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The Role of the Anesthesiologist in Reducing Neonatal Mortality

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ALTHOUGH definite figures are lacking to substantiate this claim, it is my impression that the field of obstetric anesthesia has been neglected by anesthesiologists. According to the survey of hospitals in New York City offering maternity care,¹ 54 per cent use anesthesia regularly for delivery of the infant. No further investigation was made of the personnel administering the anesthesia. Even at present in not more than a very few hospitals is anesthesia by physicians available and utilized on a twenty-four-hour basis for obstetric patients. Granted that there are major economic problems to be solved before such coverage will be widely available, it is indeed a challenge to our specialty to take a more active role in reducing both maternal and neonatal mortality. At present anesthesia stands third or fourth on the list of causes of maternal mortality, and it is widely known that the death rate of infants under one day has decreased very little in the past thirty years. In the majority of these deaths, respiratory inadequacy appears to be the main cause. With the anesthesiologists' wide experience with respiratory obstruction, apnea, and shallow ventilation, it is logical to think that we may be able to contribute to a decreasing incidence of

death, as well as to learn much of practical use in pediatric anesthesia, by closer observation of the newborn infant.

There are at least five ways in which an anesthesiologist who is a permanent part of the obstetric team, can aid in reducing infant mortality.

Maternal Pain Relief

Although the management of labor is rightly the responsibility of the obstetrician, better attention to methods of relieving pain will avoid many complications later. Each patient in labor should be visited by the anesthesiologist, and her medical, psychologic, and obstetric problems reviewed as carefully as if she were to undergo a gastrectomy. It has been demonstrated by Hellman and Hingson² that the actual method chosen for pain relief makes little difference, provided all methods are administered with equal skill. A patient from whom a history of dyspnea with exertion can be elicited should under no circumstances be required to expend voluntary and involuntary effort during second stage. A multipara with a rapid labor frequently has a full stomach, and her pharyngeal and laryngeal reflexes should not be obtunded by general anesthesia. On the other hand, some patients who are emotionally unstable are much better asleep during the actual delivery. Con-

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duction anesthesia can defeat the whole plan of a progressing labor if given too early in the latent period of first stage instead of at the onset of the acceleration phase.³ No one plan for pain relief can possibly fit all medical and obstetric variations. Only by individual selection of anesthetic agents and technics can the best results be obtained.

Assistance with Obstetric Emergencies

Hemorrhage in the antepartum, intrapartum, or postpartum period is high on the list of causes of fetal anoxia as well as maternal mortality. The anesthesiologist should be able to maintain the patient's blood volume, leaving the obstetrician free to deal directly with the cause of bleeding. This involves foresight in obtaining blood for cross matching and for observance of the clot, the use of plasma expanders if the supply of blood is too little or too late, the introduction of more than one needle if bleeding is not quickly controlled, and the use of the sternal route for transfusion if there is difficulty in entering a vein. On the other hand, hypervolemia is not uncommon following massive blood replacement, especially in the obstetric patient, and early signs of pulmonary edema must be looked for and treated promptly.

Episodes of hypotension in the antepartum period are not uncommon and are not always readily explained by blood loss, Pitocin infusions, or other drug effects. While undertaking the diagnosis, it is wise to turn the patient to the lateral position. Placental oxygen tension has been estimated to be about 40 mm. Hg tension when the maternal arterial oxygen tension is in the vicinity of 100 mm. Hg. No data are available on the fall in placental oxygen accompanying hypotension from whatever cause. True postural hypotension, as described by McRoberts,⁴ is rare but can be dramatically treated by the simple measure of turning the patient on one side. Obviously, oxygen therapy should be used in addition.

Oxygen therapy should be used much more in the antepartum period than it is at present. The heavy sedation occasionally necessary for control of a toxemic patient is always accompanied by respiratory depression, and oxygen added to the patient's inspired air will keep the fetus better oxygenated even though hypoventilation exists. Patients with fever all have a higher oxygen consumption than normal, and

the oxygen content of air is sometimes not enough for both mother and infant. Many causes of fetal distress are best treated with oxygen inhalation in addition to other therapy. Among these causes are acute respiratory episodes of multiple sclerosis, myasthenia gravis, poliomyelitis, pneumonia, cardiac decompensation, hemorrhage, epileptic seizures, and uterine spasm from Pitocin infusions. If fetal distress persists, circulatory obstruction is likely from umbilical cord complications, and oxygen therapy will be of no avail. It should be the anesthesiologist's responsibility to have equipment for oxygen therapy always at hand and in working order.

There are occasions, fortunately rare, when marked uterine spasm occurs during the first stage of labor. The only effective treatment is prompt, deep general anesthesia. Block technics and relaxants have no place in relaxing a tight uterus. Because its potency allows ample oxygenation and because it is the least irritating of the potent agents to inhale, cyclopropane is ideal for this emergency, but apnea and arrhythmias not infrequently accompany such use. Their management is the duty of the anesthesiologist, not the casual anesthetist.

Care of the Infant in the Delivery Room

This is properly the province of the pediatrician, but rarely in this country is there a pediatrician in the delivery room for *every* delivery. Until such a time occurs, the anesthesiologist is the logical person to observe and treat the infant if the occasion arises. In this way the obstetrician need not break sterile technic and may proceed with suture of the episiotomy or investigate the source of undue maternal hemorrhage. Teamwork is especially important at this time. If the anesthesiologist is involved with maintaining a difficult airway or managing an episode of vomiting of solid food, his duty is obviously with the mother so that the immediate care of the infant is done by the obstetrician. If both are busy, the obstetric nurse clears the infant's airway and administers oxygen if cyanosis persists.

All three, obstetrician, anesthesiologist, and obstetric nurse, need to be thoroughly familiar with the immediate problems of the newly born infant. The importance of maintaining the head-down position from the moment the head appears has recently been stressed by Gibberd.

TABLE I.—EVALUATION OF THE NEWBORN INFANT

METHOD OF SCORING.—Sixty seconds after the complete birth of the infant (disregarding the cord and placenta), the following five objective signs are evaluated and each given a score 0, 1, or 2. A score of 10 indicates an infant in the best possible condition.

Sign	Score		
	0	1	2
Heart rate	Absent	Slow (below 100)	Over 100
Respiratory effort	Absent	Slow, irregular	Good, crying
Muscle tone	Limp	Some flexion of extremities	Active motion
Response to catheter in nostril (tested after oropharynx is clear)	No response	Grimace	Cough or sneeze
Color	Blue, pale	Body pink, extremities blue	Completely pink

After gentle, efficient pharyngeal suction, observance of ventilation will indicate the need for a pharyngeal airway, oxygen therapy, direct laryngoscopy, and occasionally endotracheal intubation. The cardiac rate can be observed throughout at the point of attachment of the umbilical cord to the skin. The accompanying table shows a method of "scoring" of infants at sixty seconds after birth, which has helped guide therapy, and the need for close pediatric supervision (Table I).⁵ Routine gastric aspiration accomplishes two purposes, ruling out esophageal atresia and leaving the stomach empty, but should not be done until ventilation is satisfactory.

Certain diagnoses should be excluded in all infants before they leave the delivery room. Much time is lost in establishing the presence of operable anomalies if one awaits the onset of symptoms. Esophageal atresia, diaphragmatic hernia, imperforate anus can easily be diagnosed, while the presence of omphalocele and meningocele are obvious. A large amount of gastric contents should suggest the diagnosis of intestinal obstruction whether it be due to atresias of the small intestines, meconium peritonitis, or acute volvulus. A flat plate of the abdomen is the quickest way to diagnose obstruction below the stomach. The presence of maternal polyhydramnios should always make one search diligently for the anomalies which interfere with the normal circulation of amniotic fluid. To date, congenital cardiac anomalies remain unapproachable in the immediate newborn period. The initial evaluation of the erythroblastotic

infant is made as soon as ventilation is established and blood collected for serum bilirubin and hemoglobin content.

One of the most important contributions of the anesthesiologist in the delivery room is the keeping of records regarding exactly what happened before, during, and after the child was born. Not until a large supply of such records is available can any association of cerebral palsy, mental deficiency, and other motor disabilities and oxygen lack be determined. At present the anesthesiologist's record, in addition to the customary graph of maternal pulse, blood pressure, and respiration, contains notes as to maternal factors which may affect oxygenation; the presence of signs of fetal distress, such as changes in fetal pulse, complete absence of heart sounds, presence of meconium in the amniotic fluid antenatally, complications of delivery, amount of fundal pressure used, the score, the time of sustained respiration, the use of oxygen, the amount of gastric contents aspirated; anesthesia and obstetric complications, and fluid therapy.

Research Work

The immediate newborn period is almost without investigation. The normal behavior of body temperature in different weight groups and the infant's response to cooling or warming need clarification. The possibility, probability, and desirability of assisting ventilation are almost unknown. The compliance and resistance factors as well as those of pressures, time, and volume need study. The effect of pain-relieving drugs given the mother during labor on the infant's respiration and circulation needs controlled study. Is humidity of real use in helping to expand lungs, and if so, how much and what kind? The infant's respiratory center is once more being shown to be sensitive to carbon dioxide, even if anoxia exists.⁶ Should the use of this drug be reintroduced for assisting ventilation? Is there a specific antagonist to barbiturates, similar to normorphine effect on opiates? These and many other questions challenge the anesthesiologist and likewise the pediatrician if he is present.

Responsibility for Educational Program

It has been emphasized before that everyone likely to take care of a newborn infant should

VIRGINIA APGAR

be familiar with the principles as well as actual practice in so doing. Such personnel includes the obstetrician, anesthesiologist, pediatrician, obstetric nurse, medical students, and student nurses. It is with gratitude that we note that the entire Subcommittee on Infant Mortality of the New York County Medical Society agreed in 1954 that *responsibility* for a teaching program belonged entirely to the anesthesiologist in every hospital. Whether he does the teaching personally or delegates it to someone more experienced is optional, but the responsibility for teaching is his. The best teaching is done in the delivery room during actual deliveries. The next best location is in the autopsy room with gross and microscopic material. The only good way to teach the ease of intubation of the newborn infant is with a recent stillbirth or neonatal death. Frozen autopsy material gives one a very wrong sense of difficulties. Frequent lectures, discussions, and perinatal mortality conferences all should be a part of the teaching program.

The shortage of anesthesiologists in this country is admitted but is becoming less each year. More serious, however, has been the apparent lack of interest of our specialty in the problems of the perinatal period. Also in some localities the assistance of the anesthesiologist has not been welcomed by the obstetrician, a short-sighted viewpoint which is rapidly vanishing. In no field of patient care is there more hope for improvement in mortality figures than in the newborn period if there exists an alert, interested team of obstetrician, anesthesiologist, and pediatrician in every hospital offering maternal care.

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