



Role of Embalming in Various Scenarios. A review article

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ABSTRACT

Embalming is a restorative procedure done to preserve the dead human body and requires specific types of intervention and treatment. The present study highlights the importance of embalming and its various aspects in health care settings. Extensive literature has been reviewed to highlight the importance of embalming and standard precautions taken during embalming in various scenarios. Universal precautions have to be taken before handling of all the dead bodies as they can be the potential source of infection.

KEY WORDS: Embalming, HIV (Human Immunodeficiency Virus), Ebola virus, COVID 19, Universal safety precautions

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INTRODUCTION

Embalming is an ancient art involving science of temporarily preserving human remains after death to prevent decomposition and to make them suitable for public display at a funeral service. It is also done for the purpose of long term preservation for dissection done in medical colleges. Climatic conditions such as extreme cold or dry heat act as a natural preservative and prevents the decomposition of dead bodies for great lengths of time. These natural processes are not considered embalming as they do not require human interventions. Embalming process is based on the few fundamental principles like there should not be any risk of infection on contact with the dead body, proper long term preservation should be done and putrefaction should be prevented. There should not be any kind of mutilation of the body parts so that a life like appearance is produced. The present study highlights the importance of embalming and its various aspects in health care settings.

MATERIALS AND METHODS: Extensive literature has been reviewed to highlight the importance of embalming and standard precautions taken during embalming in various scenarios.

HISTORY OF EMBALMING Embalming has been recorded in history as far back as the Egyptians. Many methods and materials were developed for preserving dead bodies. Egyptians used the evisceration method and immersed the body parts in some special solution made by them. Ancient Sicilians had devised a method that used heat. Onset of the civil war in 1881 has changed the history of embalming significantly by increasing the demand for an effective preservation method for funeral purposes. Initially, arterial embalming with preservative solutions containing a variety of salts including zinc chloride, dichloride of mercury, aluminum salts, arsenic and lead was the method of choice. The father of modern embalming "Dr. Thomas Holmes" became one of the famous person in the field of preservation. He developed a very effective solution "Innominata" that he used to embalm the dead soldiers with after the war. Dr Richard Burr, Dr August Renouard, Clark and Sullivan, Dodge brothers, Barnes and Joel Crandall are other important names in embalming. In the 1870s, Samuel Rodgers emphasized on cavity embalming by inventing an instrument called "trocar". Hoffman discovered the formaldehyde in later 1800s which later on proved to be the most effective solution in the field of embalming. The embalming pumps using gravity were popular in late 1800s. Around mid-1930s, electric-powered injection machines came into the picture and replaced the embalming pumps using gravity method. [1, 2, 3, 4] Preservation, Sanitization and Presentation are three important goals for embalming. To achieve these goals, an ideal embalming fluid containing essential chemicals is necessary. The chemicals required to make this fluid are combined in different proportions and introduced into the arterial system and / or body cavity. There

are variety of preservatives, sanitizers, disinfectants and other additives used to delay decomposition and restore a natural appearance as far as possible, for viewing a body after death. Embalming involves the conversion of proteins into to a longer lasting substance by forming cross-linkages and their reactive centers get destroyed that normally hold water needed for decomposition. This process made the tissues rigid by inactivating the enzymes and destroying the protein bodies of pathogenic bacteria. Embalming fluid is used to preserve a deceased individual for indefinite period and / or for transportation of the same from one place to another for last rites. For cadavers to be dissected by medical students, the first priority is long term preservation and not presentation. An ideal embalming fluid is made up of appropriate proportions of the following compounds including preservatives, germicidal agents, buffer, wetting agents, anticoagulants, dyes, vehicle and perfuming agents. Types of embalming fluid are of two types: Arterial fluid & Cavity fluid. Arterial fluid is injected into the arterial system and its formalin content may vary depending on the type of body to be embalmed, i.e., an autopsied or burnt case, dead for a long period etc. In cavity fluid, the embalming fluid is injected into the thoracic, abdominal and pelvic cavities and also into places where arterial fluid has not reached. Embalmer in the modern era must have the basic understanding of various different disciplines like anatomy, microbiology, pathology, chemistry and some restorative art like cosmetology. The embalming procedure should ensure that there is no risk or fear of infection on contact with the dead body. Preservation of the body is done in such a manner that it prevents the putrefaction process by pathogenic bacteria and prevents the dead body from contamination with insects and maggots. Pre embalming involves collecting information about cause and time of death and treatment if any the deceased was undergoing. The source of this information is hospital papers and relatives. Verification of the documents and inspecting and screening the body are essential steps before doing embalming. Record keeping is an essential step of embalming. Blood and gases are removed from the dead body and insertion of disinfecting fluid is done as a part of modern embalming. The carotid or femoral artery is used for making incisions for inserting the embalming fluid. Elevation of anterior abdominal wall, prominence of superficial veins, rounding of fingers, lips and toes & firmness in limb muscles are signs to stop embalming. Assessment of each part is required for confirmation of embalming. Clamping the required artery using artery forceps & suturing of the artery is done. Incision site is also sutured & closed properly. There is a risk of exposure to various kind of infections as process of embalming involves the handling and disposal of human remains contaminated with the body fluids. Cleaning and disinfecting the working area along with disinfection of the instruments is done by dipping the instruments in 2% glutaraldehyde for 30 min and washing them with soap water & finally autoclaving the instruments. So the process of embalming is associated with increased risk of exposure to infectious microorganisms. All the waste generated after embalming is potentially infectious and come under high risk waste and should be dealt with great care. It should be correctly segregated, sealed, stored and disposed of appropriately. The universal safety kit involving surgical gloves (double pair), plastic apron, face mask, head cap, goggles and shoe cover up till knee are guided to wear as every dead body has to be considered as potential health hazard till it is properly embalmed. [5, 6,7]

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Ebola virus: Ebola virus is a single stranded RNA virus and belongs to “filoviridae” family. It causes Ebola virus disease or viral hemorrhagic fever a rare but fatal disease in humans. Transmission of this virus in health care settings can occurred through contaminated instruments used during postmortem care and through splashes of blood or other body fluids including urine, feces and saliva while handling infected bodies. So dead body **should not** be sprayed, washed or embalmed in such cases.[8,9,10]

HIV (Human Immunodeficiency Virus): The communicability of HIV virus infection rapidly declines after death but this should not form a reason for embalming the body. The embalming should be avoided in such bodies unless it is essential and body is to be transported for funeral service to his or her native place. A separate room is needed for embalming an AIDS body. Maximum of three persons should be allowed in embalming room. Persons performing embalming should not have external injury. The universal safety kit should be used. All the openings should be closed and eye corners should be dealt with great care. After embalming all the instruments should be treated with great care.[5]

Coronavirus Disease (COVID-19): The corona viruses have become the major pathogens of respiratory disease throughout the world. They are categorized under single stranded RNA (+ssRNA) virus family. [10]The main mode of transmission of COVID-19 is through droplets. These viruses seem to be a serious public health risk worldwide and has become a pandemic. Standard precautions guidelines have been issued and should be followed by all health care workers while handling dead bodies of COVID-19. Embalming of dead body in such cases should not be allowed. [11]

CONCLUSION

Universal precaution should always be considered before handling of all the dead bodies as infection status of the body might not be identified before death. The universal precaution used while handling the dead bodies is the most important element in preventing the spread of infection. Therefore, changing the work culture and following the universal work precautions can bring lot of difference in reducing the transmission of infections while embalming.

CONFLICT OF INTEREST

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