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Ethical Aspect of Human Cadaveric Dissection in Teaching and Learning Method of Anatomy

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ABSTRACT
Anatomy is the branch of science which deals with study of structure of human body. Human cadaveric dissection has been used as a most preferred method of teaching and learning anatomy since many years. It gives three dimensional views of human body parts. The human cadavers are obtained by unclaimed dead bodies from the forensic mortuary of government hospitals or donated bodies which are voluntary donated during life and by family members. The use of human cadavers for teaching and learning purposes and research purposes is surrounded by ethical and religious issues. The main ethical concern of cadaveric dissection is respect of human life. So this article has been written with intention to mention ethics, rules and safety to be followed during human cadaveric dissection.

Keywords: Cadaveric dissection, teaching and learning method, ethics

INTRODUCTION

The word anatomy is derived from Greek word "Anatome" means cutting up. Dissection (Latin word "dissecare" "means cut to pieces) is the dismembering of the body to study anatomical structure. The study of anatomy begins as early as 1600 BC ago. In the 4th century BC, Aristole produced a founded system base on animal dissection. The first use of human cadavers for anatomical research occurred in 4th century BC by Herophilos and he is considered as to be the founder of anatomy. In the 16th century, the anatomist and physician Andreas Vesalius used dissection as a primary teaching tool by doing dissection himself and forcing students to perform dissection themselves. He wrote his own textbook "De humani corporis fabrica" in seven volumes which was primarily emphasized on dissection. His book contains three dimensional diagrams of several organs. He is referred as founder of modern anatomy.

Dissection of human body is an opportunity extended to only medical students of the medical institutions. Anatomical cadaveric dissection is a time honoured part of medical education. [1] For medical students, their first and last encounter is cadaver only. Human cadaveric dissection is most preferred method of teaching and learning method in anatomy for medical students despite of technological advancements. It helps medical students to understand three dimensional views of different anatomical structures their relationship with each other. [2] The process of teaching and learning anatomy with the help of human cadaveric dissection should be done with proper ethical consideration.

ROLE OF HUMAN CADAVERIC DISSECTION IN ANATOMY

Anatomy cadaveric dissection has remained an important part of medical education across all over

the world. Human cadaveric dissection is a backbone of medical knowledge for medical students. The practice of cadaveric dissection allows students to grasp the three dimensional anatomy and concept of biological variability. [3] The good medical and surgical practice could only be based on adequate anatomical knowledge of human anatomy which can only be learned from cadaveric dissection. [4] Human cadaveric dissections also plays important role in sharpening the medical student's attitudes to life and death. [5] Dissection of cadavers is essential to develop knowledge and skills at cognitive and psychomotor levels of anatomy learning. It is also important in modelling attitudes as well as humanistic and ethical values throughout the life, which will be helpful in their carrier for practice of medicine. Therefore dissection of cadaver will continue as a fundamental approach to learning anatomy. Therefore need of human cadaver is increasing day by day in medical institutions. Medical institutions have to follow "Anatomy act" which give license to dissect donated dead bodies. [6] Donor's main reason to donate bodies is to promote teaching and for medical research purpose. The use of human cadaver in medical education is well accepted while use of body donations for medical research purpose is surrounded by diversities and ethical uncertainties. Donating of one's body for dissection meets the criteria for the highest level of charity as set forth by the 12th century philosopher, and rabbinic scholar Moses Maimonides. [7]

ETHICAL ASPECT OF CADAVERIC DISSECTION

Throughout the globe, there is debate on body donation and dissection of cadavers because of variety of ethical, religious and legal issues which should be considered and integrated. However, like the use of human tissue for research purposes, the use of cadavers for teaching and training purposes also surrounded by ethical uncertainties. [8-12] The medical students feel cadaver as their first patient and first teacher in their dissection course. [13-14] The main ethical concern about cadaver is the respect for cadaver as a first patient and first teacher which later translate into respect for human beings as teachers and a lifelong respect for learning. Mutilation of body parts of cadaver should be strictly avoided which shows disrespect towards cadavers. Therefore certain rules, ethics and safety should be followed during cadaveric dissection in dissection hall. By holding formal ceremony such as "cadaveric oath" at the beginning of course promotes professionalism and medical ethics.

RULES AND REGULATIONS TO BE FOLLOWED IN THE DISSECTION HALL:

Human cadaveric dissection is a privilege extended to only the medical students of medical institution. Working with human material requires respect and sensitivity. [15] As well as medical students should be aware of their responsibilities while handling with human material which help them to derive the maximum benefit from dissection hall.Here are some rules and regulations must be followed by medical students and teachers while handling human material in gross anatomy in gross anatomy laboratory setup.

Handling of human cadavers:

- Cadavers will be treated with respect and dignity at all times. Human cadavers were obtained by unclaimed dead bodies from the forensic mortuary of government hospitals or donated bodies. It is imperative that proper respect is paid to the cadavers at all times since donors are assured of this at the time of body donation. Persons donating their body receive no financial compensation; this is truly their ultimate gift. [16]
- A professional attitude is expected during laboratory session as well as outside the lab, while discussing the dissection hall experiences in public place.
- Human cadaver material should not be removed from laboratory under any circumstances.
- Intentional destruction or incomplete dissection is considered as unprofessional behaviour.
- Keep cadavers and work area as clean as possible.
- No photographs or videos in dissection hall without prior permission.
- Only students enrolled for the course may enter the laboratory.

Potential hazards of embalming fluid:

Embalming fluid is used to preserve bodies of deceased person for both funeral purposes and in medical research in anatomical laboratories. This

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fluid is primary source of fumes and odour. Embalming fluid is used to fix the tissues of the cadaver by cross linking proteins and kill microorganisms. Embalming fluid contains variety of preservatives, disinfectants and sanitising agents to prevent decomposition of body. Typically it contains mixture of formalin refers specifically to 37% aqueous formaldehyde (2.5%), phenol (2.5%), glycerine (10%), ethanol (20%), thymol (< 50 ml) and water (67%). This formula is subject to change according to climatic condition of different places. Despite of functions of these components of embalming fluid, we should be aware of hazards and protection against these components.

- Formalin: it is 37% of formaldehyde in water. It fixes the cadaver tissue and kills microorganisms by cross linking proteins. It is highly toxic, mutagenic and carcinogenic. Exposure to formalin causes irritation of mucous membrane, upper respiratory tract irritation, contact dermatitis, tearing of eyes, runny nose and headache.
- Phenol (Carbolic acid): it is considered highly toxic and corrosive. It is used as a mold inhibitor. It can be absorbed through the skin.
- Glycerine: It is wetting agent, miscible with water and alcohol and prevents water loss from body. It is used to keep the joints of the cadaver flexible.
- Ethyl alcohol: it is germicidal agent and fixes tissue by drying. It is extremely volatile therefore has inhalation hazards. It causes upper respiratory tract irritation and may dehydrate skin after prolonged exposure.
- Thymol: it is very strong antimicrobial and antifungal agent. It is highly corrosive and causes burns and upper respiratory tract irritation.

Laboratory rules to minimize hazards in dissection hall:

Following safety measures will protect from irritating effects of embalming fluids and from other hazards in the dissection hall.

- All students must wear NITRILE or LATEX gloves. NITRILE gloves are recommended because they are less porous and more puncture resistant than latex.
- All students must wear long sleeved white coat while working with cadavers.
- All students must wear shoes that cover their entire foot. No open toed shoes or scandals are allowed.
- The ventilation system in the dissection hall should remain on at all times so that it removes air at the level of cadavers and reduces exposure to embalming fluid chemicals and odours.
- It is not advisable to wear soft contact lenses in the dissection hall because it may absorb the chemicals used in lab and cause eye irritation.
- Discontinue work in the lab if you are pregnant because the risk of foetal malformations appears to be increased in women who experiences symptoms of organic solvent exposure.
- Remove excess fluid from the table with sponge and plastic container provided so that floor around the dissection table will remain free of fluid and tissues.
- Soiled gloves are to be rinsed in the sink before removing them from hands and then thrown into regular disposal container.
- Do not touch the bones, models and other learning materials with gloves on.
- Eating, drinking, smoking or uses of other tobacco products are prohibited in the laboratory.
- All students must wear safety glasses when operating with saws and bone splitting instruments.
- Dissection tools must not be left loose on the table or on the cadavers.
- Scalpel blades must be handled with care and disposed properly in red "SHARPS" CONTAINERS. Report any injuries to a member of the staff and a first aid box should always there in dissection hall.

Preservation of the tissues and organs:

All tissues, organs or body parts removed from cadavers must be collected and stored in designated closed or sealed container so that it does not yield any health hazard. No body parts or organs or tissues should be removed from dissection hall. All preserved specimens must be kept in a closed museum jars.

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The importance of cadaveric dissection for learning anatomy helps the students in developing spatial and tactile appreciation of structures, variation between individuals, and the effects of any disease on the body which they cannot learn from models, textbooks or 3D programs. [17] Students should therefore learn how to treat the human remains with dignity and confidentiality. [18] The fundamental component of professionalism is altruism means "selfless concern of well being of others" which is learnt from "body donor". It emphasizes the humanistic side of medicine who decided to donate his body to make a contribution to society.

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