

TECHNICAL NOTE

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Casting, Another Means of Identification

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ABSTRACT: Casting with plaster and silicone is an invaluable tool in identifying victims as well as perpetrators of a crime. Plaster is used for making foot, shoe, and tire impressions. It is excellent for casting bite marks and wounds. Plaster is ideal for making positive impressions of the fingers and palms of deceased persons who are so badly decomposed that inked impressions cannot be made. Silicone is used for casting toolmarks, and to make negative impressions of fingers and palms of deceased persons. It is also outstanding for lifting latent prints from doorknobs, bottle-necks, and other odd shaped items where it would be impossible to use tape without wrinkling, thereby, destroying the print.

KEYWORDS: criminalistics, castings, plaster, impressions, alginate, decomposed fingers and palms, bite marks, silicone, latent prints

Today, with the sharp increase in violent crimes, there is an urgent need for those persons responsible for preserving evidence and crime scene processing to develop new techniques and improve on the old ones. In the past, casting in law enforcement was accomplished primarily to preserve foot, shoe, tire, and tool impressions. By utilizing materials developed for making precise impressions in dentistry, casting applications for the preservation of evidence are almost unlimited.

Procedures

As with all evidence, photographs should be taken before anything else is attempted. In the case of bite marks, the center and outer areas of the bite mark should be swabbed for saliva after the initial photographs are taken. Once the saliva samples are obtained, place a scale in the area of the bite mark so as not to obscure any detail of the mark and rephotograph the bite mark so that the negative can be printed to scale, life size, at a later date. With this type of photography, the camera must be as close as possible and in plane with the object being photographed. It is a good practice to take a variety of photographs, aiming the light source from different directions at 30 to 45° angles, and bracketing the f-stop value to ensure maximum detail.

The following steps represent a fast and effective method for preserving bite marks and wounds:

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1. Using a self-curing plastic, such as Kerr Formatray®, a form is constructed around the area to be cast. The form should be at least 25.4 mm (1 in.) high with slight indentations scratched on the inside before the form hardens. Having the form 25.4 mm (1 in.) or more in height eliminates the need for reinforcing the alginate mold. Slight indentations scratched on the inside of the form will cause the alginate to adhere better and lessen the chance of the mold separating from the form when they are removed from the bite mark/wound. The form can also be painted with an alginate adhesive like Getz Hold® to bind it further to the alginate. Mark reference points on the outside of the form to denote anatomical locations. These reference points will aid the pathologist/odontologist in the excision of the bite mark/wound from a deceased victim. The form can be glued over the area that had been cast, the wound excised and placed in the freezer for preservation. Precautions must be taken when using the material on a live person. These self-curing plastics generate an enormous amount of heat during the curing process; therefore, to avoid pain and discomfort to the victim, the form must be removed from the victim within 1 min after construction, and then set aside until it has fully cured. Once the form has cooled down, replace it on the victim, inspecting the bottom of the form to ensure that it fits snugly. If not, tape the bottom with masking tape to prevent seepage of the alginate material.

2. Mix the alginate material with one-and-a-half to three times the recommended amount of water. Pour the material into the form.

3. As soon as the alginate has set remove the mold, wrap it with damp paper towels, and place it on a hard surface. Depending on the anatomical location of the bite mark/wound, it may be necessary to extend the form in order to make a plaster cast of the alginate mold. This can be accomplished by folding a piece of aluminum foil until you have two or three layers—38 to 76 mm (1½ to 3 in.) high. Tape the foil securely to the bottom of the form, tape the overlapping edges of the foil, and pour the plaster into the alginate mold. Consult the product manufacturer regarding variations in powder to water ratio to determine what, if any, side effects will be incurred. For instance; when using Caulk Dentsply Jeltrate Alginate Normal Set® with the recommended amount of water, the plaster must be poured into the mold within 30 min after the alginate has set up; the alginate will begin to distort after that time. Increasing the water ratio by one-and-a-half to three times, the plaster must be poured into the mold within 5 to 15 min. Regardless of the powder-water ratio, the mold must be wrapped with damp paper towels if the plaster is not poured within 5 min after the alginate has set up. If the mold is not wrapped with damp paper towels, it may begin to shrink causing distortion to the bite mark/wound impression (see Figs. 1 through 6). Figures 7 through 10 depict photos and casts of wounds and bite marks.

Occasionally, perpetrators of a crime will consume food at the scene. Most foodstuff will render fair to excellent bite mark evidence. None should be overlooked, however, as it may be the only connection between the offender and the crime. Melons are particularly deceiving; the juices will usually obscure the bite mark. The shape, size, and consistency of the object will dictate the method for casting and preserving the bite mark. Once photography and saliva samples are obtained, the cast can be made in the following manner.

Firm Objects

For firm objects, for example, apples, pears, peaches, and so forth, mix the alginate material with one-and-a-half to three times the recommended amount of water in a container slightly larger than the object. Most anything can be used for the container from a cottage cheese, sour cream, or milk carton to a styrofoam cup or cardboard lined with wax paper or foil. Pour a thin layer of alginate over the area to be cast to prevent the trapping of air, then submerge the object into the alginate past the bite mark, being careful not to touch the bottom or sides of the container. When the alginate has set, remove the object and pour plaster into the mold in the normal manner and time period.

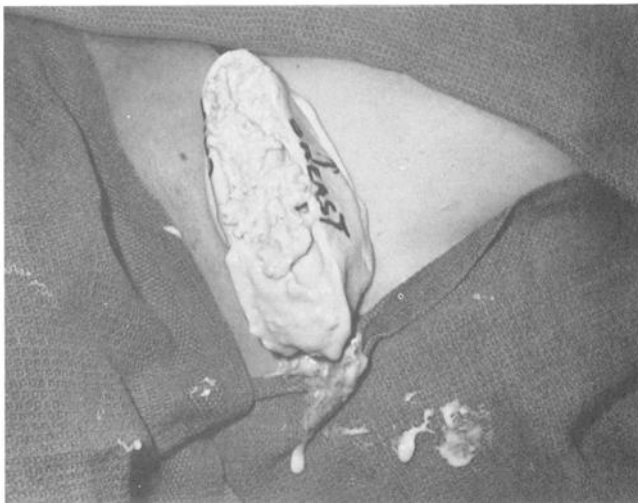
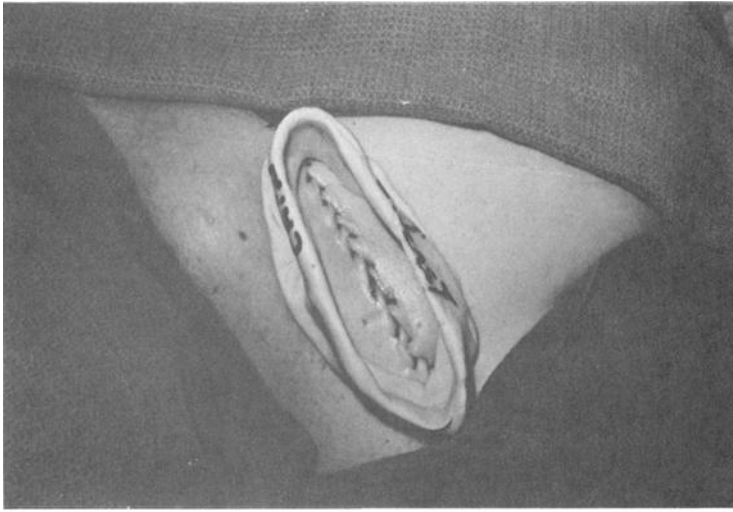


FIG. 2—Alginate impression material poured into the form.

Flat or Fragile Objects

For flat or fragile objects, for example, cheese, melons, bread, and so forth, with aluminum foil, a form is constructed around the object. Fold a piece of aluminum foil until you have at least three layers—51 to 76 mm (2 to 3 in.) high. Tape the foil to the object, then tape the overlapping edges of the foil together. Measure out enough alginate so the mold will be 25.4 to 51 mm (1 to 2 in.) thick; mix the alginate with two to three times the recommended amount of water, and pour into the form. As soon as the alginate has set, fold the excess foil onto the mold, remove the mold, wrap it with damp paper towels, and place it on a hard surface. It may be necessary to extend the form to make a plaster cast of the alginate mold. If so, repeat the above

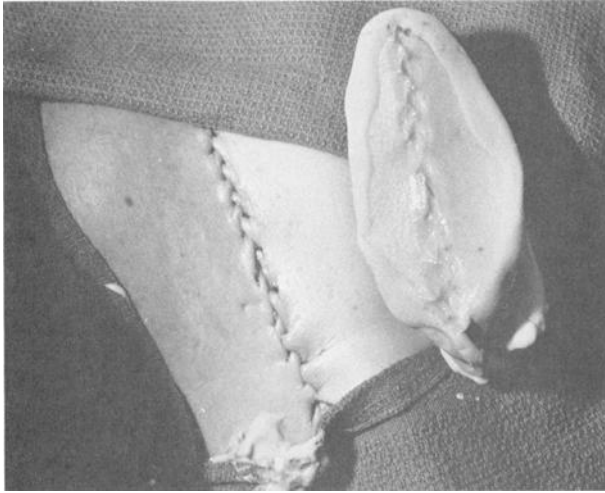


FIG. 3—*Negative mold of area.*



FIG. 4—*Aluminum foil extension to Formatray form.*

steps for constructing the form, tape it securely to the bottom of the form, tape the overlapping edges together, and pour the plaster. Keep in mind the time limits for pouring the plaster into the alginate mold.

In cases where the victim is decomposed to the point that inked finger and palm impressions cannot be obtained, the hands can be cast in a similar manner as mentioned above. If the hands are open, that is, fingers and thumbs extended, the cast can be made at the morgue. Construct a container out of cardboard; the container should be approximately 76 mm (3 in.) high and 25.4 mm (1 in.) larger than the hand. Notch one end of the container in the shape of the wrist and a fraction smaller than the wrist, so that they will fit snugly. If the cardboard is lightweight and uncoated, line it with wax paper or aluminum foil (see Fig. 11). Mix the alginate material with two times the recommended water and pour into the container. The material should be level with the notch. Place the subject's hand in the material. Do not let the hand touch the bottom of the container. It may be necessary to insert a piece of string through the top portion of

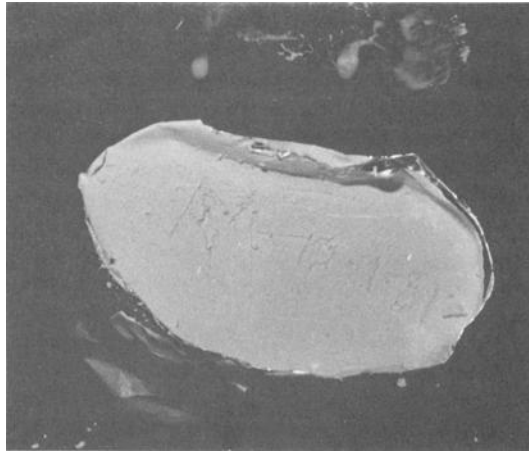


FIG. 5—Plaster (snow white #1) poured into negative mold.

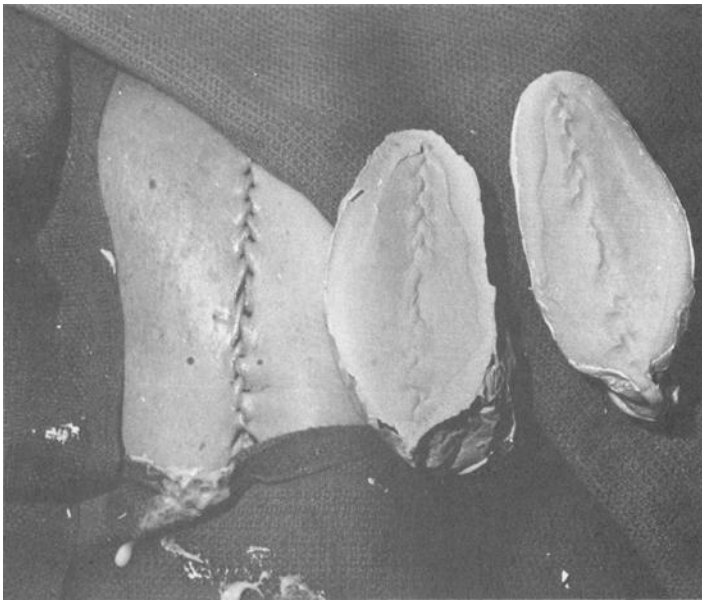


FIG. 6—Area, cast, and mold.

one of the fingers to control the depth of the hand. As soon as the alginate is set, remove the hand and pour plaster into the mold in the prescribed manner and time.

If the hands are cupped or clinched, the fingers will have to be removed from the hand. Mix alginate material in a styrofoam cup, again adding double the amount of recommended water. Submerge the first joint and as much of the second as possible into the center of the cup, being careful not to touch the bottom or sides. As soon as the alginate sets, remove the finger and pour plaster into the mold (see Figs. 12 and 13). An acceptable mold of the palms and fingers of deceased persons can be made with a rubber base silicone material such as Dentsply Dent-Kote®

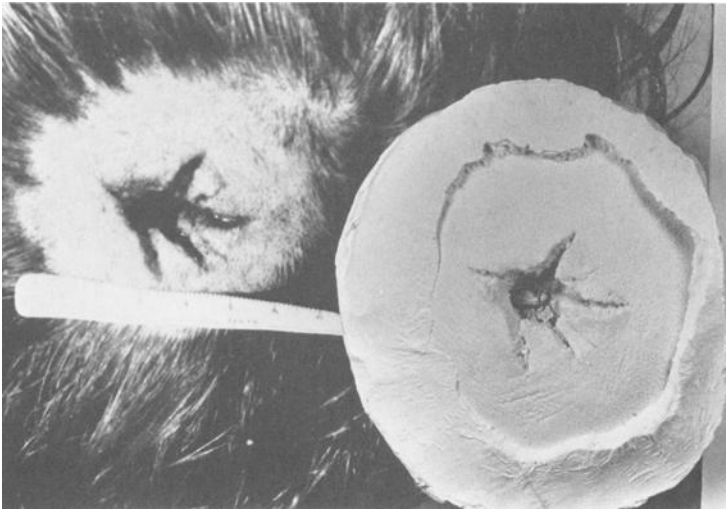


FIG. 7—Contact wound, .38 caliber, top of head.

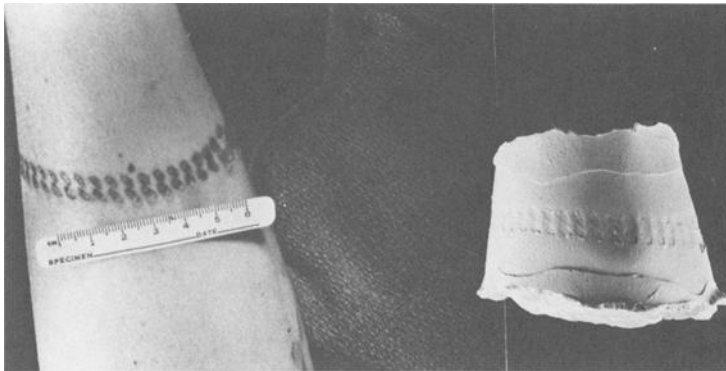


FIG. 8—Impression of identification bracelet burned into victim's arm.

insulation paste. Because of the flexibility of the material, it must be reinforced before the plaster can be poured.

Dentsply Dent-Kote insulating paste is excellent for lifting latent finger/palmprints developed on doorknobs, bottlenecks, and other odd-shaped or indented articles. Using tape to lift prints from such articles is next to impossible without wrinkling the tape and destroying part or all of the print.

Process the area with black latent print powder; clean away any excess powder from the developed print. Place a mark outside the area to be cast to indicate a section on the object where there are no prints of value. This will allow you to cut the cast without destroying any prints when you remove it from the object.

According to the instruction sheet, mix the paste in the large tube by kneading it gently with the fingers. Squeeze out enough paste into a shallow bowl or on a glass slab to cover the entire area. Shake the catalyst vigorously to assure the ingredients are well mixed. Squeeze the catalyst, one drop at a time, into the paste. Approximately five drops to 51 mm (2 in.) of paste or

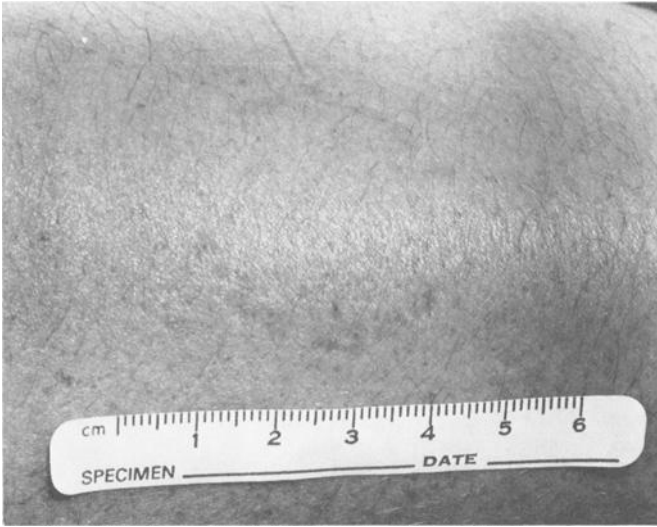


FIG. 9—*Bite mark on victim's arm.*

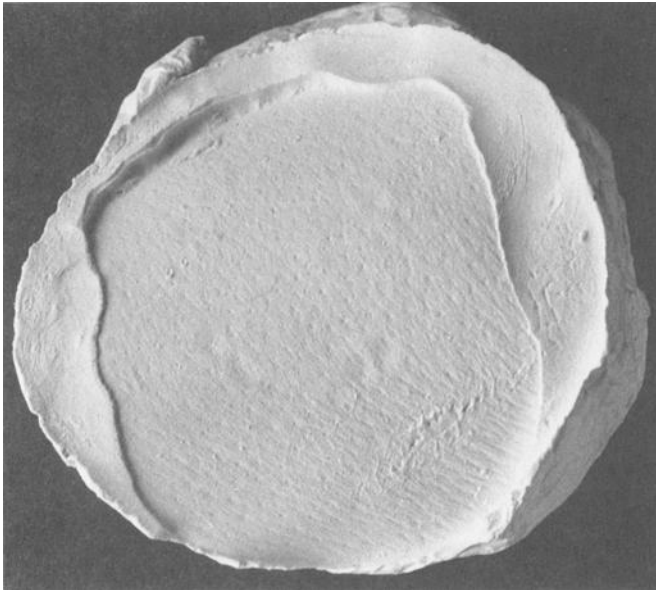


FIG. 10—*Cast of bite mark in Fig. 9 approximately 1 h after bite.*

one drop to 1 g of paste. Mix thoroughly for 30 s. Spatulate or pour over the area to be cast. On round stationary objects such as doorknobs, it is necessary to pour the Dent-Kote on top of the knob and gently guide it with a tongue depressor or plastic knife around the sides on to the bottom of the knob. Applying gentle pressure will not destroy the developed prints. On portable articles, such as bottles, have someone turn the articles slowly as you pour the Dent-Kote on it. After the Dent-Kote has set, remove it and forward it to the photo laboratory to be photographed

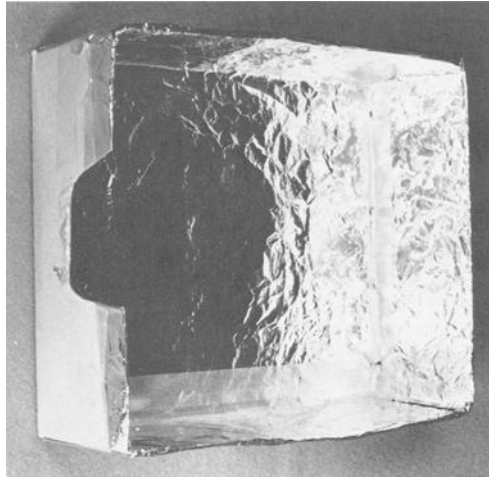


FIG. 11—*Box for casting hands of deceased.*

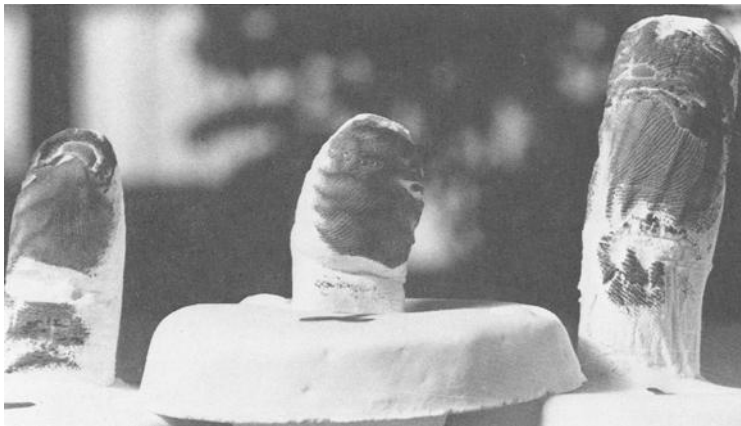


FIG. 12—*Casts of decomposed fingers of homicide victim.*

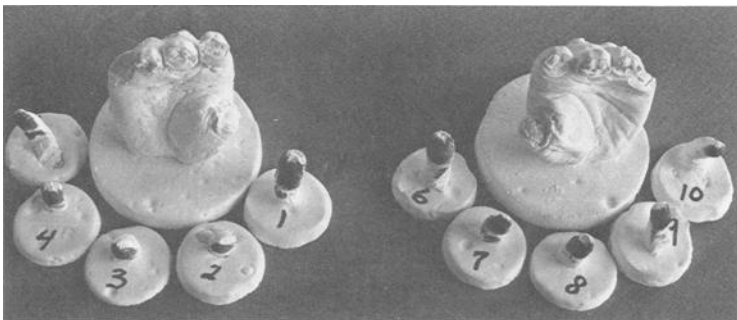


FIG. 13—*Casts of decomposed hands of homicide victim.*

1 : 1. Since the print(s) on the cast are reversed, the photographic negative will have to be reversed during the printing process to produce a positive image for latent comparison (see Figs. 14 through 16).

Discussion

It is not the intention of this writer to suggest that he is the innovator of the three-dimensional preservation of bite marks and parts of the human body; nor does this writer mean to imply that his techniques are absolute. Peterson [1] in his article "Investigation of Human Bite Marks" stated

Alginate materials are effective in taking bite mark impressions in human tissue. Whenever possible, the area of the impression should be surrounded with a barrier of wax or a paper cuff in order to keep the alginate from spreading. The alginate should then be mixed with double the amount of water normally recommended. It can also be reinforced by placing matches, paper clips, etc., in the material before setting. When set, the entire impression should be covered with a "cap" of plaster to avoid distortion of the model.



FIG. 14—Silicone (*Dent-Kote* insulating paste) poured over broken bottleneck. Bottleneck was processed with fingerprint powder before pouring the silicone.



FIG. 15—Silicone cast and bottleneck. Note that cast is reverse or negative image.



FIG. 16—Enlarged photo of silicone cast in Fig. 15. Negative was printed in reverse or backwards (emulsion side up) to obtain a positive image.

By using the Formatray or folded aluminum foil as a form for the mold, reinforcement and “capping” are not necessary. The Formatray form can also be used for the excision and preservation of the bite mark. Svensson and Wendel [2] suggest the use of Poller’s method for casting marks on skin. “This method is, however, rather too troublesome for ordinary field work . . .” Kirk [3] recommends using moulage for negative and positive casts of body parts, wounds, and face masks. This is an effective technique but again, it is not suitable for field use since the material must be heated and melted for use. Sopher [4] advocates the use of rubber base or silicone impression compounds for casting the negative mold of a bite mark. This is an excellent method and it gives the forensic odontologist a permanent mold to work with. The silicone, however, must be reinforced and capped with plaster before it is removed from the wound and plaster poured into it. The cost difference between the rubber base materials and the alginate materials may present a problem in law enforcement departments. There are numerous methods for obtaining impressions of fingers and palms from decomposed bodies. Allison [5] lists several in *Personal Identification*. While all are effective, some are time-consuming and costly, for example, X-ray and photography, modeling clay and photography, and photographing the friction ridges—making a paper negative from the original negative and then printing the paper negative to obtain a positive image. An advantage to the technique outlined above is that the latent examiner can use the cast to make comparisons to latent prints lifted at the crime scene and to master print cards; therefore, it is not necessary to photograph the cast.

Conclusion

It is a rare occasion for the crime scene technician to find the scene of a violent crime in its original state. Emergency personnel, understandably, are more concerned with saving a life than preserving evidence; therefore, once the emergency personnel have left, traffic into the crime scene should be limited to the crime scene technician, homicide investigator, and the medical examiner. It is essential that evidence be preserved and collected on the scene before the victim is removed. This is especially true in cases where the victim has bite marks or a rare-shaped wound on his or her body. For this reason, it behooves the crime scene technician to ex-

pand his knowledge in evidence preservation and crime scene processing. He alone is responsible for the crime scene and the evidence within the crime scene. By using the method described above, the technician can see the final results of his cast within 30 min, and compare it with the wound on the victim to ensure that he had duplicated the wound with maximum detail and accuracy. If there is any doubt in regards to the detail or quality of the cast, the forensic odontologist can be consulted; and, if need be, the wound can be recast on the scene without undue loss of time or inconvenience to other crime scene personnel. The technique outlined above used materials that leave little or no residue on the body or in wounds to hinder the forensic pathologist before a postmortem autopsy. However, since this technique can be accomplished on the scene, the medical examiner can be consulted and advised of the materials and techniques while he is still present at the scene.

Acknowledgments

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