Original Research Article

Autopsy Photography Demystified

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Abstract

With the Ministry of Health & Family Welfare, Govt. Of India, trying to introduce regular night autopsies; It has become empirical for us, the Forensic Doctors, to have basic knowledge on using photography and/or videography for medicolegalwork.Autopsy photography plays an important role in documentation of evidence, especially when the photographs are analyzed at a later date by a medicolegal expert in case of any dispute regarding the injuries, post mortem changes and /or artefacts. This article presents some basic photographic techniques to help the autopsy surgeon to better document their findings.

Keywords: Autopsy photography, Camera Settings, Documentation, Documentary evidence, Imaging, Medico-Legal, storage, transmission.

Introduction

Forensic photography is the application of photographic knowledge and skills to aid the law. Documentation of evidence in forensic medicine is a vital component in supporting aninvestigation.Recentadvancements in photographic technologieshave made it possible to document evidence in ways that previously may not have been possible.That being said, it often takes a knowledgeable photographer to successfully capture the details of the evidence.We have conducted a comprehensive analytical study on autopsy photography at the Mortuary of Osmania General Hospital, Hyderabad, Telangana; in the years 2017 to 2019, where we tested various methods to best document autopsy findings using mobile phone cameras, point and shoot cameras, DSLR cameras with in body flash, external flash units etc. including methods to securely store and transmit the digital photographic data without it getting tampered.We have concised the findings of our study as follows:

Methodology

Autopsy Photography

1. On receiving the body onto the autopsy table, initial step would be to take photographs of the whole body, even before removing the clothes and washing the body. Wide angle lens, of focal length 24 mm, is preferred to capture the entire body in a single frame. The camera must be positioned at right angles to the body, to avoid perspective distortion. It is always best to fill the frame with the object of interest; in this case, the body. Care must be taken to exclude unwanted objects in the background.
2. A small grey or white card, sized about 6 x 4 inches, with details of the postmortem number and date should be included in the pictures[1-3].
3. In cases of homicides and unknown persons, photographs of the clothing are equally important as the photographs of the body/ injuries. Any tears, rents or stains on the clothing must be labelled and photographed both in-situ and after removing the clothing, before handing them over to the investigating officer. Series of photographs must be taken, initially photos showing the location of the rent are taken followed by a closer image which shows the details of the rent like the nature of its margins, corners etc. A normal kit lens or a 50mm prime lens would best suit this purpose.
4. The whole body must once again be photographed before washing. Photographs of uncleaned injuries, dried blood or other stains on the body must be taken before washing which is especially useful in firearm deaths, where any evidence of blackening and soot may get altered by washing the body. Photographs of any trace debris stuck onto the body like gravel, weed or dust which can link the crime scene or the assailant to the deceased must be taken before collecting and sending them to the forensic science laboratory. A normal kit lens or a 50mm prime lens would best suit this purpose.
5. Photographs of the injuries are taken in series, first image should be taken to show its location preferably by orientation with anatomical landmarks and the second image should be a close-up image to show the details of the injury like nature of the margins, floor of the injury and any foreign materials embedded in the tissues. Always try to use the same view point for both the orientation shot and the close up shot. Photograph of injuries must always include a scale. A small grey or white card containing the postmortem number and date must be included, it is better to include the card with case details in the orientation picture and a scale in the close-up picture, as having both the scale and card in the close-up image would make it cluttered and distracting. The injuries must be properly illuminated either with the help of built in flash or external flash units. A 50mm prime lens is best suited for this purpose, never be tempted to use a wide-angle lens for photographing

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injuries, as all wide-angle lenses produce distortion, especially, at close ranges.

All photographs of the internal structures during autopsy must include a card with case details and a scale for measurement. If the pictures are taken with the organs in-situ then a probe or a finger must be pointed towards the finding that one wants to capture. Alternatively, a pointer or a circle mark can be added for digital images using photo-editing software which will help the medically untrained legal personnel. In cases where the organs are dissected out of the body, the organs must be wiped of any blood or other body fluids that may produce reflective patches on the photographs. The organs must be placed on either a grey or a green cloth which provides contrast with the red color of blood of the organs[4-6]

Storage & Transmission

1. Transfer the photographs from the device to the computer. A dedicated drive to store the postmortem photographs has to be maintained where the images are stored in separate folders named by their PME number. All the PME folders created in a day are sorted, in chronological order, in folders named by date. These folders and sub-folders are sorted in dates, months and years; for better organization and easier retrieval of data.
2. Each PME folder must have a "Metadata.pdf" file, which contains the metadata of all the images of that particular case. Metadata contains useful information of the image like the image size, camera details and settings, date and time and in cases where the camera is equipped with a GPS chip, geographical location from where the image was taken. The reason behind making a file exclusively for metadata is that the metadata of individual image files can be tampered and manipulated, hence if we provide the original metadata in a file, it can be compared with future copies of the images in question.
3. Each PME folder must have a "Hashvalues.pdf" file, which contains the hash values of all the image files of that particular case. The Hash value is the fixed bit length outcome of the image file by using either the MD5 (Merge Digest Algorithm) or the SHA 3 (Secure Hash Algorithm 3rd generation). The hash value of any file is constant and does not change even on duplication of the original file; but any tampering or altering the image file changes the Hash value. Thus, any future digital copies of the images can be compared with hash values of the original image.
4. A copy of the entire folder containing all the case images, metadata.pdf file and hashvalues.pdf file is written onto a non-re-writable CD drive labelled with crime details using a permanent marker. This CD drive is then sealed in an envelope labelled with the crime particulars of that particular case. The sealed envelope is accompanied with:

a) A certificate from the forensic doctor, who has performed and photographed the autopsy, stating the authenticity of the images, containing case details, information about the device used to capture the images, process of transfer of images, condition of the computer being used and a mention about any other processes the images were subjected to and duly signed by the forensic doctor, as per the requirements under section 65 B of the Indian Evidence Act.

b) A sample seal with signature of the doctor.

A signed receipt should be taken from the police officer collecting the pictures. Since the photographs are considered as evidence according to sections 63 and 64 of Indian Evidence Act, a proper chain of custody has to maintained while transferring the photographs. A chain of custody file has to maintained by the investigating officer for proper documentation of seizure, custody, control, transfer, analysis and final disposition of evidence. It verifies the actual possession of the evidence at every point in time. It ensures that true evidence is not lost and false evidence is not introduced. Finally, shorter the chain, before deposing as evidence in court, the better.

Recommendations: Ideally a DSLR or a mirrorless camera would give the most control over the imaging process and also the best quality of images.A 50mm prime lens will well suit for majority of the autopsy; but a kit lens with a focal range of 18 – 55mm can also be used. A 50mm prime has the following advantages:

- Can be used in low light conditions
- Has a shallow depth of field to isolate the findings from distracting backgrounds.
- 50mm focal length is equivalent to the human eye.

Since the lighting during autopsy is mostly constant, it is best to shoot the camera in manual mode with most of the images having the same settings.

Aperture: (determines the amount of light falling on the sensor) Shoot at the widest aperture available to increase the light falling on to the camera sensor.

Shutter speed: (determines the time for which the sensor is exposed to light) 1/focal length should be the minimum shutter speed to avoid blurry and shaken images. For instance, while shooting at 50mm, 1/50 sec is the minimum shutter speed to avoid blurry images.

ISO: (determines the sensitivity of the sensor to light) it is best to keep it at the lowest possible to avoid grainy images. However, in low light conditions it is best to increase the iso as per need; grainy images are better than dark under exposed images with little detail.

Color temperature: the normal daylight color temperature ranges between 4500K to 6000K. It is best to have the color temperature around 5000K to 5500K, to show the true colors of injuries or other postmortem findings. If an external flash is being used it must also be calibrated to the same color range.It is recommended to take a few test shots before the autopsy and adjust the camera settings accordingly. Also, periodically check the clicked images for any out-of-focus or shaky images during the autopsy[7-9].

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