

Applications of Museum Techniques of Preserving Wet Neuroanatomical Specimens for Teaching Medical Students

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Abstract

Introduction: Anatomy museum specimens are used as a visual undergraduate and postgraduate teaching aids, which are gradually replacing cadaveric teaching. Among this, neuroanatomy specimens are delicate and utmost care is required to handle them and are also difficult to obtain. This necessitates the requirement of robust neuroanatomy specimen preparation and preservation for teaching medical students. *Material and Methods:* The neuroanatomy specimens were collected after careful dissection from the cadavers using standard dissection methods. After thorough washing, the specimens were placed in 10% formalin solution for fixation. After fixation the specimens were mounted, placed in the acrylic boxes and displayed for teaching and learning in the anatomy museum. *Results and Conclusion:* The specimens resulted in better understanding of anatomical details and relations of structures. Neatly dissected, carefully preserved specimens of various sections of the brain are useful for teaching and research purposes.

Keywords: Museum Techniques; Neurospecimens.

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Introduction

The role of anatomy museum in the understanding of the subject is very important [1]. Anatomy museums are great venues for self-learning, apart from demonstrating various anomalies, encountered during dissections. This calls for a well maintained, neatly dissected and preserved specimens in anatomy museum with proper descriptions and necessary cataloging and documentations.

Anatomy museums are thus truly the places where “dead teach the living”. Sadly enough, the

anatomy museum often do not get the due attention they deserve. Conscious and continuous efforts for properly and systemically arranging, cataloging with relevant descriptions, constant & continuous efforts in maintaining, updating the specimens are the call of the time. The departments should make all-out efforts to improve the museums and the same should not be ignored.

The medical students find neuroanatomy difficult who face learning difficulties in understanding the complex anatomical details. The neuroanatomy specimens are delicate, utmost care is required to handle them and difficult to obtain. This necessitates the requirement of robust neuroanatomy specimen preparation and preservation for teaching medical students [2].

The study of the neuroanatomy specimens in the museum is a useful and important tool for learning. The preparation of the neuroanatomy specimens is a daunting task which starts with the collection of the specimen from the cadavers in the dissection hall. Thereafter the specimens are washed thoroughly in

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the running water and finally fixed in 10% formalin and delicately positioned in appropriate size acrylic boxes for preservation.

Methods

The preparation of the neuroanatomy specimens involves:

- Dissection
- Preparation
- Preservation
- Mounting
- Labeling

The specimens were collected after careful dissection from the cadavers received by the department of anatomy as part of the body donation programme. After thorough washing in running water to remove the blood clots and debris, these specimens were placed in 10% formalin solution for seven days. This ensured proper fixation of the specimens. After fixation, the specimens were mounted, placed in the acrylic boxes and displayed for teaching and learning in the anatomy museum. The fixing and mounting of the specimens was carried put as per the methods described in John D Bancroft's Theory and Practice of Histological Techniques [4] as follows:-

Specimen fixation

- Formalin (40% formaldehyde) - 1 litre
- Potassium acetate - 85 gms
- Potassium nitrate - 45 gms

Restoration of the specimen

- 95% alcohol and keep it for 30 minutes - 12 hours to restored colour

Mounting of the specimen

- Glycerine - one part
- Formalin - one part
- Tap water - 18 parts
- Thymol crystals - pinch

If the water is turbid, then filtration is required. Sealing of the boxes was done to prevent evaporation.

Sealing compound

- DPX (Distyrene Plasticiser Xylene) or cello-tape

The labelling of the specimens was done by sticking the relevant structural information with glue and secured with adhesive tape.

Outcome & Discussion

Neatly dissected, carefully preserved specimens of various sections of the brain are shown in Fig. 1, 2 & 3.

With the compression of first MBBS from eighteen months to twelve months for the first MBBS students by the Medical Council of India (MCI), there has been a pressure on the faculty to complete the course in a stipulated time period. This poses a great challenge for the faculty as well as the students. The students find it difficult to grasp the basic anatomical concepts more so in a



Fig. 1: Coronal section of brain at the level of body of corpus callosum



Fig. 2: Horizontal section of Brain through right cerebral hemisphere at level of interventricular foramen

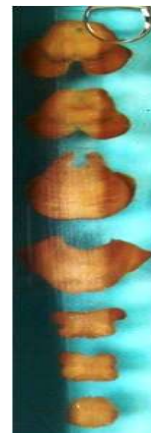


Fig. 3: Brain Stem sections from Midbrain to Medulla

complex and difficult topic such as neuroanatomy. Moreover, the neuroanatomy diagrams and atlases are of limited help. The neuroanatomical structural details can be better understood with the help of three dimensional specimens. This is further aided by the use of legends to the specimens mentioning the structural details of the specimen. Effective improvements in the students' study methods have been demonstrated by using neuroanatomy specimens prepared by new anatomical techniques for undergraduate students [3]. Though the conventional fixation of the brain is accomplished in two weeks, a perfusion technique via the middle cerebral arteries achieves the desired fixation in 5-6 days [5]. Newer teaching tools in neuroanatomy include three dimensional scans, photographs and illustrative videos [6,7,8]. The practical utility of these newer techniques in teaching and understanding of the holistic and integrated neuroanatomical structural details has been proved beyond doubt.

To accomplish the ultimate aim of helping students to understand anatomy, museum visits have been included in the curriculum and is an important part of undergraduate training in our institution. Demonstration of the neuroanatomy sections and specimens is a regular feature in the dissection Hall briefings and tutorials. Although neuroanatomical specimens are important teaching tool but an integrated approach involving study of three dimensional reconstructions, photographs, radiographs artistic sketches and illustrative videos will help in better understanding of concepts. Moreover, the photographs, radiographs and the videos are archived in the kiosk based computer software kept in the Anatomy museum for correlation and easy comprehension. The Kiosk comes handy in quickly revising the neuroanatomy curriculum especially during preparatory leave before university examinations.

In the present scenario, the medical student community comprises of heterogeneous groups and their learning objectives are quite diverse [9]. The role of anatomy teachers is that of a smooth facilitator rather than a strict teacher. Neuroscience is a complex scientific field which comprises of neuroanatomy, neurophysiology, neurohistology, neuropharmacology, psychology, neurochemistry, and neuroradiology. With the increasing population more and more clinicians encounter neurological conditions in the day to day practice. The holistic knowledge of neuroscience is an inescapable requirement for better management

of these patients and the first-hand knowledge of neuroanatomy forms the solid foundation for further advancement of learning. Neuroanatomy specimens in transparent acrylic or Perspex boxes provide a three dimensional arrangement, are easier to handle and can be preserved for longer periods.

Medicine is ever changing dynamic field but the basic anatomy remains the same. The application of the museum specimens for the medical and nursing students is of great help for understanding the complex structural details of neuroanatomy. Although newer modalities of teaching like three dimensional scans and illustrative videos have been proved helpful, the importance of neuroanatomy specimens still remains unmatched.

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