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Review Article

MRITSAMSHODHAN PADHATTI: ANCIENT EMBALMING AND RESTORATIVE ART

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ABSTRACT

Anatomy is where students learn the basic knowledge of medicine. Dissection is among the most profound experience of medical school. The routine performance of dissection provides students with training in spatial appreciation, orientation and also skill in handling instruments. Hence, giving the cadaver an ante mortem appearance not only generate interest for dissection but also helps to identify the structures, its course, relation and variation which are encountered during dissection. This can only be possible if cadavers were embalmed properly. The main objective of this article is to provide a brief knowledge about various processes of preserving a cadaver.

Keywords: Embalming, Cadaver, Preservation, Anatomy, Dissection.

INTRODUCTION

Cadaver remains a principal teaching tool for anatomist and medical educators teaching gross anatomy. Dissection of cadavers has provided us a strong edifice so that we can express our surgical talents for independent learning, thinking, performing psychomotor skills and exchange our views in education process. One who intends to acquire definite knowledge of surgery should study the anatomy practically by dissecting the dead body properly. Whatever is practically seen and whatever is known from scripture that combined together develops the knowledge further¹. For better practical knowledge it is essential to have better subject, where as for the anatomical dissection, it is important to restore or enhance a normal ante mortem appearance of the body. For this purpose, the process of *Mritsamshodhan Padhatti* or embalming had introduced in our ancient literature.

NEED FOR PRESERVATION/EMBALMING

Embalming, the word for the old english phrase "to apply the balm", is derived from latin word with "em- encapsulated and balm", any aromatic resin produced by certain trees of the mint family. It is the science of temporarily preserving human remains to forestall decomposition and make it suitable for display. People have practiced human preservative methods and restoration art since early time for various purposes, some are following:

- **Religion & belief:** The ancient Egyptian practiced their embalming and mummification techniques to meet religious goals involving the afterlife. They believed that preservation of body empowered the soul after death.
- **Royalty:** In epic period, body of king *Dashrath* was preserved by *Maharishi Vashishta* in "*taila droni*". During dark ages or mid ages, the law had typically prohibited medical schools from acquiring corpses for anatomical study and dissection. Most of people preserved were from royal families or held another elite status such as members of clergy. The Pope, Bishop, Counters & Princess were among elite group of individuals embalmed during middle age.
- **Tribal warfare & revenge:** Embalming had done by various tribes to demonstrate triumph over enemy to prove the warrior's manhood or to exact revenge.
- **Knowledge:** For the knowledge of human anatomy.
- **Time:** Embalming had done for the people who die far away from their homes to allow transportation and delayed funeral services.

DIFFERENT EMBALMING TECHNIQUES AYURVEDA PROCESS

In Ayurveda, the process of embalming has described by *Acharya Sushruta*. He had explained that description of anatomy of human body up to skin is the subject matter of surgery². Therefore one who intends to acquire definite

knowledge of surgery should study the anatomy practically by dissecting the dead body properly³. For that purpose he had explained the following guidelines for embalming and dissection⁴:

- The body you need to preserve should not have any congenital malformation, it should be normal.
- The entire body of person not died of poisoning or chronic disease.
- It should not of hundred years.
- Fecal matter from intestines is removed.
- Should be kept in a cage placed in a flowing river.
- Should be wrapped with one of *munja valkal, kusha, sana* etc.
- Should be made to decompose in a dark area.

There after a week, when the body is fully decomposed it is taken out and slowly rubbed with brush of one of *ushira, hair, bamboo* and *balvaja* while observing all parts, external and internal.

MUMMIFICATION

Egyptians believed that for the person to live after death, the body had to be preserved in some way and the best method they knew was that of mummification. After death the bodies of poor and ordinary people were put in the hot dry sand of the desert which preserved them naturally. The bodies of pharaohs and nobles were mummified to further ensure preservation. They believed that the pharaohs became gods after death and their bodies through mummification would last for all eternity. It took 70-80 days for them to artificially turn a dead person into a mummy. The following are steps they follow to mummify someone:

1. Wash and clean the body with water from Nile River.
2. Remove internal organs because they have a lot of water.
 - Brain was taken out. They believed that the brain was not very important. It was just stuffing for the head.
 - Heart was left inside body. They believed that heart controlled thoughts, emotion and served as the place where memories were stored.
 - Four organs were taken out and embalmed separately. The liver, lungs, stomach and intestines. These were placed in a separate jar called canopic jar. These jars were placed beside mummy when it was later put in a tomb. Other organs were thrown away.
3. The body was covered in a type of salt called natron for forty days. It took that long for the body to completely dry out.
4. Mummy was then stuffed with incense (frankincense and myrrh) and covered with resin to make it waterproof.
5. Finally, mummy would be covered with amulets and wrapped in strips of linen (a cloth material made up of flax). Amulets are carved figures that are thought to have magical power. One important example was scarab beetle, which was placed over the heart to protect it.

After mummy was complete, it would be placed in a coffin - a box usually made of wood. Egyptian coffin looked like people they had faces, shoulders, feet and were decorated to look like the person did it real life. This coffin would then be placed along with other important items, in a tomb-a special burial

chamber. The whole process has to be done only for religious purpose.

EMBALMING

During dark ages, the law had typically prohibited medical schools from acquiring corpses for anatomical study and dissection. Renaissance, the historical period that emerged from the dark ages, marked a period of increasing freedom in study of anatomy and medicine. In those days, dissection had to be a speedy process, typically performed outdoors in the cold in front of a large group of anatomy students or other spectators. At the same time, anatomy students needed a preservative that would allow a more careful and lengthy examination of body without worry of decomposition. It was clear that some form of drying the body would be necessary and there had already been some experimentation exposing cadavers to heat of the sun & ovens. It was also discovered that warm air pushed through vessels would clean them out and dry the tissue surrounding them. Later on inject able solutions were discovered to make blood vessels more visible for study.

In 1300s, in Italy a colored solution that hardened in the body was developed. Warm water ink, mercury & wax were used at that time. The first instrument used for injection including a bladder, which held in solution, attached to canula made from a straw, the quill of a feather and later a glass tube. The tube like section would be inserted in a body opening & the liquid would be pressed out of the bladder into the body. Tools approximately a modern hypodermic syringe were manufactured as early as 1500s. At end of century first continuous flow syringe was developed. The first man to embalm by injecting a prepared preservative chemical solution into blood vessels is believed to be the Dutch anatomist Fredrik Ruysch but his technique is unknown. In 1867, the German chemist August Wilhelm Von Hofmann discovered formaldehyde, whose preservative properties were soon discovered & which became the foundation for modern method of embalming. In 19th & 20th centuries arsenic was used frequently as an embalming fluid. Modern embalming is believed to have begun in the U.S. during the American civil war.

Process: The modern embalming techniques are not the result of a single practitioner, but rather the accumulation of many decades, even centuries of research trial, error & inventions. The actual embalming process usually involves four parts.

1. Arterial embalming involves the injection of embalming chemicals into the blood vessels, usually via the right common carotid artery or femoral artery. The embalming solution is injecting using an embalming machine. The embalmer massages the cadaver to ensure a proper distribution of the embalming fluid. In case of poor circulation other injection points are used.
2. Cavity embalming, the suction of the internal fluids of the cadaver & the injection of embalming chemicals into body cavities, using an aspirator or trocar.
3. Hypodermic embalming, the injection of embalming chemicals under the skin as needed.
4. Surface embalming, which supplements the other methods especially for visible, injured body parts.

Embalming Chemicals:

Preservatives: These are commonly a percentage (18-35%) based mixture of formaldehyde, gluteraldehyde, phenol which are then diluted to gain final index of the arterial solution.

Water conditioner: These are designed to balance the hardness of water & help to reduce the deceased acidity.

Cell conditioner: These act to prepare cell for absorption of arterial fluid & help to break up clots in the blood stream.

Dyes: These are used to restore natural coloration & counter stain against conditions such as jaundice. e. g. erythrosine, carmine red, eosin etc.

Humectants: These are added to dehydrate & emaciated bodies to restore tissues to a more natural & hydrated appearance.

Antioedemic: These are designed to draw excessive oedemic fluid from body.

Additional disinfectant: For certain cases such as tissue gas, topical disinfectants such as dis-spray are added in solution.

Cavity fluid: This is generally a very high index formaldehyde or gluteraldehyde solution injected undiluted directly via trocar incision into body cavities to treat the viscera. In case of tissue gas phenol based products can be used.

Steps:

1. Making solution: Take 800gm phenol, 15 gm borax & 15gm sodium citrate. Add these to a mixture of 4 lt. formalin, 1.5-2 lt. glycerin and 4 lt. normal saline.
2. Solution is to be kept in jar 8-10 feet above ground to facilitate passage of fluid due to gravity during infusion.
3. Cotton pads are to be inserted into nose, ear & mouth to avoid any leakage.
4. Cadaver is to be stretched to its full extension and incision is to be made in femoral triangle.
5. Identify femoral artery.
6. A trocar is to be inserted & fluid to be infused in both directions cephalic and caudal.
7. With the help of syringe, remaining solution is injected to the highly muscular parts such as gluteal region.
8. The whole procedure may take 4-5 hours. After examining any sign of putrefication, if does not occur, cadaver is preserved in 10% solution of formalin in tank usually after 24 hours.

This method is used in our institute since 8-10 years. Long term preservation required different techniques such as using stronger preservatives, multiple injection sites to ensure through saturation of body tissues & in case of a body to be used for anatomical dissection, taking no blood drainage & doing no treatment of the internal organs.

PLASTINATION/POLYMER IMPREGNATION

Plastination is a process that replaces body water and fat with reactive plastics. It was first developed by Von Hagens in 1970. It is relatively new method of preservation where by the bodily fluids are replaced by liquid and is then hardened to create a solid, durable anatomic specimen that will last indefinitely. The standard process of plastination includes 5 steps.

Process: Water and lipid tissue are replaced by curable polymers such as silicon, epoxy and polyester co polymer.

1. **Fixation:** Body is embalmed in formaldehyde solution in order to half decomposition.
2. **Dehydration:** Specimen is placed in a bath of acetone under freezing conditions; acetone draws out all water and replaces it inside the cells.
3. **Force impregnation:** Specimen can then be placed in a bath of liquid polymer silicon rubber, polyester or epoxy resin by creating a vacuum acetone is made to boil. As acetone, vaporize and leave the cell it draws liquid plastic.
4. **Hardening:** The plastic must then be cured, either with gas, heat or UV light in order to harden it.
5. **Posing:** At last specimen is posed to its suitable position.

DISCUSSION

Embalming human remains for burial has taken a long road to its present state. During ancient periods it was done by wrapping cadaver with some drugs then kept in a cage and placed in flowing water. It was done only for study purposes. Later on dead bodies were put in the hot dry sand of the desert which preserved them naturally. Egyptian embalming was a religious practice, as preservation of the body was a necessary precursor to resurrection in the afterlife. As Christianity became more dominant in the area, the practice was suppressed. Later on in Europe embalming techniques were primarily used to preserve the dead for purposes of dissection and study. Different experimentations were done for making preservative chemicals starting from hot air up to inject able solutions. Further arsenic and mercury were used for this restorative art but later on banned due to their hazardous effects. Now these days formaldehydes were used for this purpose and corpse were preserved successfully with lesser dangerous effects.

CONCLUSION

Embalming, in most modern culture is the art of temporarily preserving human remains to forestall decomposition and make it suitable for display at a funeral. On the other hand, a science of preserving human body for anatomical study and research. Most of the medical students do have little knowledge about details of embalming. This approach will be useful as an introductory especially for the fresher in medical profession.

REFERENCES

1. Dr. Bhaskar Govind Ghanekar; Sushruta Samhita Sharirsthana 5/60. New Delhi: Meharchand Lachmandas Publications; page no.-177: Reprint 1988
2. Dr. Bhaskar Govind Ghanekar; Sushruta Samhita Sharirsthana 5/58. New Delhi: Meharchand Lachmandas Publications; page no.-177: Reprint 1988
3. Dr. Bhaskar Govind Ghanekar; Sushruta Samhita Sharirsthana 5/59. New Delhi: Meharchand Lachmandas Publications; page no.-177-178: Reprint 1988
4. Dr. Bhaskar Govind Ghanekar; Sushruta Samhita Sharirsthana 5/61. New Delhi: Meharchand

- Lachmandas Publications; page no.-178: Reprint 1988
5. Maksoud GA, A.R.El Amin, A review on material used in mummification process in ancient Egypt; Mediterranean Archaeology and Archaeometry, Vol. 11, No. 2, page no. 129-150
 6. Valerie Wohl; History of embalming and restorative arts, page no.1-16 Funeral. EliteCME.com

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