

Roy Fields,¹ and D. Kimberley Molina,¹ M.D.

A Novel Approach for Fingerprinting Mummified Hands

ABSTRACT: Fingerprinting has long been used as a method for identifying bodies and, since first discovered, many advances have been made in both fingerprint acquisition and interpretation. However, in the field of forensic pathology, the attainment of fingerprints from mummified bodies has remained difficult. The most common technique historically used to obtain fingerprints in these cases usually employs the amputation of the fingers combined with soaking and/or injecting the fingers with various solutions in order to enhance the fingerprints. A novel approach to fingerprinting mummified fingers is presented which involves removal and rehydration of the fingerpads (including the epidermal, dermal, and adipose tissues) followed by inking and rolling, using a gloved finger for support. The technique presented produces a superior quality of print without amputation of the finger, yielding excellent results and assisting in obtaining positive identification.

KEYWORDS: forensic science, fingerprint, human identification, mummification, dermatoglyphs, tissue rehydration

Fingerprinting has long been used as a method for identifying bodies. The development of the “science” of fingerprints dates back to 17th-century England when Nehemiah Grew described fingerprint ridges (1). Sir William Herschel further expanded the field when he recognized that fingerprints could be used as a means of identification (1). Since then numerous advances have been made in both the areas of fingerprint acquisition and interpretation. However, in the field of forensic pathology, the attainment of fingerprints from mummified bodies has remained difficult. Several techniques have been proposed to obtain prints in these cases including directly reading the prints from the fingertips, making casts of the fingers to create a negative fingerprint image, taking x-rays of the fingers' coating with a radio-opaque substance to create a radiograph of the fingerprints and rehydrating the fingertips to obtain prints (2–4).

At the Bexar County Medical Examiner's Office (BCMEO) in San Antonio, Texas, we historically have used a rehydration technique on mummified hands in order to obtain prints. This process usually employs the amputation of the fingers combined with soaking and/or injecting the fingers with various solutions in order to enhance the fingerprints. In 2005, one of our autopsy technicians introduced a novel approach to fingerprinting such cases which did not require the full amputation of the fingers. In the last 2 years, we have been intermittently using this new procedure with excellent results and in 2007 we standardized the procedure for use on all mummified cases.

Initial Case Summary

An unidentified body was sent to the Bexar County Medical Examiner's Office from an outlying area. After autopsy, it was determined that the individual died as a result of homicidal violence (blunt force injuries to the head). The investigating agency had no leads as to the identity of the person, and decomposition made a visual comparison impossible. The fingers were mummified

and unprintable. Thus, a novel technique developed for fingerprinting mummified bodies was utilized.

Procedure

Supplies Needed

The following supplies were needed: a small pair of scissors (*Iris* scissors), a scalpel, forceps, and ten containers to be used to keep the fingerprints separate and labeled.

Step 1 Incising the Finger

Hold finger securely in place with the posterior surface exposed. Incise the finger vertically medially and laterally and across the distal tip, approximately 1 mm from the border of the fingernail (Fig. 1). Turn the finger over, exposing the anterior surface. Make a transverse incision approximately 5 mm proximal to the distal interphalangeal joint (Fig. 2).

Step 2 Removing the Print

Time and care must be taken with this step, as it will determine the quality of print you are actually able to produce. Using forceps, securely grasp the lower edge of the fingerpad. Gently retract the fingerpad, while cutting the underlying tissue with the *Iris* scissors (Fig. 3). Be certain to remove the entire epidermis, dermis, and subcutaneous adipose tissue WITHOUT removing the muscles or tendons of the finger. As each of the finger pads is successfully removed, place them into their individually labeled containers.

Step 3 Rehydration

Rehydration of the prints is accomplished by massaging the removed fingerpad under warm running water. This step takes approximately 10–15 min in most cases. Gently massage the pad to ensure full rehydration by carefully rolling the finger pad between your fingers such that the inner surface is the subcutaneous tissue

¹Bexar County Medical Examiner's Office, 7337 Louis Pasteur Drive, San Antonio, TX 78229.

Received 6 Oct. 2007; and in revised form 24 Nov. 2007; accepted 24 Nov. 2007.



FIG. 1—Incision of the medial and lateral finger for fingerpad removal.



FIG. 2—Transverse incision approximately 5 mm below the distal interphalangeal joint for fingerpad removal.



FIG. 3—Retraction and removal of the fingerpad.



FIG. 4—Proper rehydration of fingerpad.



FIG. 5—Improper rehydration technique.

(Fig. 4). Do not fold the fingerpad such that the epidermal surfaces touch each other (Fig. 5) as this can cause removal or distortion of the print. If the fingerpad does not rehydrate within the stated time, take the *Iris* scissors and trim the subcutaneous tissues off of the fingerpad without removing or damaging the epidermal surface. This will decrease the rehydration time. We do not recommend soaking the fingerpad instead of massaging it to rehydrate as the quality of prints is suboptimal due to epidermal loss/distortion.

Step 4 Fingerprinting

Carefully dry the fingerpad with a clean, dry cloth. Place the fingerpad on top of a gloved finger (Fig. 6) allowing the pad to take its usual form, increasing the quality of the print. Ink the print (Fig. 7) and roll the print on the fingerprint form as usual (Fig. 8).

Step 5 Re-Rehydration

If you find that the print still has ridges or is otherwise inadequate, return it to the warm water and massage it for a few more minutes and then repeat Step 4. The print will begin to harden and

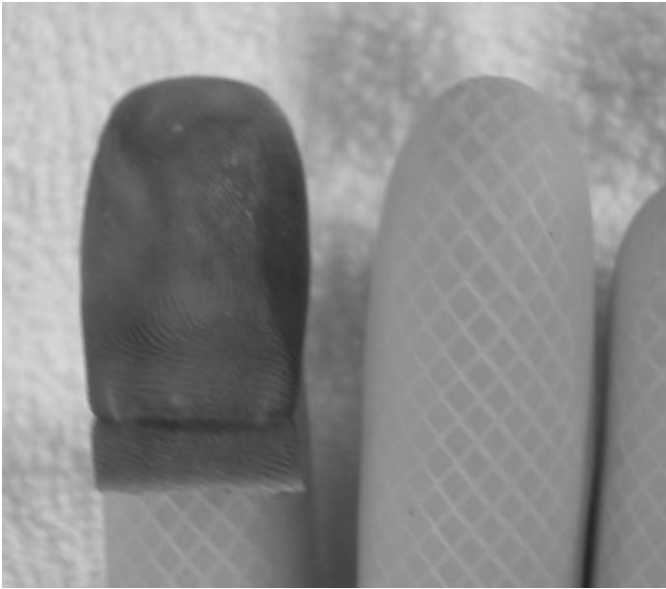


FIG. 6—Fingerpad on top of a gloved finger in preparation for printing.

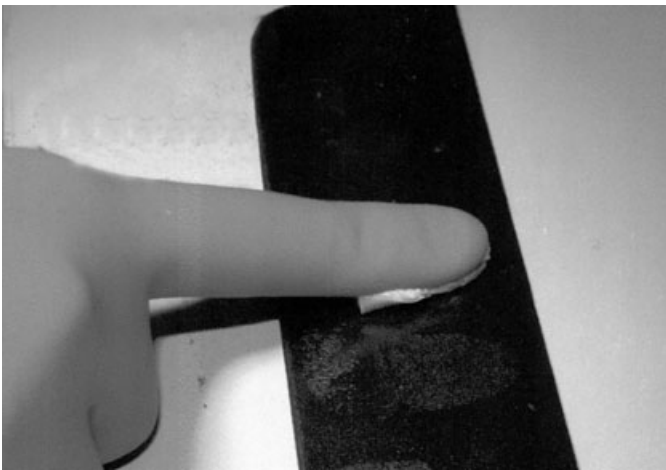


FIG. 7—Inking of the fingerpad.

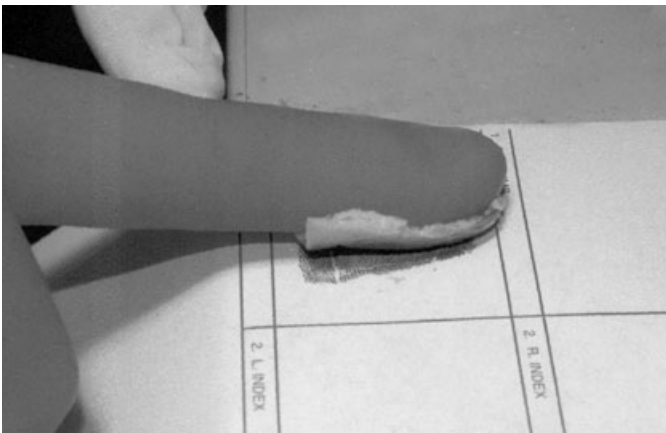


FIG. 8—Printing of the fingerpad.



2. R. INDEX

FIG. 9—Print of mummified finger without intervention.



FIG. 10—Print of rehydrated fingerpad technique.

dry out quickly after it is removed from the water and may require multiple rehydration steps in order to achieve the desired outcome.

Results and Discussion

Figure 9 shows a fingerprint taken of the mummified finger prior to any intervention. Figure 10 illustrates the print obtained after the procedure described above was performed. The print was of sufficient quality that a positive identification of our decedent was obtained leading to the eventual arrest of a suspect. As illustrated in Fig. 11, the procedure caused minimal deformity to the hands and fingers, especially when compared to other techniques which require full digit amputation.

We feel that this novel approach to printing mummified fingers causes minimal deformity of the remains with excellent results, assisting in obtaining positive identification. Though the procedure



FIG. 11—*Finger after fingerpad has been removed.*

is time consuming, the procedure remains faster than either dental or DNA analysis. The procedure is easy to learn and the results improve with experience. At the BCMEO, we feel confident enough with this procedure, that we have instituted it as our

standard protocol. Unfortunately, due to the manner in which records are maintained at our office, it is impossible for us to compare identifications made pre- and post- our procedural change; however, from the photographs, the reader can certainly see the excellent results obtained with this procedure. We also feel that the outcome, identifying previously unidentified remains, is well worth the effort.

References

1. James SH, Nordby JJ, editors. Forensic science: an introduction to scientific and investigative techniques. Boca Raton: CRC Press, 2003.
2. Kahana T, Grande A, Tancredi DM, Penalver J, Hiss J. Fingerprinting the deceased: traditional and new techniques. *J Forensic Sci* 2001; 46(4): 908–12.
3. Schmidt CW, Nawrocki SP, Williamson MA, Marlin DC. Obtaining fingerprints from mummified fingers: a method for tissue rehydration adapted from the archeological literature. *J Forensic Sci* 2000; 45(4): 874–5.
4. Haglund WD. A technique to enhance fingerprinting of mummified fingers. *J Forensic Sci* 1988;33(5):1244–8.

Additional information or reprint requests:
 D. Kimberley Molina, M.D.
 Bexar County Medical Examiner's Office
 7337 Louis Pasteur Drive
 San Antonio, TX 78229
 E-mail: kmolina@bexar.org