

RESUSCITATION OF ASPHYXIATED INFANTS BY THE INSUFFLATION METHOD OF MELTZER AND AUER

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The remarkable experiments of Meltzer and Auer on intratracheal insufflation were made known in France by Carrel, who also brought them to my attention. I was greatly impressed by them and concluded that the principle might be applicable to the resuscitation of asphyxiated infants, for which purpose I had an apparatus constructed by Mr. Lépine of Lyons. The apparatus is very simple and resembles the one used on animals at the Rockefeller Institute and differs only in being of a size suitable to new-born infants.

I have employed this apparatus and the method of intratracheal insufflation in my obstetrical service since August, 1910, with promising and highly interesting results. I make this statement because I am of the opinion that it will require several years' experience to determine its exact clinical value and extent of applicability. I am, however, ready to affirm that the principle of the method embodies a great advance and its efficiency is already beyond question for the reanimation of asphyxiated infants.

The principle of the method of Meltzer and Auer is well known. A continuous current of air directed as far as the bifurcation of the trachea through a tube of small caliber, produces a ventilation of the lungs sufficient for oxygenation of the blood even if there are no respiratory movements. The air injected into the bronchi returns between the catheter and the tracheal wall, and can also remove foreign bodies and mucus that may be in the respiratory tubes. The apparatus constructed by Lépine is composed of:

1. A rubber bulb.
2. A T tube, one branch of which is united to the bulb, and another to a small mercury manometer, while the third is connected to a rubber tube ending in a metal cone.
3. A gum catheter No. 12. A rod of soft copper is placed in the catheter in order to give it the proper shape for introduction into the glottis. The caliber of the catheter was selected after an anatomic study of the trachea on the cadaver. The internal diameter of the trachea of a new-born child is 4 mm. There is allowed, therefore, between the wall of the trachea and a catheter No. 12 (Charrière) a sufficient space for the

returning current of air. The end of the catheter must reach the bifurcation of the trachea. This point is located at a distance from the mouth which varies according to the size of the child. For a child weighing 2,000 gm. the distance is 8 cm.; 3,000 gm., 10 cm.; 4,000 gm., 12 cm. Therefore, three transverse lines are marked on the catheter to indicate how far it should be introduced according to the weight of the child.

OPERATIVE PROCEDURE

The mucus contained in the throat of the infant in a condition of asphyxia is rapidly removed by the finger or by a little sponge fixed in forceps. The infant is wrapped in a warm blanket and placed on a table, the neck being in slight hyperextension.

The index finger of the left hand of the operator is introduced as far as the upper end of the esophagus so as to feel the hard rounded prominence which is formed by the posterior face of the larynx, the two arytenoid cartilages, and to find in front of them a soft opening, which is the glottis. The catheter, containing its copper rod, to which a proper curve has been given, is introduced by the right hand between the tongue of the child and the palmar face of the left index finger of the operator and thus penetrates easily into the trachea.

The catheterization is exceedingly easy. After a few trials on the cadaver, I could always do it without trouble. Moreover, the interns, externs, and nurses of my service succeeded also in introducing the catheter very easily. The average nurse can certainly acquire the technic without difficulty.

When the catheter has reached the proper distance, the copper rod is removed. The end of the insufflation apparatus is now attached to the catheter and air is injected through the catheter by the rubber bulb, while the mercury manometer is watched. The pressure must not exceed 10 or 15 mm. Soon the noise of the returning current of air passing through the lips of the child is heard. The manometer indicates that there is no over-pressure by accumulation of air in the respiratory apparatus. Therefore, the conditions of ventilation are known, and no accident is to be feared.

The insufflation is continued as long as is necessary. After a few minutes, the child appears to be less atonic, the heart becomes stronger and more regular, and the respiratory movements start. The catheter is removed when the infant is in a condition to carry on automatic respiratory movements.

CLINICAL RESULTS

The method must be applied under well-defined conditions. If it is used in mild cases of asphyxiation, it is certain that it will give constant positive results as do all the other methods. If it is used in the cases in

which apparent death is not due to asphyxiation but to traumatism of the brain or of the medulla oblongata, it will yield negative results. Therefore, the value of the method must be ascertained in the cases of deep asphyxia of the new-born by long intra-uterine compression or by interference with the fetal-maternal circulation, as, for instance, from compression of the umbilical cord.

I have employed the method in seven cases of the last kind. The seven infants were restored to life after a longer or shorter period of insufflation, although two of them had been extricated after difficult versions.

Observation 1.—Child weighing 2,760 gm.; Braxton Hicks version for placenta prævia; no respiratory movements; heart regular, but very slow; insufflation for twelve minutes; afterward, movements of the face and respiratory movements. The child cried as the catheter was removed.

Observation 2.—Child weighing 4,200 gm.; difficult version, with prolonged extraction of the head; asphyxia pallida; irregular heart; a few diaphragmatic convulsions; very infrequent. Reanimation occurred after insufflation during eight minutes.

Observation 3.—Child weighing 3,600 gm.; extracted by forceps; probable prolapsus of cord; child was atonic, without respiratory movements; meconium evacuated; heart hardly perceptible. Reanimation occurred after insufflation during seven minutes.

Observation 4.—Child in a condition of blue asphyxia, but the heart was almost normal. The child was quickly reanimated.

Observation 5.—Similar to Case 4. It is probable that in these two cases the reanimation would also have taken place easily if the ordinary methods had been employed.

Observation 6.—Child weighing 1,970 gm.; premature labor; high forceps delivery; asphyxia pallida; no respiratory movements; very irregular and slow heart; grave form of apparent death. After five minutes of insufflation the heart became regular; reanimation after eight minutes.

Observation 7.—Child weighing 3,000 gm.; long labor; period of expulsion lasted five hours; blue asphyxia. Reanimation occurred after insufflation for six minutes.

The method deserves to be employed also in cases of traumatism to the skull and brain. I am of the opinion that it will excel other methods in this condition, although it will, of course, be limited by the severity of the injury, which may be incompatible with life.