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Anesthesia for Vaginal Delivery

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IF THE CORRECT DRUG IS EMPLOYED, and if there is no mismanagement of anesthesia, there is no relation of agents or techniques to maternal or infant mortality. Also, if there is no maternal respiratory or circulatory depression as a result of the use of drugs for pain relief, the condition of the infant at birth is unrelated to the use of analgesia and anesthesia. The choice of method of pain relief is made on the basis of medical problems existing in the mother, obstetric problems or the urgency of the moment.

Hypnosis is theoretically ideal but time-consuming. Antepartum hypnotic sessions during the last trimester are recommended or, if this is not possible, thiopentone supplement may be necessary.

Prepared childbirth, consisting of lectures to both parents, and exercises in relaxation for the mother also is theoretically ideal, and is also time-consuming. In a recent series completed at Sloane Hospital for Women, 134 clinic patients attended

such classes and 95 percent delivered vaginally; 20 percent received no medication at all during the first stage of labor. For delivery of the infant, 6 percent received no anesthesia of any kind, 9 percent pudendal block, 26 percent caudal or spinal anesthesia, and 59 percent inhalation anesthesia. This distribution of techniques is similar to the experience with several thousand women delivered vaginally without benefit of classes. Infants were evaluated according to the method shown in Table I. The condition of the infant at birth compared favorably with 3,800 consecutive vaginal deliveries, as seen in Table II.

The drugs used in first stage of labor comprise three groups: Barbiturates are indicated only for apprehension, a symptom common to primiparas, especially those with language difficulty or minimal intelligence. Rarely was an intravenous barbiturate used to counteract overdosage of a drug used for regional anesthesia. An opiate may be given intramuscularly or intravenously when pain becomes uncomfortable. Barbiturates are not indicated for pain, nor opiates solely for apprehension. The selection of the opiate and its dose should be made individually. It is our feeling that 50 mg. of demerol® repeated at intervals is a much more satisfactory dose than 75 or 100 mg. If morphine is chosen, a dose of 6 mg. is suggested. A derivative of the belladonna group is often added,

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TABLE I
EVALUATION OF 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 of 0, 1 or 2. A score of 10 indicates an infant in the best possible condition.			
SIGN	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)	None	Grimace	Cough or sneeze
Color	Blue Pale	Body pink Extremities blue	Completely pink

to counteract the tendency to vomit from a side action of the opiate, and to add to the general sedation. Scopolamine 0.4 mg. is especially useful, while atropine, though successful in depressing nausea, causes a patient to be more alert. Amnesia doses of scopolamine are not recommended because of total lack of co-operation of the patient, and extreme restlessness necessitating surgical planes of anesthesia for delivery. In situations beyond the control of the anesthetist, or in accidental overdosage of barbiturates or opiates, two new drugs which counteract each of these groups of drugs are under investigation. Normorphine has been used on the obstetric service to counteract opiate depression only 30 times in three years. It produced the expected response in 24 infants. Its action is much more predictable and efficient if given to the infant in the umbilical vein, 0.25 mg., rather than to the mother before delivery.

Continuous caudal analgesia solves well the problems of pain relief toward the end of the first stage, and of the second stage. If the anatomy of the caudal region feels completely mysterious, a continuous lumbar epidural anesthesia is performed by preference, without subjecting the mother to traumatic attempts at caudal anesthesia. With the first indication of a need for pain relief, we prefer to give one dose of demerol and scopolamine. As the effect of these drugs is wearing off, a vinyl plastic catheter is inserted into the caudal

canal through a 16 gauge needle so that the tip of the catheter lies at about the second sacral segment. After a test dose of 5 cc. of the drug selected, if no sensory or motor change takes place, 10 more cc. are added and the effects observed for about ten minutes. Additional 10 cc. doses are administered until pain relief is satisfactory. Any of the drugs used for regional anesthesia may be used for continuous caudal anesthesia, in appropriate concentrations. Our present preference is for 0.75 percent xylocaine® with adrenalin 1:200,000 if the maternal blood pressure is not over 130/80 mm. Hg. If higher, adrenalin is omitted. The signs of a successful caudal anesthesia are many, the most important being pain relief from contractions. This subjective sign does not necessarily accompany any specific level of loss of sensation to pinprick, sympathetic sign, or motor paresis. The most reliable objective signs are those observed in the rectal area, and paresis of the legs. Loss of tone of gluteus minimus, absent anal skin reflex, loss of tone of the anal sphincter, and inability to contract it indicate the beginning of a successful caudal anesthesia. If pain relief still is not present, addition of more drug will effect this. If the anesthesia must be administered with speed, the air test is omitted, as is the test dose, and the drug, 15 cc., is injected before the catheter is inserted. With the concentration of xylocaine mentioned, it is difficult to tell an accidental intrathecal injection which gives a differential spinal anesthesia from a successful caudal anesthesia. The real differential diagnosis lies in the occurrence of a typical post-spinal headache.

Continuous lumbar epidural anesthesia is administered to the patient in the sitting position, unless the patient is thin. The sitting position makes the palpation of anatomic landmarks easier, but does increase cerebrospinal fluid pressure in the lumbar area, making it a little more likely that the dura will be punctured. Several methods exist to identify the epidural space. All except one depend on the presence of negative pressure transmitted from the thoracic area. Sucking in of a fluid level in the needle; deflation of a small, inflated balloon attached to the hub; and the springing in of the stylet of the Macintosh needle are examples of the first group. We still find the lessened resistance of a smoothly riding piston of a 2 cc. syringe after the needle has entered the epidural space, as compared with the resistance felt when the tip is in the subflavian ligament, the most useful sign. If by chance the tip has entered the subarachnoid space, pulling back on the piston reveals the presence of spinal fluid, which can be reinjected, and the needle withdrawn until no fluid appears. With this

TABLE II

	P. C. B.	Vaginal deliveries
No. of Infants	134	3,800
Scores 0-1-2	3%	5.1%
Scores 3-4-5-6-7	21%	23.8%
Scores 8-9-10	76%	71.1%

method, no spinal fluid is lost. With the methods involving the removal of a stylet, the presence of spinal fluid is all too obvious since it shoots out the end of the needle to be lost on the drapes. A Huber tip needle permits the downward placement of the catheter, avoiding the embarrassing situation of having good anesthesia of the lumbar segments and none of the lower sacral segments. Using the Huber tip needle facing caudally, inserting the catheter for several inches, and turning up the head of the bed will usually assure good sacral anesthesia.

Bilateral lumbar sympathetic block, maintained by insertion of catheters, is satisfactory in some hands, but another method is of course needed for management of second stage and delivery.

Other blocks useful at the time of delivery are local infiltration of the site of episiotomy, and pudendal block performed by the transvaginal route. Five to 10 cc. of one percent xylocaine placed slightly posterior, medial, and inferior to the tip of the ischial spine will give a prompt anesthesia of adequate duration.

A single dose spinal anesthesia, popularly known as saddle block, is eminently satisfactory for instrumental delivery. With the end of the delivery table dropped a few inches, the patient is asked to assume a relaxed sitting position. A small spinal needle, 0.25 gauge, $2\frac{1}{2}$ inch, is inserted quickly into an easily palpable lumbar interspace, without skin wheal, and 3.0 to 4.5 mg. of 0.3 percent hyperbaric pontocaine®, or 2.5 to 3.75 mg. of hyperbaric 0.25 percent nupercaine is injected between contractions. The sitting position is maintained for 20 to 30 seconds. Intravenous ephedrine is rarely needed to treat hypotension.

Many methods are available for general anesthesia, the success of which of course depends on the availability, the skill, and interest of the anesthesiologist. Nitrous oxide still remains the most useful gas for inhalation anesthesia. In mixtures of $3\frac{1}{2}$ liters to one of oxygen, its administration just as a contraction begins and continued to the height of the contraction is eminently successful in spontaneous delivery. A similar level of analgesia can be reached with any inhalation agent, but the lack of odor of nitrous oxide and its non-explosiveness are especially attractive. This analgesic level, however, is unsafe if forceps are to be applied. Immediate change to first plane anesthesia is instituted. Here again, any inhalation agent other than nitrous oxide can be employed. Because of its rapid induction and potency, cyclopropane is by far our first choice. Ethylene, ether, vinethene®, trilene® or chloroform, if cyclopropane is not available, will provide satisfactory working conditions.

Under ideal circumstances, intravenous pentothal® sodium is satisfactory. The conditions for its use are a visible caput, an ample pelvis, forceps already in the obstetrician's hands, no teaching to be done, and a functional venipuncture. Rapid injection of 7.0 to 10 cc. of $2\frac{1}{2}$ percent pentothal, and application of the forceps in 15 seconds by the clock will result in the delivery of an infant as active as if no depressant drugs were used. Apnea in the mother is usually prevented by the stimulation of the obstetric maneuvers. Of course, equipment must be at hand for artificial ventilation, and must be used promptly and properly if apnea should occur.

A few principles for selection of method of pain relief have become apparent during the past few years:

1. A dyspneic patient should never be allowed to "push" whether the dyspnea is the result of pulmonary or cardiac disease. Continuous caudal analgesia is our first choice in this group.

2. Patients with obstetric hemorrhage or severe anemia should not be given spinal or epidural block. Hypotension is much more frequent in this group because of hypovolemia, low hemoglobin content of the blood, and dilatation of the peripheral vascular bed.

3. A history of a recent meal always indicates a regional method of anesthesia. This can always (almost always) be arranged for vaginal delivery, but not always if cesarean section is necessary.

4. A tight uterus can be relaxed only with third plane anesthesia. Any drug can be used to reach third plane, except ethylene and nitrous oxide. Cyclopropane is by far the most rapid one. Nerve blocks and muscle relaxants are of no use.

5. Spinal anesthesia is not used if there is a history of syphilis, or if a high fever is present, or if central nervous system disease is present.

6. Patients with central nervous system disease (and there is a surprising number of them) should have a tracheotomy set at the bedside and it should be used electively if there is any doubt that the patient is unable to clear her own airway by coughing. We have recently encountered, in the labor room, cases of multiple sclerosis, myasthenia gravis, subarachnoid hemorrhage, unexplained convulsions, and brain tumor.

7. Patients with borderline disproportion, uterine inertia, and cervical dystocia should not have continuous caudal or epidural anesthesia.

8. No anesthetic method, even third plane anesthesia, will help relieve cervical dystocia.

9. No method of pain relief will improve the strength and length of contractions.

10. No drug including morphine will stop labor, if it really has begun.

Aside from these medical and obstetric considerations, there are no good arguments for or against any anesthetic agent or technique if the right drug is used, and if it is used correctly.

Complications relating to anesthesia should be few, and fatal complications should be zero. Aspiration of vomitus should be prevented by use of regional anesthesia wherever possible. Intentional emptying of the stomach is not practiced as much in these cases as on a general surgical service, because of danger of precipitate delivery, and of increasing hemorrhage. When vomiting has occurred, even in the head down position, the jaws are separated and the contents scooped out. Suction is of no assistance and a waste of time when solid vomitus is present. The pulse must be followed and its state reported at frequent intervals. A sudden weakening or disappearance calls for immediate tracheotomy. The use of a laryngoscope in a mouth clamped tight shut and full of solid food is impossible. Introduction of a blind nasal endotracheal tube only causes tremendous epistaxis and a tube occluded with food. Horizontal incision through the cricothyroid membrane is the quickest, least bloody approach. With moderate extension of the head, the cricoid cartilage holds the lumen of the trachea open, allowing suctioning immediately. We believe tracheotomy preferable to a paralyzing dose of a relaxant in the face of acute anoxia. Although we have not needed to do a tracheotomy on the obstetric service for 17 years, equipment for it is always available.

Hypotension as an anesthetic cause of death ranks as high as aspiration of vomitus. Prophylactic measures consist of bringing blood volume up to normal with blood, or second best, a plasma expander; oxygen therapy for cardiac and pulmonary disease in the antepartum period; frequent blood pressure observations before and immediately after spinal and caudal anesthesia; and putting the legs in stirrups as soon as a patient resumes the supine position after a saddle spinal anesthesia. Therapeutic measures consist of intravenous vasopressor drug, elevating the legs, oxygen therapy, and replacing blood volume. The anesthesiologist should always know what vein he will choose to use next, if an intravenous needle becomes dislodged. The external jugular veins are most useful, while iliac crest or sternal puncture should be kept in mind if venipuncture fails. Headache following spinal anesthesia is an uncomfortable and usually unnecessary complication. Prophylactically, it is unwise to choose that route for anesthesia if history of previous spinal or other severe headache exists. If dehydration is not allowed to occur and if only one small hole is made in the dura, headaches should not occur. Once present, it is successfully treated by introducing generous amounts of saline epidurally. Practically, a catheter is introduced caudally for about 12 inches, and an initial dose of 40 cc. of isotonic saline pushed through the catheter. Usually, ambulation can be undertaken within a few minutes, with marked relief of the headache. To date, 80 cc. has been our maximum initial dose. The catheter is left in place overnight, and a second dose of saline introduced before removing the catheter. Coccygodynia occurs quite frequently after continuous caudal anesthesia even with an easy placement of the needle. This symptom is temporary, and needs no treatment.