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The Elnady Technique: An Innovative method for Tissue Preservation

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Abstract

Shortage of cadavers and organs in teaching veterinary anatomy has led to the development of new techniques such as the Elnday technique to keep anatomical specimens preserved. Common tissue preservation techniques can result in offensive odours, discolorations of the tissue or dangerous chemical residues. Plastination is a valuable tool in teaching anatomy but the complexity and high cost involved in the process limits its use in developing anatomical specimen. Elnady technique is innovative, simple and inexpensive used. The specimen produced with this technique are flexible, soft and realistic. The Elnady approach works well for creating better contrast specimens for educational purposes.

Introduction

Immediately after death or removal of the tissue from the living body, the post-mortem changes by way of autolysis of cells, multiplication of micro-organisms and splitting of proteins into amino acids occurs. These immediate changes occurring in the tissue can be prevented by coagulating the tissue proteins with the help of chemical treatment. The elnady technique, developed by Dr. Fawzy Elnady in the Department of Anatomy and Embryology, Faculty of Veterinary Medicine, at Cairo University is innovative technique for tissue preservation and it is simple and inexpensive method. The specimen produced with this technique are soft, realistic, durable and flexible. Even though plastination provides high-quality teaching specimen, the complexity and the cost involved in the process limits the use of it. The plasticated tissues are rigid and lacks natural elasticity which doesn't suite for endoscopic cadaveric observations and teaching-learning process.

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Steps involved in Elnady Technique:

Step 1: Fixation with Formalin

The tissue is fixed with formalin after euthanizing the animal along with bleeding followed by cannulation and injection of 10% formalin into the common carotid artery. The amount of formalin injected depends on the size of the animal. Formalin is the preferred fixative as it penetrates faster than other fixative solutions. The cadavers are then kept in the lab at room temperature for one week for small animals and two weeks for large species, during this time the tissues become completely soaked with formalin.

Step 2: Dissection and dye injection

After complete fixation the cadaver is dissected for the tissue or organ of interest for the purpose of practical class within anatomy, embryology or surgery, museum display or research studies. For proper penetration of acetone and glycerin proper dissection of the tissues is required especially larger specimen and muscle tissue can be dissected to smaller sizes. Small holes can be drilled in the marrow cavity of long bones enhance defatting and to prevent greasy specimens.

Staining of the specimens with dye of interest can be done to produce realistic appearance of the tissue and mask the darkening of the tissue due to formaldehyde.

Step 3: Dehydration with Acetone

The entire process of dehydration of the tissue is carried out at the room temperature. After the formalin fixed tissue samples can be thoroughly washed under running tap water to remove the formalin fixative and immersed in pure (100%) acetone bath for one week. Two or three subsequently pure (100%) acetone baths are required for complete dehydration. Hydrometer can be used to measure the concentration of acetone.

Step 4: Glycerin Impregnation

The dehydrated specimen can be gently hand pressed and left to drain of acetone through a sieve or on a flat smooth stainless-steel mesh plate for half an hour. Then tissue samples are then immersed in glycerin water bath for one or two weeks depending on the size and type of the tissue.

Step 5: Cornstarch Curing

The glycerinated tissue samples are drained for half an hour and thoroughly wiped with a tissue paper. The samples are then placed in a cloth bag that are 2-3 times the size of the samples and cornstarch is rubbed outside the bag. The bag is tightly ligated and can be placed in plastic buckets containing cornstarch for one to three weeks until glycerin exudation from the sample is no longer observed. The clumsy cornstarch can be replaced intermittently. If glycerin exudation is observed then second curing can be performed. Once the curing step is completed the cornstarch cleaned from the tissue with help of air brushes or air compressors if necessary. Then, vessels or other features like the pericardium or muscles can be painted using acrylic or fabric dyes. The final specimen is kept either in a plastic bag or sealed container that is kept in a clean environment.

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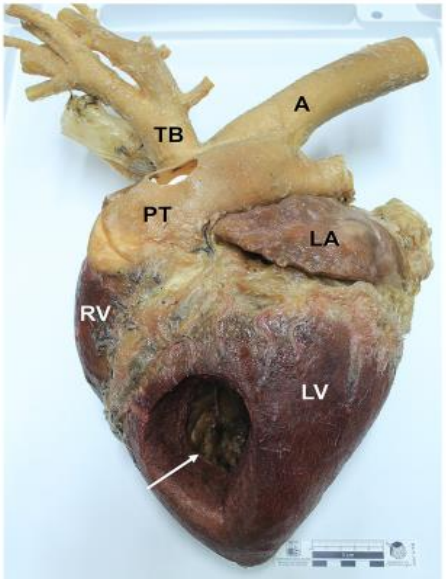
Conclusion

The elnady technique developed by Dr. Fawzy Elnady is a simple, innovative and inexpensive method for tissue preservation for educational, display in museum or research purpose. The limitations of plastination are overcome by the elnady technique. The cadavers or the tissue samples are fixed with formalin as fixative. After complete fixation of the tissue the sample is dissected and can be dyed for proper visualization of the blood vessels and internal structures. The formalin fixed specimen is washed under running tap water and dehydrated with pure (100%) acetone for two-three weeks. After draining the specimen from acetone, it is immersed in glycerin for one to two weeks depending on the size and type of specimen. Then the specimen is subjected for cornstarch curing one to three weeks until glycerin exudation from the specimen is stopped.



Photograph of the left side of an equine heart preserved and stained by the modified Elnady technique. A window opening in the left ventricle (white arrow). A: Aorta; LA: Left auricle; TB: Brachiocephalic trunk; PT: Pulmonary trunk; LV: Left ventricle; RV: Right ventricle.

Photograph of two specimens of Chilean frog (Caudiverbera gayi), ventral view, preserved by the modified Elnady technique. Notice that the musculature and organs are pale and unnatural.

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