

Preparation of Low Cost Silicon Cast of Tracheo-Bronchial Tree of Barbari Goat

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(Received 28 August 2022, Accepted 12 October, 2022)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The silicon cast of tracheo-bronchial tree is extremely imperative to understand the distribution of bronchial tree pattern. It may be an ideal model for comparative anatomical study of various species by silicon cast technique. Many different silicone and various methods have been implied earlier with a syringe and a gun but there was a problem with cost and some methods are very difficult that requires much care and expertise. These methods have been implemented not only for lungs but also for cerebral ventricles, bony labyrinth, vascular pattern of liver, kidney, spleen, coronary vessels etc. In present study Barbari goat lung was collected from postmortem cases in the department of Veterinary Pathology, ANDUAT, Kumarganj, Ayodhya. The fresh samples were utilized and silicone sealant was injected in trachea. The trachea was then gradually milked downwards as the silicone was forced into the lungs until the surface of the lungs appeared uneven. The apical bronchus and its segmental bronchi were observed in the caprine lung. This technique is easy, safe, economic and long lasting and can be used for teaching or for museum purposes.

Keywords: Tracheo-bronchial tree, silicon sealant and acid maceration.

INTRODUCTION

The utilisation of specimens is crucial for imparting greater knowledge and engaging instruction, particularly in areas like anatomy. The tracheo-bronchial tree specimen is a silicon-resin manufactured specimen in which silicon is placed inside the lungs and forced to expand through the terminal network of bronchioles before being allowed for natural or acidic maceration which in turn create a three-dimensional framework that will aid in comprehending bronchial branching and alveolar creation. A corrosion cast of the bronchial tree can be created using a variety of low cost materials including Dr. Fixit silicon sealant, GP resin, Epoxy resin and GP silicon sealant (Tompsett, 1970; Menaka *et al.*, 2008; Prasad, 2009). Manual massage and strong silicon injection should be performed since the bronchial tree's lumen is noticeably reduced toward its terminal end, preventing the sealant from reaching the alveoli and providing a superior cast. This technique

will be very noteworthy to the students of veterinary colleges because this technique becomes more fruitful in learning the lower metabolic pathway and in the virtual learning of veterinary and medical anatomy.

MATERIALS AND METHODS

For preparing the corrosion cast the lung of goat was procured from postmortem cases in the department of Veterinary Pathology, ANDUAT, Kumarganj, Ayodhya which was then cleaned and kept on plain surface. The lung of Barbari goat was then sealed using the silicon sealant (AIPL U.S.A. "G P 100") (Fig. 1) with the help of gun (Fig. 2) is injected into the lungs through the lumen of trachea. Hartmann and Groenewald (2014) have used 'Mold Max' 30 RTV silicone, durometer shore 30A hardness, viscosity 25000 cps, mixed with chloroform to reduce the viscosity by 50%. These chemicals have to be imported and are not always easily available in India. Thus they may not be cost-

effective. Henry (2008) used RTV silicone with its catalyst to fill the airways and then allowed to stand for 24 hours. Later it was boiled for 24 to 48 hours to remove soft tissue. Any remaining tissue was further treated with 10-20% H₂O₂. RTV silicone is available in India but the catalyst is not available and has to be imported. Narayanan (2015) used LAPOXTM epoxy resin with hardener to prepare the bronchial cast. For sealant to reach the terminal portion of bronchial tree the gentle massage was done on the surface once it is filled completely it is hanged for fixation of silicon for at least 12 hours. After that the lung was kept in 50% HCl Solution for acid maceration, which was then removed from that beaker and washed in running tap water for clearing all the tissue debris.

RESULTS AND DISCUSSION

After the acid maceration the clearcut branching of bronchi was seen along with the tracheal bronchi. Bronchi got divided into left and right lung. The branching pattern of bronchi of Barbari goat showed that the lung bifurcated into left and right primary bronchus at the bottom of heart then further it got divided into secondary and tertiary bronchi (Fig. 3 and 4) and these findings were similar to the findings of Konig and Liebich (2006); Dyce *et al.* (2010) in bovines and Ramkrishna and Leelavathy (2017) in sheep. In Barbari goat the right side was having additional tracheal bronchi and not found on the left side. Sivagnanam *et al.* (2014); Ramkrishna and Leelavathy (2017) in sheep lung, Trivedi *et al.* (2016) in goat and Tamiselvan *et al.* (2017) in calf lung found the same results.



Fig. 1. A.I.P.L U.S.A. G. P. 100 silicon sealant.



Fig. 2. Gun with silicon sealant.

The presence of apical bronchus at the right side (Fig. 3 and 4) which ventilates the apical lobe of right lung was the most important feature of the lung of ruminants which is better understood with the help of this specimen. The bronchial tree pattern and extra pulmonary vascularization cast has been prepared in pigs (Michael *et al.*, 2005).

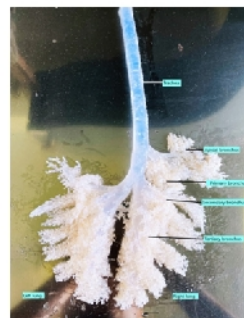


Fig. 3. Silicon cast of tracheo-bronchial tree of Barbari goat (Ventral view).



Fig. 4. Silicon cast of tracheo-bronchial tree of Barbari goat (Dorsal view).

CONCLUSION

Corrosion casts of the airway of the lungs of mammals make excellent teaching tools and museum items. It looked great and was quite strong. The trachea and deflated lung of a Barbari goat were collected intact. Silicone resin that was sold commercially had a natural self-curing property. As a result, silicone resin was injected into the lung via the trachea. The resin deposited in the trachea must be manually pressed into the bronchi and its branches from the surface of the lungs since the resin's viscosity was thick and it cured quickly. It was known when the entire airway was filled with silicone resin when the normal colour of the surface of the lungs changed to the colour of the resin then the entire airway was filled with silicone resin. Then the specimen was hanged undisturbed for one night. Acid maceration may be done to obtain the cast quickly and the resulting cast may well be washed in water.

FUTURE SCOPE

Since the corrosion cast technique is very cost effective and excellent teaching tool, will be very beneficial for veterinary students to understand the bronchial tree pattern. Exploration on this technique may open the

gates of new innovations regarding bronchial tree pattern in a very low cost.

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How to cite this article: Nimgaonkar Mayur Sudhirrao, K.N. Singh, Mukesh Kumar, R.K. Joshi, Pankaj Kumar Choudhary, Sonu Jaiswal and Amit Singh Vishen (2022). Preparation of Low Cost Silicon Cast of Tracheo-Bronchial Tree of Barbari Goat. *Biological Forum – An International Journal*, 14(4): 453-455.