

Jelly Wax an Alternative to Resin for Sheet Plastination

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Abstract: *Plastination can be used for anatomy, art, biology, clinical medicine, surgery and many fields. Semi-transparent 3-5 mm brain sections can display distinct grey and white matter by using jelly wax. It can be an excellent aid to compare X-rays, CT, MRI and Ultrasonography. The jelly wax sheet plastination can also be used for sections of any organ or part of the body other than brain. Jelly wax is a type of paraffin wax which is cheap and easily available in the local market. Since it need not be imported which would be more costly, it is most suitable for developing countries and can overcome the use of resin imported from the western world. The sheet plastinated sections can be preserved for many years without the change of color.*

Keywords: *Jelly wax, Sheet plastination, Organ section, Resin.*

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I. Introduction

The magnetic resonance imaging (MRI), computed tomography (CT) and ultrasonography, requires an in-depth knowledge of cross-sectional anatomy. It is very essential for a medical practitioner to interpret these images into combined modern cross-sectional imaging techniques with corresponding slices of humans and animal tissues [1]. Pashaei in 2010 [2] mentioned that sheet plastination is a type of plastination which is considered to be a vital tool in the enhancement and clarification of concepts of cross-sectional anatomy and relationships previously often difficult to appreciate. Different types of resins like E12, biodur prem 10 and P-40 are used for sheet plastination which is costly and difficult to import [3, 4, 5]. Hence the present work has been undertaken which discusses the cost effective and easy method of sheet plastination to prepare sections of the human brain.

II. Materials and Methods

The materials required for sheet plastination are: Frozen formalin fixed whole brain, sharp knife, jelly wax, acrylic mould, acetone.

The basic steps of plastination are: specimen preparation, dehydration, moulding

II.1. Specimen preparation

For the production of jelly wax slices, the basic steps are same as described by other authors using P40 and E12 epoxy technique. The whole brain specimens were cleaned by removing connective tissue and blood vessels and frozen for a day.

II.2. Specimen dehydration

Brain slices of 4 to 5 mm thick sections were cut by the knife from formalin fixed frozen brain. Instead of brain any other organ section can also be used for sheet plastination. Later the slices were washed in running water for 10 minutes to remove the formalin and ~~later~~ soaked in a blotting paper. Then the slices were dehydrated in 3 changes of acetone at room temperature for 15 days each. Complete dehydration can be checked by using acetonometer or alcohol meter.

II.3. Moulding

After dehydration, the brain slice was sheet plastinated. An acrylic mould suitable for the brain slice was taken and the molten jelly wax was poured into it filling 1/3rd of the mould. The slice was placed over it and the molten wax was poured until the mould was full. The air bubbles encountered were removed with a hot pithing needle, and covered by the acrylic lid. Thus the sheet plastination prepared showed transparent brain sections with the details of grey and white matter.

III. Results

The prepared jelly wax sheet plastination of brain slices were transparent and could be used as a visual aid with the radiographs, CT Scan, MRI images, display in museum and for teaching purpose. The white and gray matter was clearly differentiated in brain (Fig. 1) and the cortex and medulla in kidney (Fig. 2).



Figure 1: The sheet plastination of human brain section showing central white and peripheral grey matter



Figure 2: The sheet plastination of goat kidney section showing pyramidal shaped medulla and peripheral cortex.

IV. Discussion

Cook in 1997 [4] used E12 resin for the sheet plastination and described that as a concerted move toward closer integration of the clinical and preclinical aspects of the undergraduate medical curriculum at the University of Auckland, the Department of Anatomy with Radiology has implemented a number of clinical procedures, pathological observations and diagnostic methods into the course resulting in a structured program of clinically based teaching of gross anatomy to second and third year medical students. Magiros et al. in 1970 [3] used biodur prem 10 resin and University of Murcia in 2014 [5] used P-40 resin for sheet plastination. But no one had ever thought that jelly wax could also be used for the sheet plastination. Jelly wax is a type of paraffin wax and transparent with melting point 55-60°C.

In some studies it is shown that the impregnated slice is surrounded by polyester resin or mixer of P40/A4 while curing. The slice show clear delineation of white and grey matter and durable for comparison with images of modern modalities [6, 7, 8, 9, 10, 11, 12]. However in the present study no such wax was surrounded.

The differences between grey and white matter was distinct in brain and cortex and medulla in kidney. The specimen can be preserved for many years.

V. Conclusion

Jelly wax sheet plastination serves as excellent aid for teaching sectional anatomy. It has following advantages and disadvantages:

V.1. Advantages

- The jelly wax is cheap and easily available in the market
- Process is very simple with less equipments
- It needs no import as for the resin is concerned
- Its refractive index is similar to that of Glass

V.2. Disadvantages

- Air bubbles may form but can be removed with pithing needle

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