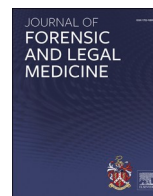




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Letter to the Editor

Perils of human remains examination in COVID-19 times



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ABSTRACT

The novel coronavirus, SARS-CoV-2 has surged globally bringing the whole world virtually to a standstill. Due to its highly contagious nature, various guidelines, protocols and preventive strategies have been devised for the safety of healthcare workers during management of the living as well as the dead. However, guidelines and precautions to be followed during the examination of the human skeletal remains are largely lacking. The present communication intends to address the issue of safe handling of human remains during medicolegal investigations in the COVID-19 pandemic times.

1. Introduction

The entire world has been affected by the SARS-CoV-2 infection known as COVID-19 which has already turned into a pandemic.¹ Researchers across the globe are working incessantly to derive measures for combating the virus and its ill-effects. SARS-CoV-2 has been categorized as a HG3 (High risk Group 3) organism.² A consistent increase in number of the affected cases indicate at the high transmissibility and virulence of the virus, and hence, preventive measures need to be devised and stringently followed. Guidelines and standard operating procedures have been developed regarding various aspects relating to the management of the living as well as those who die of COVID-19. Management of the COVID-19 dead bodies includes, handling of the corpse, transportation of the body, postmortem examination, and performing the last rites, etc. These guidelines are evolving continuously based on the available researches and updates.³⁻⁸ However, guidelines and precautions to be followed during the examination of the human skeletal remains are largely lacking.

2. Perils of medico-legal investigations

Personnel involved in forensic casework and medico-legal investigations need to be utmost alert and should be taking all possible precautionary measures to minimize the risk of infection while confronting the confirmed or suspect cases of COVID-19. During the autopsy practice, the risk of infection may be perceived in cases of unknown/suspected COVID-19 status or in latent cases.³ Hence, unknown/unclaimed bodies don't offer any prima facie indication of the infection, until and otherwise testing for the same is conducted prior to autopsy. But then, testing each and every case prior to autopsy is neither feasible nor a negative result be considered a 100% proof of absence of infection.⁹ Limited facilities in the morgue and shortage of PPEs, are further likely to put the health care workers involved in autopsies to risk of infection.¹⁰ For this reason, minimally invasive techniques (MIT) for autopsy, and Virtopsy has been proposed as safe procedures for post-mortem examinations.¹¹

Similar issues may be raised in medico-legal investigations of human

remains recovered from isolated/unattended places such as forest areas, river/sea side, etc. Such remains may be intact, dismembered, mutilated or even skeletonized, and may show various stages of putrefaction, and disintegration. It is still unclear as to how much time the novel coronavirus; SARS-CoV-2 survives or remains viable and virulent after the death of an individual and also on various surfaces.¹² In view of this, the possibility of human remains as a potential source of viable novel coronavirus should not be ignored during medico-legal investigations. Examination of human remains involves a set protocol which includes, detailed examination of the death or crime scene, and remains, as well as various procedures undertaken to ascertain the identity of the remains. As of now, no specific guidelines are available regarding the management of human remains during COVID-19 pandemic.

3. Recommendations

Considering the increment in infectivity rate (R_0) globally, there is likely to be increase in the number of infective individuals, and COVID-19 deaths in the times to come, and hence, guidelines and protocols need to be devised for examination of human remains as well. First and foremost, the number of forensic investigation personnel should be restricted to minimum at the crime or death scene where skeletal remains are found. All concerned should be trained in infection prevention and control practices, and use of personal protective equipment (PPE) should be made mandatory for all concerned, when dealing with such cases. The death/crime scene should be thoroughly examined and searched for human remains, or for presence of any other evidentiary material. Collection, preservation and transfer of the human remains as well as all the evidentiary material from the site of recovery to the autopsy room or the laboratory should be done carefully, and strictly following infection prevention and control practices. Leak proof body bags and containers should be used to transfer the material. The exterior of the bags and containers should be disinfected with 1% sodium hypochlorite solution. At autopsy, all human remains should be assumed to be COVID-19 positive, until proved otherwise, and due precautions should be taken. All the measures recommended and updated over the period of time for autopsy practices in COVID-19 bodies should be

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applied on skeletal remains examination cases.⁶⁻⁸ The Disaster Victim Identification (DVI) protocols which are well tested and recognized all over the world, and especially recommended for the examination of the skeletal remains, should be adopted for the better handling and the examination during the COVID-19 pandemic.¹³

The minimal invasive autopsy technique or Virtopsy uses magnetic resonance imaging (MRI) and computed tomography (CT) in autopsy either independently or as an addition to conventional autopsy. The role of these technologies in the pandemic have been emphasized in the literature for forensic practitioner's safety and health, such as, contactless technique, detection of smaller lesions, exploration of the areas which are difficult to approach conventionally, easier detection of internal injuries like fracture, availability of the recorded images for re-evaluation and expert references.¹¹

Sawing of bones generates aerosol into the surrounding areas which are considered hazardous in terms of transmission of SARS-CoV-2.¹⁴ Hence, all the personnel involved should be wearing full PPE. Use of the 'Craniotomy box' should be encouraged to examine all the remnants in sequential manner. It helps to control and contain hazardous aerosols generated during sawing the bones during the autopsy.¹⁴ Following the examination, the autopsy room and instruments should be thoroughly disinfected with sodium hypochlorite solution as per the recommended protocols.⁶ The samples due for testing at the forensic science laboratories should be sent in thoroughly disinfected leak proof containers as described before. The human remains for the last rites should be handed over to the concerned officials in leak-proof body bags, and cremation or burial should be carried out as per the religious sentiments of the deceased in accordance with the guidelines for the disposal of the dead.^{6,15}

4. Conclusions

Taking cognizance of the high rate of SARS-CoV-2 transmission, the human remains should be handled with due care, and following the recommended standard infection prevention and control practices. Research is needed to establish the duration for which the novel coronavirus can survive and remain virulent on various surfaces and in the body fluids and tissue after death.

Authors' contribution

UP, TK & KK contributed equally.

Declaration of competing interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript that could inappropriately influence (bias) our work. Authors declare no conflict of interest.

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