



Wellcome Film Project

Resuscitation of the Newborn

Uptodate: from the Institute of Obstetrics and Gynaecology, London.

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University of London Audio-Visual Centre, 1972.

Made for the British Postgraduate Medical Federation.

Produced by Peter Bowen.

Black-and-white

Duration: 00:19:04:11

00:00:00:00

<Opening titles>

<Narrated by Harvey to camera>

Anyone who has seen the birth of a severely asphyxiated baby will know what a dramatic event it is and will not be surprised that it used to be called, in the past, the apparent death of the newly born. Many medical authors from Hippocrates on have mentioned asphyxia and have described many, many methods of resuscitation.

<Harvey narrates over image of Louise Bourgeois>

The first picture I should like to show you is of Louise Bourgeois who was the midwife to Marie de Médici, the wife of the king of France. Louise was present at the birth of Louis XIII and has left us a detailed account of his resuscitation. She noticed that he was asphyxiating when he was born and she called at once for a bottle of wine. The King was very suspicious and wouldn't let her have the wine at first, but when she got it, she took a gulp of wine and spat it into the baby's mouth, at which she said, the baby savoured the wine that she had given him and woke up.

Wellcome Film Project

<Harvey to camera>

Many, many other methods of physical stimulation have been used in the past and include whipping, putting in hot water, cold water, rubbing onions under the nose, giving enemas of tobacco smoke and scrubbing the baby with scrubbing brushes. The two most remarkable methods that I have discovered were one by Tuscan physicians chewing carnations and blowing it into the baby's mouth and the another used by Sicilian physicians taking the beak of a live hen and putting it in the baby's rectum.

In the last century despite the fact that intubation had already been described, many methods of physical ventilation were described and the next picture shows you a method which was described in Yaener[?] in 1871.

<Harvey narrates over image of 19th century resuscitation>

This was the inspiratory position. The baby was allowed to dangle down between the operator's legs and as you can see the liver was supposed to pull on the diaphragm and cause inspiration.

<Harvey narrates over a further image of 19th century resuscitation>

The next picture shows you the expiratory position. The baby was thrown up so that he jack-knifed, the liver pressed on his diaphragm and he was supposed to breathe out.

<Harvey to camera>

Now, ten years after this was described, an English physiologist showed that there was no ventilation at all produced by this method and the most remarkable thing is that the method went on being used for another fifty years on the continent and I have met people who used it. Perhaps then we can now consider why so many

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methods have been used in the past and why some very recent methods have come into fashion and gone away. One could cite intragastric oxygen which I can remember in my medical career was taken up very enthusiastically and was later found to be quite useless.

<Harvey narrates over diagrammatic chart, uses indication stick>

The information which will help us is shown on this chart. This experiment is of asphyxia in the newborn rabbit which was done by Dr John Davis, now in Manchester. Similar experiments of asphyxia have also been done on lambs and on monkeys and the pattern of events, although the timescale is different, is the same in all species and we've no real reason to suppose that the human is any different.

To the left of the chart you can see pulse rate, arterial blood pressure and respiration shown by intra-thoracic negative pressure. During the first period, marked 'normal', you can see that the animal's breathing normally and has a steady arterial pressure and pulse rate. On this line the animal was asphyxiated. Now you can asphyxiate the animal in any way you like, in this case as you can see, the animal was put into nitrogen, 100% nitrogen, but you can put a sack over the animal's head or drown the animal, it doesn't make any difference to the pattern of events.

Let's concentrate on respiration to start with. The first period is a period of dyspnoea when the animal hyperventilates and then quite suddenly the animal stops breathing; it is of course blue and lies as if dead on the bottom of its cage. This period is usually called preterm or primary apnoea. During this period the pulse rate rises slightly then falls precipitously and the arterial blood pressure follows a similar pattern. After the fall, as you can see, there is a secondary rise. After the period preterm apnoea, the animal begins to gasp. During this period of gasping, the gasps get more frequent but weaker and eventually the animal stops breathing again. And this second period of apnoea is usually called terminal or secondary apnoea. During this period the pulse rate drops steadily and the blood pressure drops steadily until the animal will go on to die unless he is resuscitated. In this case the animal was resuscitated by ventilating his lungs with oxygen and as you can see the blood pressure and the

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pulse rate recovered very smartly, there was a period of recovery dyspnoea, then the animal returned to normal breathing.

Now the importance of these experiments is that you can do anything that you like to the animal in the first period of apnoea, you can put the beak of a live hen to his rectum if you like, but so long as you put him into air he will recover. If you do anything to the animal in the second period of apnoea he will die, unless you ventilate his lungs and possibly give cardiac massage.

00:06:55:10

<Harvey to camera>

I think it is now clear why so many methods of resuscitation have been used in the past. In the nature of things, a baby is likely to be mildly asphyxiated and not severely asphyxiated and therefore most of the babies will get better with some method of resuscitation because they would have got better anyway.

The way we usually assess babies at birth is to use the well-known Apgar Score to look at the five things: heart rate, respiration, colour, response to stimulation which is usually sucking the baby out and tone. But undoubtedly the two most important of these are heart-rate and respirations.

What should one do when one is faced by an asphyxiated baby? Well in many cases the baby will only be in primary apnoea and it is only necessary to give the baby adequate oxygen to breathe and to keep him warm and to wait for him to get better. But in other cases you may need to actively resuscitate him and the apparatus you need is in fact very simple. I've set the apparatus out on this table.

<Harvey demonstrates the apparatus needed for resuscitation>

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On the left hand side of the table you can see this mucus-extractor – you can use a mechanical sucker if you like, but this is a very simple way of sucking the baby out, available in every labour ward in a sterilised pack and very simple to use by a nurse shortly after delivery. So first of all we've made certain that the baby has a clear airway.

The second thing to remember is that the baby can get very cold during resuscitation and therefore I've put this packet on the table to show one method of keeping a baby warm. This is a silver swaddler which will effectively insulate him but one can use warm blankets and also it is a good idea to have a heater about the resuscitating apparatus. The most important thing to remember is how easily babies can get cold and to take active steps to prevent him getting cold.

Now having done these first two things and having assessed the baby using the Apgar Score, usually after a minute and later after 5 minutes, if the baby is not breathing by 1 ½ minutes then it will be necessary to intubate him and if he's born in a shocked, death-like condition, then you'll have to intubate him straight away. In order to do this you'll have to use a laryngoscope and I've put a baby laryngoscope on this table. The technique of intubation is not difficult to learn and is now standard practice for pupil midwives. It is a good idea to practise intubation on a stillborn baby and you should never lose the chance to practise intubation if you haven't already acquired the technique. What you need to do is to put the baby onto a table, usually with his head down, put his head upward into a sniffing position and pass the laryngoscope over his tongue so that you can see the epiglottis and then you lift it forward until you can see the entrance to the larynx and then you put the tube in. It is very important that you can see the larynx before inserting the tube. It should never be pushed in blindly. I don't think it matters who does the intubation at delivery, anyone who is capable of doing it can do it, whether the anaesthetist, the obstetrician, the paediatrician or the midwife, just anyone who has a spare pair of hands. I think it is a good idea to lay on a spare pair of hands in case of an abnormal delivery, for instance a caesarean section and to invite a paediatrician to be present.

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Now here is one of the usual intubation tubes that we use. They come in four sizes, this one is French gauge 14, but they also exist in 12, 10 and 8 sizes. The 14 is an adequate size for most full-term babies but you might need to use a 10 for a very small baby, say about 1 kilo in weight. The only one I should like to warn you against is French gauge 8. The reason for this is that the tube is very small and very soft and it is a common trap for the inexperienced to pick out the smallest tube since one would think it would be the easiest to get into the larynx. In fact it's the most difficult because the tube curls up as you're trying to push it into the larynx.

00:12:04:00

<Harvey to camera>

Now, having got the tube into the larynx, one needs to ventilate the lungs. The simplest way to do this is to blow into the lungs – if you're going to do this you must remember that you mustn't use the whole force of your lungs but just use the air that is in your mouth. Obviously there is a danger of infection with this method of ventilation of the lungs and if possible one should have some apparatus ready to ventilate the lungs through the tube. Whatever you do you must have a blow-off valve in the oxygen line which will prevent the baby's lungs being over-inflated and the maximum pressure should be 30cm of water.

<Harvey shows drugs used in resuscitation>

We can now move on to other things to be used in resuscitation. We have the baby being ventilated and one has to consider what drugs we might give the baby. I've put out here the drugs that are commonly available. Most babies who are severely asphyxiated are acidaemic and one must do something to counteract this. I have an ampule of sodium bicarbonate here, this ampule of sodium bicarbonate is 5% but perhaps the most convenient is 8.4% and so it contains 1mg of bicarbonate for every litre of fluid.

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<Harvey to camera>

Using the 8.4%, one should use 3ml for every kilo of body weight of the baby. You can give this into the umbilical vein. Now, probably the best method of doing this is to cut the umbilical cord across and to pass a catheter into the umbilical vein and inject the bicarbonate through it. But in fact it is quite simple to inject it through a very fine needle, a gauge 25 needle into the umbilical vein in the cord, just near the umbilicus.

<Harvey shows drugs used in resuscitation>

Now, the next ampule contains dextrose at 10% and it is usual in a severely acidaemic baby to give 2ml or 3ml per kilo intravenously after the bicarbonate. The reason for this is that it has been shown, in animals, to have a marked result in the acceleration of heart-rate in asphyxia.

The third drug that we use is nalorphine, this ampule contains 1mg per ml and the usual dose is $\frac{1}{2}$ or 1mg given intravenously or intramuscularly. And this of course reverses the effects of morphia or pethidine which may have been given to the mother in the last four hours of labour.

<Harvey to camera>

It should not be used if no opiates have been given to the mother since by itself it may depress respiration. I should like to emphasise that these are the only drugs that I feel should be used in resuscitation and analeptics should not be used any more because they have been shown in animals to produce death quicker than in pure asphyxia when exhibited to animals who have been taken beyond the last gasp into secondary apnoea.

Now, the other procedure that you may need to use during resuscitation is cardiac massage. I think there are two periods where you might need to use this. First of all is in cardiac arrest. For babies born without a heart-beat, one will need to give cardiac massage before performing intubation.

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<Close-shot of Harvey demonstrating cardiac massage>

The simplest way of performing cardiac massage is to have the baby lying in front of you and to put your hands underneath his shoulder blades, to put your thumbs under the shoulders and to press back on the upper part of the sternum towards his back. It is important not to press too far down on the sternum as one would do in an adult or an older child since the baby's liver is much larger and you may rupture his liver.

<Harvey to camera>

The other occasion in which I would use cardiac massage is if the baby's heart rate is very slow on delivery, say less than 40 beats per minute. In this situation the heart is not beating very effectively and one is able to empty it and make it beat more effectively by giving it a few beats of cardiac massage before doing intubation, say 5 or 6 beats. This has shown to be effective in lambs.

Now there are two things which may help you to decide, in retrospect, whether a baby was in primary or secondary apnoea. The first is the age at which he becomes pink. If he becomes pink before gasping you have evidence that he was in secondary apnoea. If however you can promote gasping before he goes pink then this is evidence that he was in primary apnoea. One must also look at the heart-rate. In secondary apnoea the heart-rate only falls, however in primary apnoea the heart-rate could be rising or falling, so a rising heart-rate means that the baby is in primary apnoea.

I should just like to emphasise that the apparatus that you need for resuscitating the newborn baby is very simple. In fact, if you haven't got any of the apparatus that I have mentioned today you can resuscitate a baby quite simply by doing mouth-to-mouth ventilation.

<End credits>