Case Report

# Death in the Work Place; Accident or Homicide? The Role of Death Scene Examination

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## Abstract

Death scene examination is an essential component of a complete medico-legal autopsy. The present case is that of a 58-year-old male who died very late at night in an unclear circumstance. He had suffered severe multiple craniofacial fractures, and injuries to the left hand and digits (defense wounds), mimicking homicidal death. The altered scene was examined 4 weeks after the incident, and with the autopsy conducted at the same time, the manner of death was concluded to an accident.

**Keywords:** Cause and manner of death, death scene examination, reconstruction

## Introduction

History taking, death scene examination (DSE), and autopsy are three inseparable components of any complete forensic pathology investigation.[1] None is superior to the other, and every death scene is a potential crime scene. Thus death scenes should be carefully examined for evidence, or unusual circumstances, that would indicate the correct manner of death.[2] Based on training, experience and good examination of a death scene, the death investigator could reach some preliminary conclusions regarding a death.[2] Without doing a DSE and first viewing the body at the scene, encountering the latter for the first time in the postmortem room, could lead to erroneous conclusions regarding the origin of various injuries on the body.[3] DSE should always be done in medico-legal cases such as suspected homicides, suicides, accidents, pediatric deaths, traffic-related deaths, custodial deaths, and workplace-related deaths, difficult victim identification as in mummification and putrefaction, and disaster victims identification dealing with multiple casualties.[4,5] A detailed DSE provides the substrate for a comprehensive medico-legal autopsy, and thus lays the foundation for an accurate determination of cause and manner of death.[6] For example, if a ligature mark is present on the neck of a deceased, there is a tendency for the untrained to attribute the manner of death to suicide, or rarely, homicide. However, death in such instances may be accidental in origin. This latter conclusion can be archived only after a DSE.[7] A middle-aged female laundry worker was strangulated with a scarf that she was wearing, by the roller cylinder of the ironing machine in the laundry of the hospital, on a cold winter morning. She had sat at the counter adjoining the ironing machine in an attempt to have more heat directed to her back; she leaned backward and was apparently too close to the machine.[8] Only a DSE and good antemortem history could prove this death to be accidental. Such an examination helps to view the body in the context of its surroundings; hence, a systematic and thorough examination of the body should be undertaken at every death scene.[7] Non-attendance at death scenes could ultimately be a source of regret in medico-legal investigations.[1,7]

In general, DSE usually requires a multi-specialist approach that involves but not limited to, the following category of investigators, namely, police officers, forensic pathologists, criminalists, paramedics, and people from other forensic disciplines such as blood spatter analyst, forensic entomologist, and forensic geologist.[1,7] Where a DSE is done for the first time after conducting the autopsy this has been shown to be of some value when compared to not doing any at all.[3]

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**Access this article online**

Quick Response Code:

Website: www.atpjournal.org

DOI: 10.4103/atp.atp_48_18



**How to cite this article:** Nwafor CC, Ekpo MD, Nwafor NN, Obafunwa JO. Death in the work place; Accident or homicide? The role of death scene examination. Ann Trop Pathol 2019;10:68-73.

Most times the Police in Nigeria visit the scene, without a pathologist, criminalist, protective clothing and gloves or even a caution tape to cordon off the scene. The Police take photographs (at times with private phones) and do little or nothing else at the scene. This is often due to the lack of proper training and inadequate funding of the organization. Furthermore, our sociocultural value system believes that death is an act or the will of God, and it is therefore not uncommon for neighbors, friends, and well-wishers to troop to the scene on condolence visit immediately after the death.[1]

## Case Report

A 58-year-old male on night duty in an aircraft maintenance hangar was said to be using a "Nitrogen Charging Card Machine" to inflate the spare tyre of a sports utility vehicle (SUV) in the car park area adjoining the hanger, around 3:30 am. A loud bang was heard by other colleagues and security men nearby, who rushed to the scene and found the now deceased in a pool of blood, next to the vehicle, with the nitrogen card machine still running. His face was injured, and the left hand was positioned across the face [Figure 1].

One of the security personnels on duty reported the incident at the nearby Police Station at 5:30 am. The Divisional Police Officer led a team of officers to the scene where they took photographs, concluded that the death was an accident and instructed the company to convey the body of the now deceased to a morgue for storage and embalmment, clean up the scene, contact the family and continue their operations. However, a subsequent disagreement as to whether the injuries resulted from a homicidal act as opposed to an accident necessitated the need for a postmortem examination. This exercise took place 4 weeks after the fatal incident. The appearance of the face following the postmortem reconstruction [Figure 2], and the "defence" wounds [Figure 3], might make the untrained observer to think that the injuries were produced by a mixed blunt/sharp weapon in the course of a homicidal act, with defense wounds to the left hand and digits.

The forensic pathologist in the team advised that postmortem computed tomography scan, and magnetic resonance imaging, as well as a DSE, should be conducted, to which the group agreed.

### Death scene examination

The DSE team was led by the forensic pathologist. Others present were two anatomic pathologists, two medical officers, safety manager, human resources manager, and the logistics supervisor of the company, the two investigating police officers that saw the body before it was taken to the morgue, a photographer, and a videographer.

The scene of death was a car park area adjoining the aircraft hangar [Figure 4]. Contemporaneous notes were taken, documenting the number of people at the alleged death scene, the time of arrival and step by step details of all events. The important findings and information from the scene are as follows:

**Figure 1:** The body immediately after the incident

**Figure 2:** The face of the victim after postmortem reconstruction and embalmment

**Figure 3:** Lacerations on the back of the left hand digits ("Defence wounds")

1. The death scene had been cleaned up and returned to its original state except for few marks on the floor and the aluminum ceiling
2. The death occurred just by the side of the airstrip hangar where staff members working in the airstrip hangar park

their vehicles. This parking space easily accommodates three cars [Figure 5]

3. A wall separates the hangar workstation from the car park, with a connecting door
4. The SUV that the now deceased was allegedly inflating its spare tyre on the day he died was not seen. Furthermore, the tyre and rim were not present at the scene; they (except the car) were later brought on demand
5. The floor is very clean and covered by old whitish plastic tiles; there are no visible blood stains.
6. The floor bears two arc-like imprints with approximate diameters of 25.5 cm said to have been "made" by the metal rim of the tyre of the SUV
7. A depression with bending (upward concavity) of the aluminum ceiling over the car park was shown to the team. It consists of an incomplete circle partially wrapped around the damaged part of the ceiling. The distance of the damaged ceiling from the ground is 336.25 cm. The incomplete circle has a diameter of approximately 43.75 cm [Figure 6]
8. A black tyre and black metal rim were later brought to the scene encased in a transparent plastic bag
9. The tyre is of rim size I7 (R17), with tiny multiple reddish-brown droplets suspected to be blood
10. The black metal rim has an external diameter of 45.0 cm, five holes for bolts with an inner diameter of 26.88 cm [Figure 7]. The rim is bent on one of its sides, and also contain multiple tiny reddish-brown droplets suspected to be blood
11. The team went through a connecting door into the main hanger and saw a High-Pressure Nitrogen Gas Booster (painted blue with two red-colored long cylinders), bearing the trademark, TRONAIR [Figure 8]; it was chained to a pillar. We were informed that it was the source of the gas allegedly being used by the now deceased to inflate the tyre of the SUV. A log sheet documenting who signed to use the machine, at what time, and what it was used for, was attached; this log sheet was said to have been introduced after the fatal incident, as part of the new safety measures
12. Dry swabs soaked with normal saline were used to recover the reddish-brown stains suspected to be blood and present the tyre, and metal rim for subsequent possible DNA Studies intended to establish its source

**Figure 4:** The hangar is in the foreground, a plane is on the tarmac on the left side while the death scene is on the right of the photograph (left side of the hanger)

**Figure 5:** Car park where the incident occurred. The door at the rear leads into the hangar

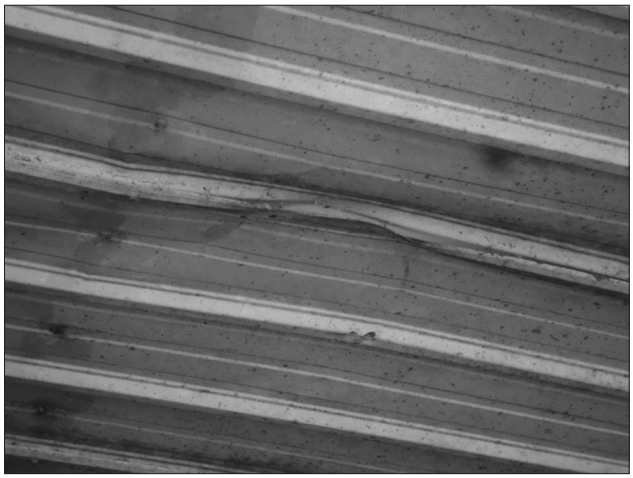

**Figure 6:** The incomplete circular impression on the aluminium ceiling; the arrow points at the dent caused by the impact

**Figure 7:** The black metal rim that impacted the victim. Note the depression on one side


**Figure 8:** The high pressure nitrogen gas booster (TRONAIR) normally used to inflate aircraft tyres. Note the chain linking the equipment to the pillar on the right

13. Pictures handed over to the forensic pathologist by the police after the DSE showed the following:
    The now deceased was at the time of the incident wearing a white shirt on dark colored long pants, lying supine on the floor of the car park, and in a pool of blood. There were no readily visible spattering of blood, and no smearing of the clothes could be identified [Figure 1]. The pooling was only around the head area, and it trickled to a slightly lower level. Four teeth were seen on the floor. The photographs also show what appeared to be blunt force trauma to the face and this appears maximal on the left side.

It is noteworthy that the Police was initially reluctant to release these photographs to the pathologists, claiming that the latter do not require them as part of their investigations.

This exercise of DSE had some limitations which the investigators noted. It was not conducted at the appropriate time because the Police and the local Coroner did not appreciate the need for it. Of course, it was a strange procedure, and those concerned lacked knowledge of what to do. Consequently, the team examined an "altered scene," the body was not *in situ*, the microenvironment had changed, materials had been displaced or repositioned, and new materials had been deposited.[9] The TRONAIR could not be processed for fingerprints for a possible match to the now deceased in view of the fact that many other people had since used the equipment after the incident. The body was not seen in the context of the environment perimortem, postmortem reconstruction and embalmment had been done, and the latter was going to affect the facial dissection and interpretation of the injuries.

### Postmortem radiological imaging findings (computed tomography-scan and magnetic resonance imaging)

These reveal complex, multiple facial, and comminuted frontal bone fractures with left orbital and intracranial hematoma, distortion of the face, the absence of dental elements and soft-tissue swelling around the face. It was concluded that these injuries are "*probably from a high-velocity blunt impact.*"

### Major autopsy findings

Traditional autopsy confirmed the above findings and in addition revealed the presence of materials used for facial reconstruction. These include foam, cotton wool, and gauze used to pack and fill up the face. Parts of the left frontal lobe of the brain were absent, and bone fragments were embedded with the substance of the brain. Intracranial hemorrhages were observed in the subarachnoid and intraventricular locations. There were multiple lacerations of the left hand with disarticulations of the proximal phalanx and bone protrusions and exposure of the tendons. The only natural disease noted was hypertensive heart disease with a heart weight of 500 gm.

The apparent severe exsanguination and loss of vitreous due to orbital injuries, and the empty urinary bladder precluded the collection of samples for toxicological studies.

Death was concluded to be due to severe exsanguination following severe facio-cranial injuries which resulted from blunt force trauma.

The pathologists opined that the metal rim was accidentally dislodged from within the tyre, flew upward to impact the aluminum ceiling, and on its descent impacted the victim"s head and face. The injuries to the left hand were apparently sustained while the victim was trying to ward off the impact.

### Commentary

This death in the workplace was an accidental death. Although it occurred between 3:30 am and 4:00 am, which made it look suspicious, the deceased was at work (so most likely was alert). For reasons unknown, he used the "Nitrogen Charging Card Machine" to inflate the spare tyre of a car (instead of an aircraft) during which the car tyre exploded, and the "rim" flew up, hit the aluminum ceiling making the depression mark seen on DSE and then landed on the face of the victim (who most probably was at that time looking upward) causing immediate fatal injuries. A look at the photograph [Figure 1] would suggest that the victim immediately fell to the ground and bled. The pattern of the flow of the blood (unidirectional) and the absence of any smearing will not favor the possibility of a homicidal attack. The injuries on the hand were not homicidal defense wounds caused by a sharp weapon.

## Discussion

Ideally, DSE should be done by the forensic pathologist before a body is removed from the scene. Where this is not possible, the scene should be viewed after completing the autopsy, usually done within 24 h.[1,7] In the index case, this exercise was done 4 weeks after the incident. Despite the limitations, the DSE, postmortem radiological imaging and the subsequent traditional autopsy concluded that the manner of death was an accident. The present authors agree that a DSE is very important and can provide valuable information even if the

body has been transported to the hospital/out of the scene for whatever reason.[7]

Without an autopsy, the cause of death can be wrong in as many as 30% of cases despite great advances in modern medical diagnostic techniques.[10] In some cases, despite a meticulous autopsy, the pathologist might be unable to make meaningful conclusions with inadequate history of the incident, negative toxicology, very scanty (negligible) autopsy findings like visceral congestion, as well as, unhelpful ancillary investigations; the cause and manner of death might then be simply speculative.[11] In such cases, DSE might provide additional clues as to the cause and manner of death. An example is the identification of a screwdriver next to an uncovered electrical outlet on a rain-soaked patio in the house of a 30 years old deceased whose house was undergoing renovation; the autopsy revealed essentially nothing of significance.[11] In the present case, a DSE helped to provide answers to medico-legal questions; seeing the embalmed reconstructed body only would have been misleading.

Documentation at DSE involves four major tasks, namely, contemporaneous note-taking, videography, photography, and sketching. All four are necessary, and none is an adequate substitute for another.[2-7] All four were done meticulously and simultaneously in the index case. For an effective DSE, enough trained workforce is needed, if the aim is to achieve good reproducible results. Videotaping a DSE has become a routine documentation procedure. Videotaping offers a three-dimensional portrayal of the scene, but it is not a substitute for the other tasks.[2,3,7,12] Videotaping does not lower the value of still photography. Still, photography of the death scene serves to provide a true and accurate pictorial record of the death scene and records the initial condition of the scene. It provides investigators and others with a record that can be analyzed or examined subsequent to the scene investigation and serves as a permanent record for legal concerns with evidentiary values.[6,7]

The first set of still photographs taken by the police was initially hidden from the forensic pathologist and his team, for unknown reasons. The Nigerian Police should be made to know that these photographs are essential for any successful investigation. While the Police have jurisdiction over the entire scene, the forensic pathologist through the Coroner has jurisdiction over the body. These set of "early but lately provided" pictures obviously added more facts to the information from DSE and helped in concluding the index case.

Sketching of the scene, the final task in the documentation includes the assignment of units of measurement to the overall scene, and a notation of the relevant physical evidential materials identified within the scene relative to the body.[12]

The maximum diameter of the incomplete circle (approximately 43.75 cm) with a depression on the aluminum ceiling was close to the diameter of the damaged metal car rim (45.0 cm). This rim perfectly fits into the size 17 black tyre. The floor to ceiling height of 336.25 cm is a significant distance capable of causing the fatal injuries like the ones seen in the victim following the descent of metal rim that had initially been forcefully ejected from the tyre that was being inflated using a "commercial" air pump.

Knowing the now deceased's mental health history can help to provide insight into the behavior and state of mind of the victim. Such information might also provide clues that will aid in establishing the cause and manner of the death.[6] There was no known mental history of the index case, though in Nigeria even when such exists, relatives try not to reveal such. Unfortunately, blood, urine, and vitreous fluids were not available at the autopsy for possible toxicological evaluation. It would have helped in ascertaining the mental state of the deceased.

### Recommendation

There should be the training of members of the Nigerian Police involved in death investigation, on the proper management of a death scene in conjunction with the anatomic pathologist. The authors are aware that the Post Graduate Medical College has approved forensic training programs which will address issues of DSE and other forensic procedures among anatomic pathologists in the country.

## Conclusion

It is always of great value for the forensic pathologist or death scene investigator to conduct a DSE of a possible homicide. By visiting the scene to view the position of the body, observe the pattern of injuries suffered by the victim, any blood spatters, and relating these to the objects in the surrounding areas, the forensic pathologist can put the pieces of the puzzle together and attempt to reconstruct the sequence of events.[7] Without a DSE, reconstruction is impossible. If the DSE is not performed before an autopsy, it should be done immediately afterward.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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