

HUMAN SPECIMEN PLASTINATION BY USING SYNTHETIC PLASTIC POLYMER

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ABSTRACT

Plastination is a preservation technique which keeps human specimen in natural, dry, hard and odour less state. This is introduced by Dr. Gunther Van Hagen. Recently, anatomists are doing research in plastination to give durable and better human specimen for demonstration tool, museum specimen without formalin irritation. In the department of anatomy, plastic polymer and chloroform is used in plastination. The formalin fixed specimens are dehydrated in acetone. Then transferred to polythene polymer mixer for impregnation and harden in natural drying process. At the end dry, hard and odour less specimens are obtained. In our experience plastination shows the plastinates are natural, dry, hard and odour less state can be an excellent medical educational tool.

KEY WORDS: Human specimen, Plastination, Plastic polymer

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Plastination is a technique of preservation of anatomical specimen by impregnation with curable silicon, epoxy or polyester resin, which keeps the anatomical specimen in dry, natural and odourless state. This study aims to facilitate the procedure in a simple way and reduce the cost of plastination by using plastic polymer. The plastination technique introduced by Dr. Gunther Von Hagens in 1978 is a cornerstone procedure for avoiding hazardous agents used in conventional specimen preparation. In the process of silicon impregnation, a specimen is kept under vacuum in cold temperature for a long period. Anatomists use silicones (S3 & S10) during impregnation usually. Zu-Yi Chinese silicon polymer was used for impregnation at room temperature (Zhen Tianzhong et al. 1998). Shin-Etsu silicon 108 and imidazole is transparent, colourless polymer used in impregnation (Y. Sakamoto et al. 2006). Biodour™ S10 silicon technique was applied to reduce specimen shrinkage (K. Dejong et al. 2007). Biodour S3 and S6 (gas cure) is used to harden in slow and fast methodology (Andreas et al. 1993). In the study, Synthetic plastic polymer i.e. polythene polymer (plastic teacups, water bottle, acrylic sheet) is manufactured by polymerizing styrene using peroxide catalyst. The synthetic plastics are hard, transparent and non-biodegradable. Chloroform is a highly evaporating and hardening agent. It breaks down the linkage of plastic polymer. Chloroform can be mixed with the synthetic plastic polymer to make a solution. It can be used as a silicon polymer mixture during impregnation. A new technique applied in the plastination. As the plastinates are products of the plastination which can be handled easily, durable and devoid of noxious effects of formalin. They are portable and excellent tools in demonstration, dissection and lecture class. They can be used to display as a museum specimen. Plastinates are easy to handle and require minimal aftercare. They can be stored in a cupboard, which reduces the cost as well as the irritation and potentially harmful chemical such as formalin.

Specimen collection

Specimens were selected and dissected. Capsule of soft organs (kidney and spleen) was removed. Muscles and fascia were removed from the pelvis bone. Fascia around vessels was removed at the hilum.

Fixation

Selected and dissected specimens were fixed by immersing in 10%-20% formalin at room temperature for 3-5 days. The fixative reagent was kept 5 times the volume of specimen in the glass jar. After fixation, the specimens were washed under running tap water for a day.

Dehydration

The specimens were dehydrated in series of 70%, 80%, 90% and absolute acetone for one day each. Absolute acetone continued 3 days more for completion of dehydration and degreasing.

Plastic polymer mixer preparation

Labels and leads were removed from the bottle. The along with other tea cups, acrylic sheet were washed under tap water and dried. They were made into pieces. 10 gm pieces of plastic polymer for 1 litre chloroform were mixed to make the solution. Polythene polymer mixer was prepared by 1:10 ratio of polythene polymer (plastic tea cups, bottle and pieces of acrylic sheet) and chloroform.

Impregnation

The specimen was transferred to a solution air-tight jar for impregnation for a week. Impregnation was completed by noting cessation or reduction of bubble formation from specimen.

Natural drying process

Excess impregnated solution was whipped on the surface of specimens and specimens were wrapped with foil for a day. It was again unwrapped to harden the specimen by natural air drying. Specimens were polished with varnish (clear) to make it shiny. Now, specimens are ready to use and keep in museum.

The external features of the plastinates are natural like pre-plastinated specimen. Dry, hard and odourless specimens are obtained.

Figure : 1. a



Figure : 1. b



Figure : 1. c



Figure : 1. d



Figure: 1. e



Figure 1: Plastinates of :

- a. Heart
- b. Kidney
- c. Spleen
- d. Coronal section of cerebrum
- e. Pelvis

DISCUSSION

Preservation of anatomical specimen retain much of natural features, long lasting is ultimate goal of anatomist, pathologist and other medical educators. This study tried some extent of this goal in the Department of Anatomy, UCMS.

Specimen were first selected, dissected, and then fixed under 10% formalin. Then these were dehydrated in acetone in ascending manner in a closed jar so that the acetone did not evaporate. The specimens were transferred to polythene polymer mixer. The mixer was mixed with the chloroform which helps to harden the tissue during the impregnation.

Non biodegradable synthetic plastics are hazardous to environment which can cause harmful effect to human health. This is remarkably task done via plastination in the field of medical sciences can use synthetic plastic polymer. Plastic are durable and free of micro-organisms for specimen tissue. Solution prepared in the study can penetrate deep to the tissue. Chloroform is hardening agent can evaporate easily. The plastinates are outcome of this study. These are natural, portable, nontoxic and durable. Easy handle and examination of plastinates without any nontoxic effect makes plastinate an excellent teaching tool for anatomy, pathology and other medical educators.

Plastination is available method which is very simple to do. The plastinates are natural, dry, hard and odourless. The 10%-20% shrinkage is observed in specimen after the plastination.

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