

Michael H. West,¹ D.D.S. and John Frair,² M.S., R.P.S.

The Use of Videotape to Demonstrate the Dynamics of Bite Marks

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ABSTRACT: Traditionally, bite mark photographs have been used to study statically a dynamic event. With the advent of the compact video camcorder, odontologists can now document bite marks on video tape and, in some instances, with the model of the suspect's dentition, may be able to record the dynamics of a bite on human flesh. A review of two cases and equipment used is discussed.

KEYWORDS: odontology, bite marks, photography, videotapes

Still photography historically has been used to record static bite mark impressions on flat-surfaced skin areas. This technique allows accurate dental model to skin comparison for identification and presentation as evidence. The forensic odontologist, however, seldom encounters this ideal combination when working with a traumatic bite mark. The more usual occurrence is a dynamic bite mark that skips, rips, and tears the skin along a curved surface. Two case studies have shown the advantages of using a recording medium that will allow the dynamic movements and interactions of the teeth and skin to be shown in motion. Video tape recordings which show this interaction using a dental model and the bite mark allow the forensic odontologists to demonstrate clearly, for comparison and presentation, the action which has taken place. The need for being able to record the dynamics of the bite mark has been clearly demonstrated in two case studies in the State of Mississippi.

Case Reports

Case Study 1

The first case study involved a ninety-year-old black female living with her disabled brother in a rural area of Delta, MS. One evening her house was broken into and she was attacked, savagely beaten, and raped. The victim recognized her attacker as a neighbor. She gave law enforcement agents his description although she did not know his name. When admitted to the hospital's emergency room, hospital personnel did not perform a sexual assault kit examination on the victim because of her critical condition [1]. Based on the

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¹Forensic odontologist and deputy medical examiner investigator, Mississippi Medical Examiners Office, Hattiesburg, MS.

information she was able to give police, a twenty-four-year-old black male with a previous police record of assaults on invalid females, was arrested. Three days after the attack, the victim became comatose and would later die, depriving the police of their only evidence, the eye-witness. When the victim became comatose, police called a forensic odontologist because of the numerous bite marks which had been discovered on the victim's body by her physician.

At the time of the examination of the victim by an odontologist, a suspect had been arrested and a court order had been issued, permitting dental impressions to be taken, an oral examination to be conducted, and a photographic record of the suspect's teeth to be made. One set of impressions was poured immediately and allowed to set. Late in the evening, the dental models were compared with the wounds of the victim and the comparison photographs were made using standard 35-mm still photography on black-and-white film. The bite marks located on the hands and face showed incised areas consistent with a human bite mark which had a 4- to 5-mm penetration. The dental models could be positioned over the incised areas and a direct comparison made and photographed.

A bite mark located on the right breast, however, presented a different situation. The breast, pendulous and malleable, was typical for a 90-year-old female. When the biting surfaces of the teeth had contacted the flesh, instead of cutting and penetrating, the teeth had skipped and abraded (Fig. 1). The results were not a clear static impression of the teeth on skin as exhibited on the hands and face, but a record of a dynamic event of the teeth pulling, stretching, and abrading the skin of the breast for several centimetres. For comparison, the dental model was placed at the beginning of the breast's bite mark abrasion, and while



FIG. 1—Case 1: relationship of suspect's model to bite mark on right breast of victim.

downward pressure was applied, the model was dragged slowly down the abrasion. A series of still photographs were taken showing the connection from beginning to end (Fig. 2).

Direct observation of the dental model-to-tissue relationship as the skin was pulled by the leading edge of the teeth and the stretching of the skin after the tooth had passed, showed a homogeneity that is very difficult to document even with a series of still photographs, because the interacting motions between teeth and skin are lost. The series of still photographs were made with hopes of recreating the illusion of motion in later court displays.

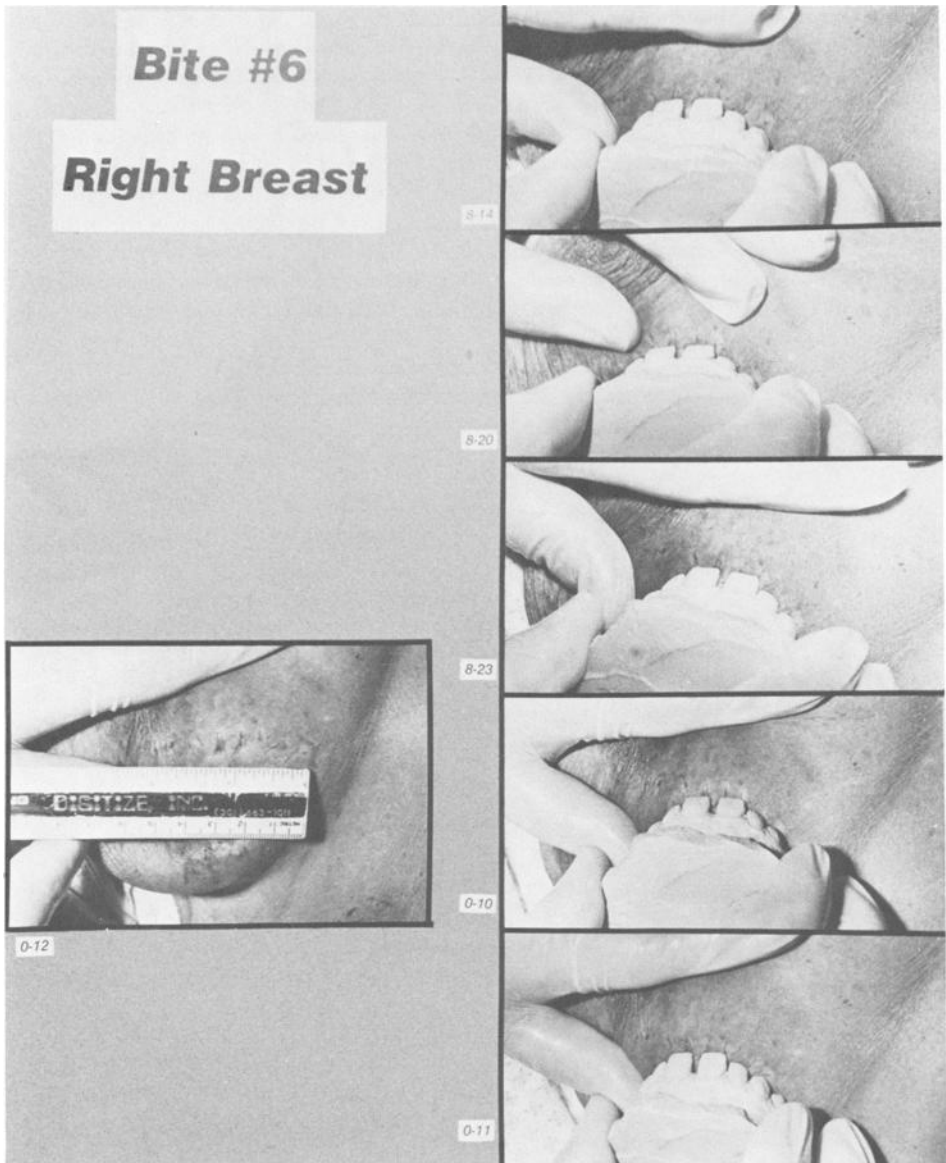


FIG. 2.—Case 1: court display attempting to demonstrate motion with still photographs.

Three days after bite mark examination, the victim died of adult respiratory distress syndrome.³ During the autopsy of the victim, a dental model comparison to a bite on the left breast was attempted, but it could not be duplicated because of rigor mortis and the refrigerated condition of the body. While this case did present several static bite marks usable for comparison, it also demonstrated the need of being able to show in motion the dynamics of biting so a better evidentiary comparison could be made.

Case Study 2

The second case study presented itself 2 weeks later when a 33-year-old white female was assaulted and attacked by a young black male who had broken into her residence. She was unable to identify her attacker and was taken immediately for reconstructive surgery of her face. During this time, her personal physician reported that the victim had received 2 human bites, 1 to the left shoulder and 1 on the right breast. That evening, an 18-year-old disgruntled former student of the victim was arrested. Following normal legal documentation, an oral examination, dental study models, and still photographs were taken of the suspect. The dental models were then compared with the victim's bite marks following her return from surgery [2].

On the right shoulder there was a typical compression bite mark with incisal penetration of 3 to 4 mm. Visual comparison of the suspect's dental model was documented with both still photography and video tape recordings as the models were held above the flesh and slowly lowered until contact was barely made. This demonstrated not only the corresponding morphology of incisal edges and diastemas, but also the rotational aspects of the bite and the teeth's corresponding occlusal height. On the left breast was a distinct human bite mark with the mandibular teeth crossing the areola medial to the nipple and the maxillary tooth No. 8 located at the lateral side of the base of the breast.

The victim's breast was typical for a 33-year-old female in good physical condition. Since the victim received the bite mark while she was in a horizontal position, the dental model comparisons and photographic documentations were done with the victim lying on her back. The still photographs could show only one segment of the bite model relationship to the full convexity and curvature of the breast's bite mark at a time. When the apex of the breast was photographed from a 90° front angle, the bite appears as a straight line; when photographed from the side, only a segment of the bite is recorded, making the still photographs inadequate for demonstrating the entire biting process (Figs. 3 and 4). Video tape documentation, however, demonstrated the three-dimensionality of the bite in motion. It showed the central incisors making contact first and penetrating the flesh, hiding their biting edges before the cuspid and premolars made contact with breast (Figs. 5-7). By rotating the video camera during documentation, the dynamics of the biting action could be better demonstrated than with the use of still photography alone.

Discussion

Case 1 defendant pled guilty to murder and was sentenced to life imprisonment; to rape and was sentenced to 40 years consecutive to the life; and burglary of an inhabited dwelling and was sentenced to 10 years consecutive to all.⁴

Case 2 defendant entered pleas of guilty to the charges of assault with the intent to ravish and was sentenced to 30 years; to burglary of an inhabited dwelling and was sentenced to 15

²Associate professor, University of Southern Mississippi, Hattiesburg, MS.

³Autopsy Report M85-148, Thomas L. Bennett, M.D., M.S.M.E.

⁴H. G. Bridges, assistant district attorney, 4th Circuit Court District, State of Mississippi, 1986, personal communication.

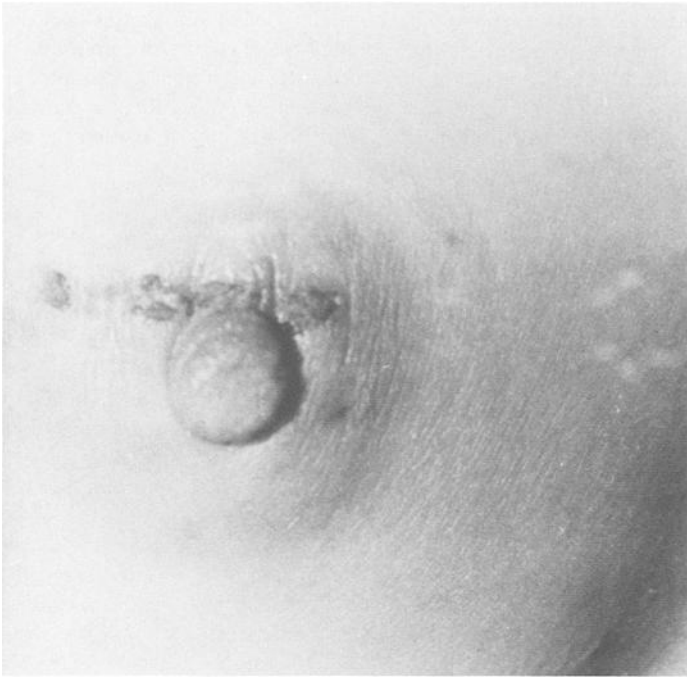


FIG. 3—Case 2: bite mark on right breast.

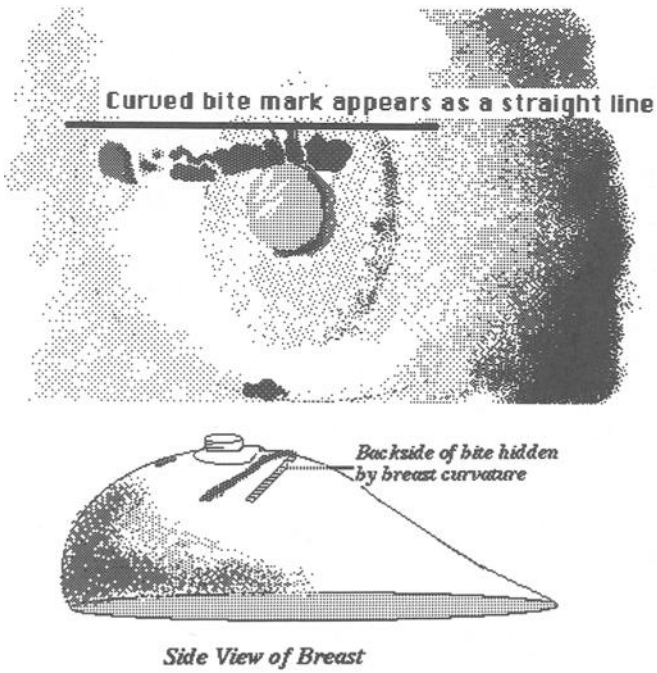


FIG. 4—Top and side view diagrams of bite mark shown in Fig. 3.



FIG. 5—Case 2: relationship of subject's models to bite on victim's breast.

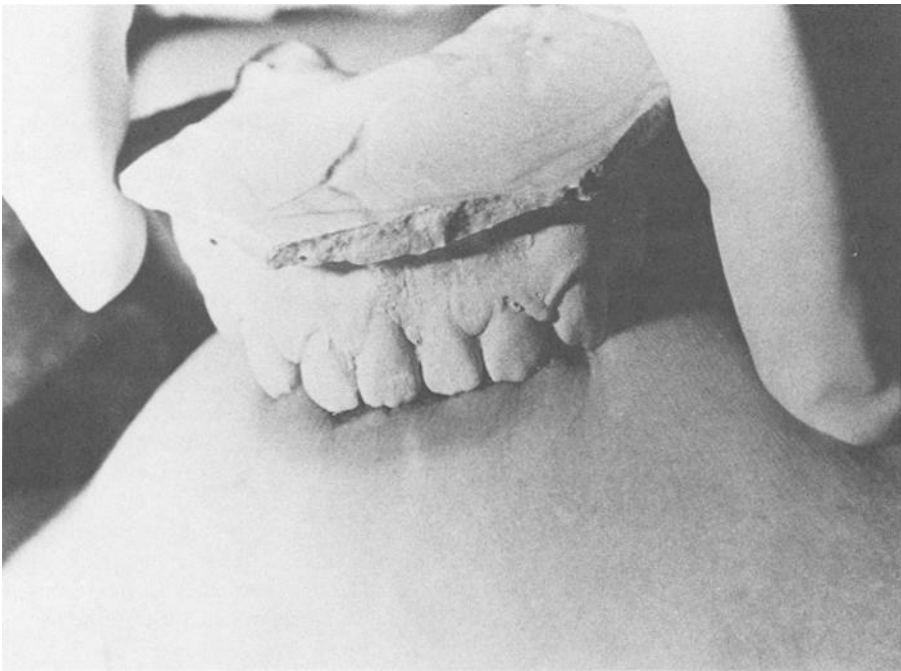


FIG. 6—Case 2: relationship of subject's models to bite on victim's breast.

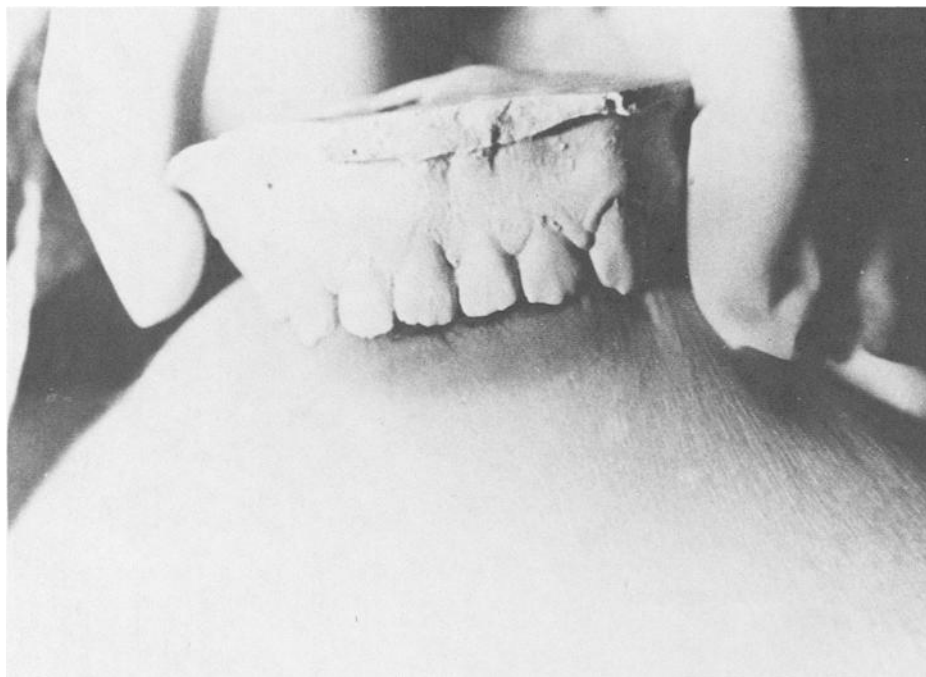


FIG. 7—Case 2: relationship of subject's models to bite on victim's breast.

years. According to District Attorney Kenneth Coleman, "without the bite mark identification evidence, we just did not have much. The victim absolutely could not identify the defendant and certainly there was (sic) no fingerprints or other physical evidence to establish that the defendant was even in the victim's house."⁵

The selection of video equipment is based on the same criteria that would be used for the selection of equipment for most areas of forensic science. The equipment should be selected on the basis of four criteria: its portability; its quality of the image produced; its ease of use by untrained personnel; and the intended use of the final image. Even these limitations leave a large number of video cameras and recorders from which to choose.

Unfortunately, many forensic odontologists travel alone to a crime scene or to the examination of a victim. It is almost impossible to perform a model-to-bite mark comparison while at the same time video taping the comparison. A bystander, either from a law-enforcement agency or hospital, is used as the video photographer to facilitate the process. Their training in the use of the equipment may be extensive or nonexistent depending on the situation. For this reason, the equipment should be as simple as possible for them to operate. Fortunately, most equipment designed for the nonprofessional usually comes equipped with automatic exposure (light level) controls, simple "on," "off," and "record" switches, a zoom lens, and some even with automatic focusing lenses.

Portability is an important consideration since the odontologists may be called upon to travel many miles to a hospital room or crime scene on short notice. The equipment should be compact enough to allow it to be transported and carried conveniently over a long distance by hand. The equipment should also have the capability of being used either with an internal rechargeable battery or with conventional 110 V.

⁵R. K. Coleman, district attorney, 3rd Circuit District, State of Mississippi, 1986, personal communication.

Although it is desirable to have optimum minute details shown when comparing the action of the model to the interaction of the skin, there are several limiting factors as to the amount of resolution which can be obtained using a video tape system. The quality of a video system, like a 35-mm camera system, is dependent on many different components to produce optimum images. The quality of the lenses coupled with the electronics in the system will vary with different models of video recorders and cameras. The size of the video tape which records the motion is not a true indicator, however, of the quality of the image which can be produced. Technical advances which have been applied to the smaller format tape recorders to increase their portability have not always been included in the older larger format recorders. Because of this and other factors, it is possible to record a more detailed image on 1/2-in. (1.3-cm) tape than on the larger, 3/4-in. (2-cm) tape.

The major limiting factor to video image quality is the resolution of the television monitor. The video image, unlike motion pictures, which are a series of projected still pictures, is a product of constantly changing individual scanning traces. The individual traces on a U.S. television monitor number 334 TV lines. This is only one-tenth of the 3048 television lines of resolution produced in a 35-mm photograph [3]. Because of this discrepancy in resolution between the 2 media, it is impossible for video to show the small details in the same manner as a still photograph.

In addition to the popular camera/recorder unit, there are other pieces of equipment that can be necessary in making video tape recordings of bite marks. This equipment can range from essential equipment such as lights and tripod to convenience equipment as simple as extension cords, playback units, and editing facilities.

It is our opinion that the best evidentiary documentation of bite marks of this type is to video tape the model-to-bite mark motion. The odontologists, and later the jury, can watch a recreation of the event and see the changing relationships of the tissue and dental model as the biting movements are followed. The easiest way for laypersons to determine the reaction of the skin tissue to the dynamics of the biting is for them to see the event with their own eyes, and in motion.

References

- [1] *State of Mississippi v. David Weatherspoon.*
- [2] *State of Mississippi v. Tony Foster.*
- [3] Mathias, H. and Patterson, R., *Electronic Cinematography*, Wadsworth Publishing Co., Belmont, CA, 1985.

Address requests for reprints or additional information to
Michael H. West, D.D.S.
P.O. Box 15846
Hattiesburg, MS 39402