

MORPHOLOGICAL STUDY OF TRACHEOBRONCHIAL TREE OF OVIS ARIES USING LUMINAL SILICONE CAST PLASTINATION

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ABSTRACT

Background: Plastination is a technique to preserve the dissected specimens. In luminal cast plastination technique, internal structures of specimens having lumen such as tracheobronchial tree, blood vessels and bony labyrinth are studied by filling with silicone or resin.

Objective: To observe the branching pattern of tracheobronchial tree of ovaries using luminal silicone cast plastination technique.

Materials and Method: Fresh five specimens of ovaries trachea and lung were collected from slaughter house. Silicone sealant was injected into the lumen of tracheobronchial tree by using a gun. The cast thus obtained was cleaned, dried, mounted and observed for the branching pattern.

Results: Out of 5 specimens, one specimen showed the presence of an additional bronchus on right side. In other specimens, trachea bifurcates into two primary or principal bronchi and then to secondary and tertiary bronchi.

Conclusion: Plastinated specimens are easy to handle compared with formalin preserved specimens. The cast obtained by this technique can be used for teaching purpose as well as can be exhibited in the museum which reveals the fine intricate structure of the organ.

KEYWORDS: Trachea, bronchus, silicone, plastination, preservation.

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Access this Article online	Journal Information
Quick Response code 	International Journal of Anatomy and Research ISSN (E) 2321-4287 ISSN (P) 2321-8967 https://www.ijmhr.org/ijar.htm DOI-Prefix: https://dx.doi.org/10.16965/ijar 
	Article Information
	Received: 18 Mar 2020 Peer Review: 18 Mar 2020 Revised: None
	Accepted: 13 Apr 2020 Published (O): 05 May 2020 Published (P): 05 May 2020
DOI: 10.16965/ijar.2020.147	

INTRODUCTION

Formalin is the main chemical used to preserve the organs and cadaver in medical field. Preserved specimens can be used for exhibition in museums as well as for educational purpose. The main drawback of using formalin is its smell, spillage during transport of specimens and toxicity [1].

It has become a major health concern among the users. To overcome all these, plastination, a recent technique to preserve the cadaver and organs is being used. Specimens preserved by this technique are dry, odourless and non toxic which also retains its original contour. This technique was first developed by Gunther Von Hagens and it has three types – whole organ

plastination, sheet plastination and luminal cast plastination. In whole organ plastination, whole organ or body can be preserved for understanding its structure. Sheet plastination mainly involves the preparation of thin body sections that can be better compared with CT and MRI sections. Whereas in luminal cast plastination technique, internal structures of specimens having lumen such as tracheobronchial tree, blood vessels and bony labyrinth are studied by filling with silicone or resin [2]. By applying the knowledge of luminal cast plastination using silicone, the cast of tracheobronchial tree of ovisaries was prepared and observed for branching pattern. Aim of the present study was to study the morphology of tracheobronchial tree of ovisaries using luminal cast plastination technique.

MATERIALS AND METHODS

Present study was carried out in the Department of Anatomy, Adichunchanagiri institute of medical sciences. Fresh five specimens of ovisaries trachea and lung were collected from slaughter house. Silicone sealant (Moldsil – 15) was injected into the lumen of tracheobronchial tree by using a gun. Specimen was kept for drying till the silicone gets solidified. Then the lung tissue was removed by boiling and with the help of forceps through piecemeal dissection. The cast of tracheobronchial tree thus obtained was cleaned, dried, mounted and observed for the branching pattern.

Fig. 1: Luminal silicone cast of ovisariestracheobronchial tree.



RESULTS

The luminal cast plastinated specimen of ovisaries lung shows the division of trachea into primary bronchi, lobar bronchi and segmental bronchi up to the level of alveoli. Out of 5 specimens, one specimen showed the presence of an additional bronchus on right side. In other specimens, trachea bifurcated into two primary or principal bronchi and then to secondary and tertiary bronchi.

DISCUSSION

Due to the unavailability of cadavers, anatomical study requires preservation for considerable amount of time [2]. For this purpose, Plastination is the best method used now a day's very frequently to restore the natural contour of specimens [3]. This technique is simple and cost effective. Plastinated specimens are easy to handle compared with formalin preserved specimens. Luminal cast plastination technique is commonly used to study the luminal structures of the organs like lung, kidney, blood vessels, and etc. Using xylene with silicone in the last steps of preparation yields light weight specimens which are easy to transport across the places [4].

According to literature, in humans there are two primary bronchi one for each lung which then divides into three secondary bronchi one for each lobe on right side and two secondary bronchi on left side. Each secondary will divide into approximately ten tertiary bronchi to supply the bronchopulmonary segments [5].

In a study done by kamath VG, et al, the cast of ovisaries tracheobronchial tree almost resembled the branching pattern of human tracheobronchial tree except there was an additional bronchus on the right side arising directly from trachea [5]. In our study also out of 5 casts prepared one specimen showed an additional bronchus on the right side. Similarly, the cast of adult horse lung specimen prepared by Menaka R, et al shows the presence of cranial, middle and accessory bronchus on the right side, cranial and caudal bronchus on the left side till its termination [6].

Cope LA studied the tracheobronchial pattern by injecting the ERTV silicone to trachea. The

cast obtained was exactly similar to human anatomy of tracheobronchial tree and can be used for educational purposes [7]. Few authors have also prepared resin cast of fourth ventricle by plastination method and tried to analyse the morphometry of ventricle by using Vernier calliper [8]. An attempt has also been made to assess the width of third ventricle by luminal cast plastination technique [9].

Multiple modes of teaching such as lecture, ppt presentation, video demonstration and showing models are necessary to create as well as to sustain the interest of students in understanding the complex organization of the human body. Such complex and intricate structures of anatomical organs are better illustrated with the use of plastinated specimens [3].

From so many years resin was the commonly used material in the preparation of luminal cast of different organs. Now a day's Silicone is the potential alternative used in place of epoxy resin while preparing the cast by the luminal plastination method [10]. Visualization of corrosion cast specimens enhance active learning in students by appreciating its normal anatomical structure [11].

CONCLUSION

Plastinated specimens are easy to handle compared with formalin preserved specimens. The cast obtained by this technique serves as an excellent tool for teaching students and can also be exhibited in the museum. It reveals the fine intricate structure of the organ. This method of preservation is an alternative to the use of formalin as a preservative which has got many toxic effects on human health. The bronchial tree luminal cast specimens help in understanding the morphology of bronchus and variation in its branching pattern.

Conflicts of Interests: None

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How to cite this article:

Tejaswi Hiremarali Lokanathan, Asharani S K , Ajay Ningaiah. MORPHOLOGICAL STUDY OF TRACHEOBRANCHIAL TREE OF OVIS ARIES USING LUMINAL SILICONE CAST PLASTINATION. *Int J Anat Res* 2020;8(2.2):7510-7512. DOI: 10.16965/ijar.2020.147