filings painted into sample bite mark indentations created in plaster, wax wafers, or other materials [1]; inking the incisal edges of anterior teeth on stone models of a suspect's teeth and imprinting the inked edges onto various materials [2]; various involved photographic techniques [3,4]; tracing the incisal edges of teeth on an acetate sheet placed over a life-sized (that is, 1:1) photo of the incisal edges [5]; and, most recently, a method that utilizes computerized axial tomography (CAT) scans [6]. While newer hi-tech methods make interesting use of advancing technology, they are neither practical nor affordable for the majority of budget-conscious practicing forensic odontologists, medical examiner's/coroner's offices, or prosecutors and public defenders. Each of these techniques, as well as others, may well have numerous advocates, and one method may work better than the others for some individuals. However, this paper will present a fast, easy, and extremely economical technique that generates accurate transparent overlays for use by forensic dentists in bite mark analysis.

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¹Forensic odontologist, U.S. Army Dental Activity, William Beaumont Army Medical Center, Ft. Bliss, TX 79920.

Materials and Methods

As this technique utilizes an office photcopy machine to produce the overlay, the first step is to determine the accuracy with which the machine reproduces original material. This can be done as follows:

1. Place three or four different types of scales, including the American Board of Forensic Odontology (ABFO) scale, on the glass of the photcopy machine, close the lid, and copy.
2. Lay the paper copy on a flat surface.
3. Place the original scales over the photocopied image, aligning the graduation marks (Fig. 1).
4. The error observed in this comparison should be less than 1% (that is, less than 1 mm of discrepancy across a 100-mm scale). As bite mark analysis is an interpretative analysis of an injury pattern, an accuracy of greater than 99% is quite acceptable. Of course, the greater the accuracy the better.

If the photcopy machine in question has significant error, then, in some cases, the service person for that brand of machine can make a minor internal adjustment to increase or decrease the size of the photocopied product.

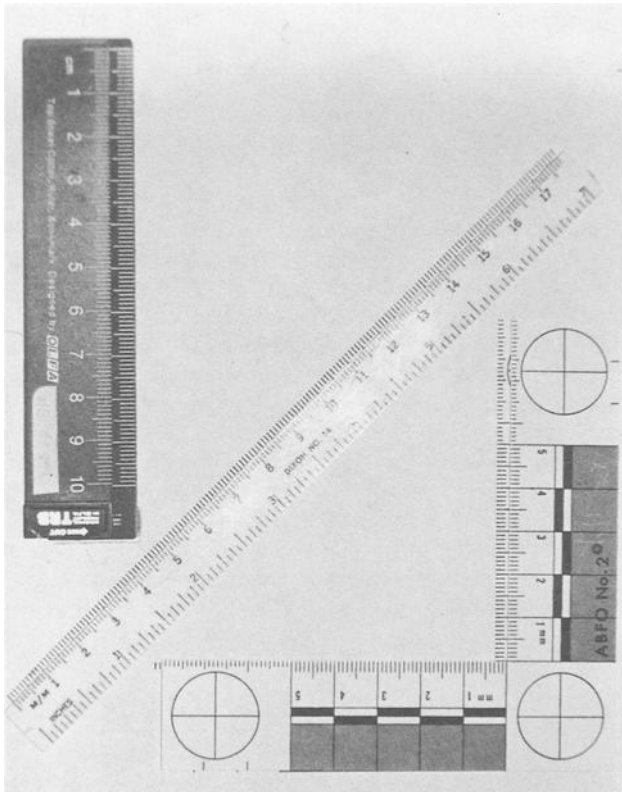


FIG. 1—Scales placed on their photocopied images.

Once the accuracy has been determined, the overlay can be generated using the following technique:

1. Make stone dental models from impressions taken on the suspect (Fig. 2).
2. Place the stone dental models to be used in the comparison on the glass of the machine with the incisal edges down. A slight weight may need to be set on top of the models to ensure maximum incisal edge contact with the glass. Use some type of marker or device to mark right and left to facilitate proper orientation throughout this procedure and, subsequently, on the overlay. This author advocates using the ABFO scale, arranged to look like a large L, and placing it on the left side of the dental models. A grease pencil may also be used to place orientation marks or information directly on the glass.
3. Cover this arrangement with a white cloth and photocopy it. This will allow the best possible image to be produced (Fig. 3).
4. Place the photocopy upside down on a light box. Turn on the light box, and the photocopied image will now show through the paper.
5. Trace the outlines of the incisal edges and occlusal surfaces of any teeth determined to be represented in the bite mark. Also copy the right/left orientation marks and any other identifying information (Fig. 4).
6. Place the paper now containing the traced incisal edges with that side down against the glass on the photocopy machine.
7. Load one sheet of Scotch Brand 502 transparency film for plain paper copiers (Minnesota Mining and Manufacturing Co., St. Paul, Minnesota into

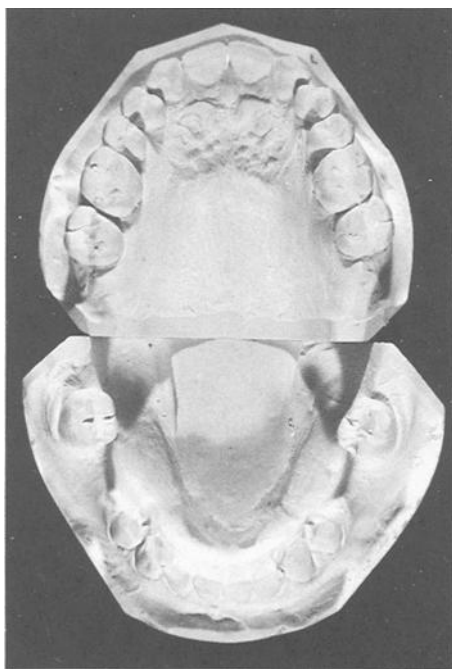


FIG. 2.—Stone dental models.

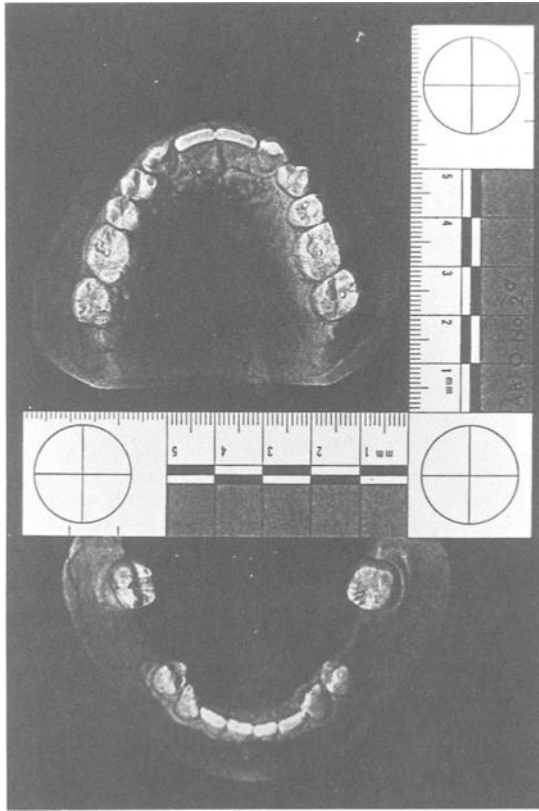


FIG. 3—Photocopy made of a stone dental model.

the machine's paper tray according to the manufacturer's (that is, 3M's) instructions.

8. Photocopy to generate the transparent overlay, which is now ready for use in the bite mark analysis (Fig. 5).

Discussion

The technique discussed generates a high-quality transparent overlay for use by forensic dentists during bite mark analysis. Only the outlines of the incisal edges of pertinent teeth are recorded on the overlay, which allows the entire mark to be visualized by the examiner, an improvement over several previously advocated methods for producing overlays. The technology utilized is readily available and easily operated, and produces a consistent and accurate product. The materials necessary are also readily available and extremely inexpensive. Finally, the simplicity of this technique belies the practicality of the method. In an age where "more technical" is equated with "better," it is important for practicing forensic dentists to have in their collection of useful techniques one that is simple, yet works well when applied to real cases.

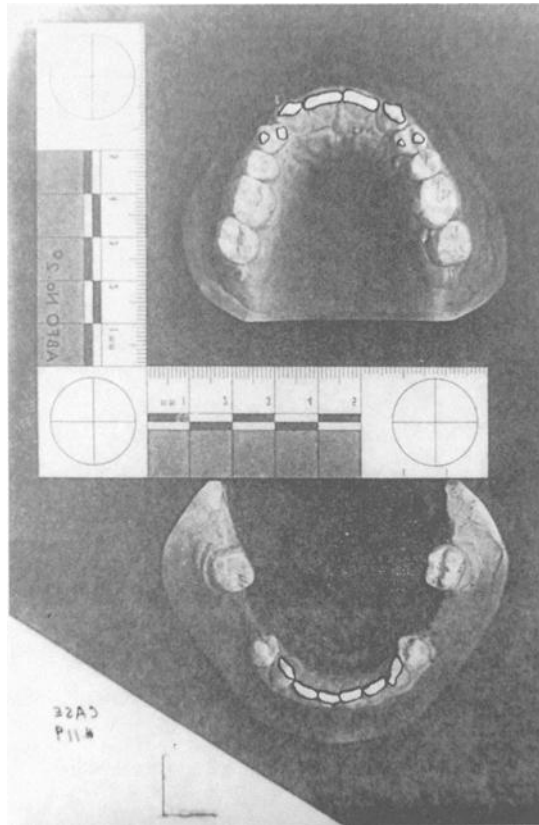


FIG. 4—Figure 3 placed upside-down on a light box, with the outlined incisal edges traced in black.

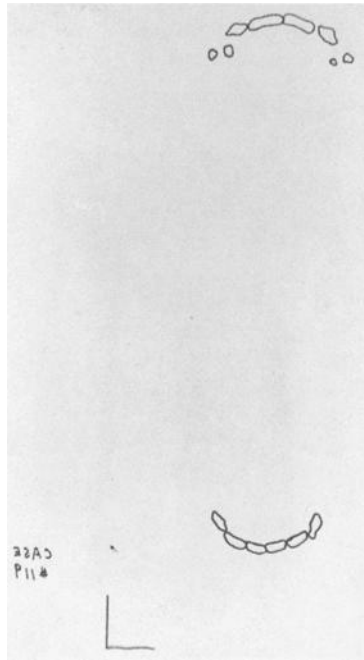


FIG. 5—Transparent overlay with the reference information in place.

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Address requests for reprints or additional information to
J. Curtis Dailey, D.D.S.
U.S. Army Dental Activity
William Beaumont Army Medical Center
Ft. Bliss, TX 79920