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Using technology to enhance autopsy practice

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Abstract:

The present short communication is based on the United States patent titled "Grossing Workstation with Electronic Scale". Autopsy is an essential part of medicolegal death investigation. Different novel tools are proposed and implemented to decrease the invasive nature of the traditional autopsy. The present proposal of a grossing workstation uses technology to primarily enhance the practice of autopsy. The proposed device comprising of camera, electronic scale (for measurements and weight), computer device to store data, screen to show and connect the case number to the specimen and time of the examination is used. The proposed grossing station decreases the need for extra personnel and photographers and decreases the chances of exposure to biohazards.

Keywords: Autopsy; Postmortem examination; Grossing workstation; Technology.

Introduction

Millions die every year and many of them undergo a postmortem examination or autopsy [1]. In the UK, 79,400 deceased underwent a postmortem examination in the year 2020 which accounted for 39% of all deaths [1]. Forensic autopsy is an essential part of medicolegal death investigation which are conducted by forensic pathologists. There is a shortage of forensic pathologists worldwide. For instance, in the United States, the National Research Council identified a shortage of forensic pathologists. The similar finding from UK as royal college of pathologist reported shortage in forensic pathologist in 2017 [2,3].

There is a huge need to develop advanced methods to enhance the practice of autopsy, reduce workload, and increase the quality [4]. Different novel tools are proposed and implemented to enhance the quality of autopsy. However, most of these tools focus on decreasing invasive nature of the traditional or conventional autopsy or as an ancillary to the traditional autopsy. One such good example is the introduction of computed tomography (CT) enhanced autopsy practices [5,6]. The present proposal focusses on a grossing workstation for autopsy with many advantages.

Significance of the present proposal

The value of autopsy is immense for medicolegal death investigation. During the autopsy, the forensic pathologist needs to examine, measure, weigh, photograph the body organs and cavities to document presence or absence of disease or trauma. Dissecting or grossing organs is an essential step during the autopsy which should be documented as evidence. These steps may increase significant amount of time of the autopsy procedure as the forensic pathologist needs to enter the data, measure and weigh organs, and photograph the organs and cavities while removing and replacing gloves or with the assistance of another personnel.

Photographing during autopsy is essential to document the evidence. Number of technical challenges include proper framing, background color, inclusion of scale, case number or identifier. Photographs of internal organs carries more technical difficulties because of light reflections, and correct exposure [7]. In addition to the substantial amount of time taken during the grossing phase, one of the difficulties is getting photographs of the

specimens. This is usually either taken by the forensic pathologist who takes time to adjust the angle and focus, or with the help of a photographer. Besides, there is a risk of missing the chain of custody and mixing specimens and organs of the deceased with others. Therefore, the forensic pathologist adopts to inserting the case number in front of the specimen during photographing. Afterall, the forensic pathologist may skip or may not complete all steps during the examination. Recording the data on dimensions or measurements also may add to the time hurdle.

The proposed grossing workstation for autopsy

In light of the aforementioned difficulties faced while conducting the autopsy, a new proposal is being made where the technology based grossing workstation (Figure 1) comprising of camera, electronic scale (for measurements and weight), ultrasonic transduce, computer device to store data, screen to show and connect the case number to the specimen and time of the examination is used [8].

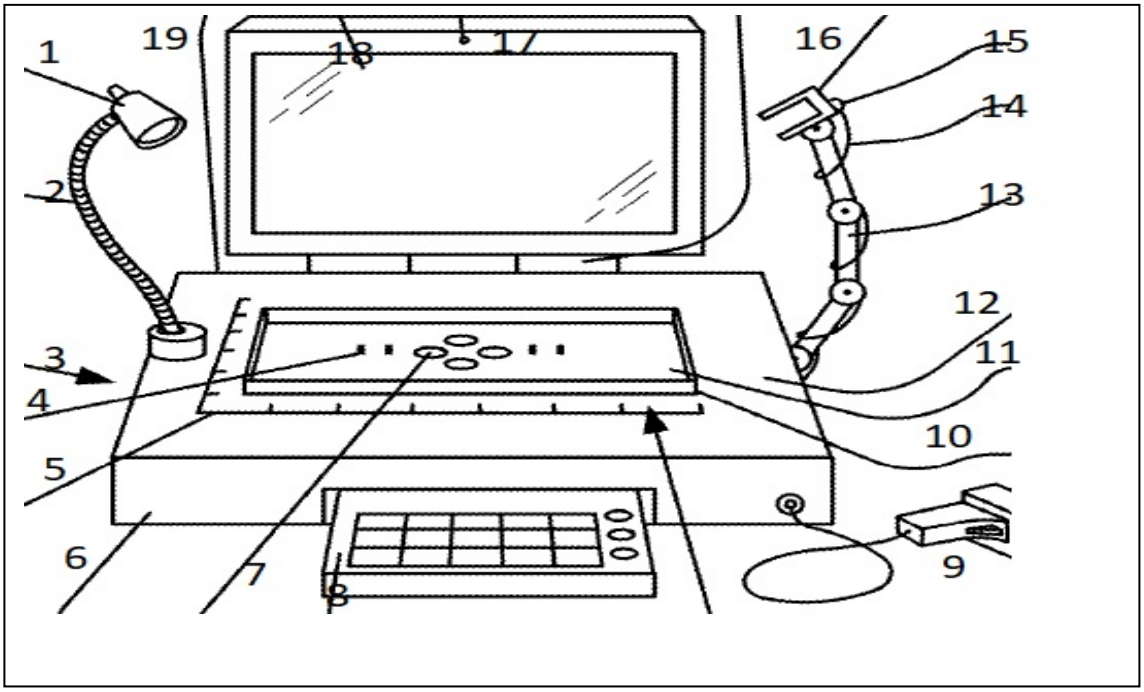

Figure 1: Illustration of proposed grossing workstation (Reproduced from Madadin M. Grossing workstation with electronic scale. United States Patent No. US 11,099,057 B2. 2021)

1: Light 2: Flexible arm 3: Scale

4: Electrode 5: Metric ruler 6: Front Side

7: Ultrasonic transducer 8: Button panel 9: Barcode Scanner
10: Side edge 11: Pan 12: Top side
13: Supported arm 14: Cable 15: Automatic imaging button
16: Camera holder 17: Microphone 18: Screen
19: Back side

The stations are flexible for free movement, adjusting angles for appropriate photographs and examination. In addition to the light source, this arrangement enhances examination and photographing. The workstation can be enhanced by adding voice recorder (dictating), sensors, thermometer, barcode reader, connected to the network to save the data on the clouds [8].

Advantages of the proposed grossing workstation

The proposed arrangement of a grossing workstation for autopsy has the following advantages:

- Keeps safe the chain of custody; as barcode reader will identify the deceased and record all data in the related files in the memory.
- Using visual aid and photographs in reliable approach would aid the presentation at the courts. Digital connection of all photographs recorded at a specific time and date with the deceased file would prevent missing or exchange of photographs.
- Electronically recording information and storing data would prevent loss of papers, etc.
- Avoids missing any part of the postmortem examination. All integrated services would promote the examination by recording and reminding of completing all steps.
- Reduce the time to conduct postmortem examination is one of the major advantages for a forensic pathologist.
- Digital manner of measuring, weighing, adjusting angles for forensic pathologists would enhance the quality of examining and photographing the organs.
- Handling devices between pathologists, technicians, photographer and camera that moves out of the mortuary for photograph download would increase the exposure to biohazards.

All built in workstation would decrease exposure to biohazards.

- Decreases the need for extra personnel or photographer.

Conclusion

The present proposal of a grossing workstation uses technology to primarily enhance the practice of autopsy. It will decrease the need for extra personnel and photographers and decreases the chances of exposure to biohazards in addition to other advantages. I recommend further studies to validate and experiment the proposed device to conclude valid result and possible use in future. More research to utilize technology in forensic practice is recommended.

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What is new in this paper?

What is already known on this topic?

Many new technologies are emerging in field of forensic pathology. However, no new recent technologies used in traditional autopsy practice.

What this paper adds?

The present short communication is based on the United States patent titled "Grossing Workstation with Electronic Scale". I believe that sharing such novel work in forensic practice would help the forensic community to participate in improving the current situation and improve the quality of practice. The current short communication proposes overcoming difficulties and facilitate autopsy practice.

Suggestions for further development

Validation and testing such innovations to enhance the quality of autopsy practice is needed. More research to utilize technology in forensic practice is recommended.

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