Tracheo bronchial Corrosion Cast in a Calf Lung

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Introduction

A corrosion cast is a resin made cast of the lumen of the passages in real organs. Gross Anatomy of the lung can be studied easily with the wet specimen or a dry plastinated lung but the pulmonary airway patterns cannot be studied by handling a gross lung specimen. A corrosion cast of the pulmonary airway can give complete detail of its branching patterns in various animals (Tompsett, 1954). Corrosion casts are prepared using varieties of resin solutions. When it is made with epoxy resin the cast is so hard, firm and brittle. Hence we choose silicone resin for preparation of such casts. Present study is done using air curable silicone resin filled in the lung of a calf.

Materials and methods

Deflated lung along with intact trachea of a calf was collected from the slaughter house. Commercially available air curable silicone resins are purchased from the hardware shops. Asian paint stainers of different colours are also procured from hardware shops.

The coloured silicone resin solutions are prepared by mixing the resin in chloroform in ratio of 7:3. So that viscosity of resin is reduced and 4 or 5 drops of stainer is added to the solution. Now the resin solution is coloured and ready to be injected into the lung through the trachea.

Holding the trachea upright, the right and left lung are suspended. The coloured resin mixture is poured through the trachea. After complete filling the specimen was hanged in air, leaving for natural maceration to remove the biological tissue surrounding the resin cast. After 5 days we find only the cast left with some remnants of the tissue which shall be washed with soap water and removed by cleaning the cast. Acid maceration may be done to obtain the cast quickly and the resulting cast may well be washed in water (Nelson, 1987).

Fig. Silicone rubber cast of a calf lung

Results and discussion

Demonstration of bronchial tree with its different stages of branching was never that easy without a corrosion cast preparation. With the help of such casts, the caliber of the lumen of trachea, primary bronchi, secondary bronchi and tertiary bronchi are easily demonstrated to the students (Huber and Edmund, 1967). The branching pattern differs in different animals which can be understood only with the help of such corrosion casts.

Corrosion casts are prepared using varieties of resin solutions. When it is made with epoxy resin the cast is so hard, firm and brittle (Tompsett, 1954). Hence we choose silicone resin for preparation of such casts. Silicone resin casts are more continous, flexible and hence the integrity of very fine branches are maintained. The only hurdle with silicone resin is that those commercially available ones in India are too viscous in consistency that they could not find their way through very fine tubes. To overcome such hurdles we dissolved these silicone resins in chloroform and made a less viscous solution that would reach even fine capillaries. To impart colour to the product we added little stainer by which we get the cast with the colour of our choice.

During the filling process chloroform evaporates resulting in increased viscosity of the remaining solution. Towards the end of this filling process we shall milk the resin down through the trachea by hand. Since the terminal branches of bronchi have a lumen which is less in caliber, the less viscous solution poured earlier finds its way easily through the tertiary bronchi but the remaining primary bronchi and trachea are bigger in caliber and hence the latter more viscous solution can be filled in them by milking movement of hand.

We found that the trachea branched into right and left primary bronchi, which in turn divided into secondary bronchi according to the findings of Hiroyoshi and Yoshito, 2002. The secondary bronchi again terminated into tertiary bronchi which appeared like fine bristles.

On the right side we found a cast of separate bronchi leaving the trachea before the right primary bronchus which is apical bronchus supplying the bigger apical lobe of the right lung which is a unique feature in bovines. Hence the resulting specimen was very good museum specimen and a valuable teaching aid.

Summary

Corrosion casts of the airway of the lungs of mammals made with resin are good museum specimens and valuable teaching aid. It is very durable and appealing. Deflated lung of a calf is collected without damage along with trachea. Commercially available silicone resin is self curing in nature. Hence silicone resin is injected through trachea into the lung. Since the consistency of resin is thick and cured fast, the resin deposited in the trachea has to be squeezed into the bronchi and its branches by hand from the surface of the lungs. When the natural colour of the surface of the lungs changes to the colour of the resin it is understood that the entire airway is filled with silicone resin. Then the specimen is 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.

References

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