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Selection of analgesia and anesthesia for vaginal delivery

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THE SELECTION OF ANALGESIA AND ANESTHESIA FOR VAGINAL DELIVERY

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PART I INTRODUCTION

Anesthesia during delivery was first used by Simpson in 1848. He was subjected to considerable criticism and persecution at that time. After the use of Chloroform by Clark during the birth of Prince Leopold, Queen Victoria's eighth child, anesthesia during delivery became more widely used. Since then it has become established that every woman has the right to as painless delivery as is possible by modern methods. Progress in anesthesia, especially obstetric anesthesia, has been slow and it is estimated that more progress has been made in the last decade than during the preceding century.

This progress brought with it many advantages to the mother and physician in the conduct of a safe, painless delivery but at the same time brought new dangers to the mother and fetus as well as responsibilities to the physician. The physician's responsibilities are readily shown by the many agents and methods of anesthesia available to him during labor and delivery and the statistics showing the risk of these to the mother and fetus.

Many authors have presented statistics illustrating the risk of anesthesia during labor and delivery. Phillips and others[26] made a study at Magee-Women's Hospital in Pittsburgh, Pa. Before World War II maternal mortality was 27.4 with deaths due to anesthesia ranking fourth at 1.5. After World War II maternal mortality was 4.1 with anesthesia ranking second at 0.9. Of the deaths due to anesthesia, approximately one-half were due to aspiration of vomitus. The remainder were due to drug induced vasomotor collapse.

A similar study made by Phillips, Frasier and David[24] in Baltimore, Md. showed similar results. Campbell[3] estimates that anesthesia is a cause or factor in 40 per cent of all maternal deaths.

It is interesting to note the increased relative importance of anesthesia as far as maternal deaths are concerned. In spite of the decreased incidence of maternal deaths due to anesthesia, most feel that this is too high. Many feel that all deaths due to anesthesia are preventable.

The dangers of anesthesia to the fetus have been pointed out by various authors. Bulfin[2] in a series of 445 perinatal deaths listed 7 as due to analgesia and anesthesia. Davis[7] listed the dangers to the fetus as being due to hypoxia, respiratory depression and prolonged labor.

The question then arises as to how a suitable analgesia and anesthesia for labor and delivery is to be chosen and administered. Three broad criteria for anesthesia in general have been advanced by Cullen.[6] These, in order of importance, are the safety of the patient, the needs and convenience of the surgeon and the comfort of the patient.

Obstetric anesthesia, however, is peculiar in several different ways. These all serve to complicate the choice of anesthesia for a given patient. These peculiarities, according to Eastman and Hellman[8], are as follows:

1. There are two patients to consider, the mother and the fetus. The fetus is particularly sensitive to hypoxia and respiratory paralysis. Since most analgesics and anesthetics cross the placental barrier, they exert a depressant effect on the fetus as well as the mother. The fetus is always in a state of low oxygen tension. Therefore, those agents that lower maternal oxygen tension or cause maternal hypotension can cause fetal hypoxia.
2. Labor and delivery is physiologic and in most cases analgesia or anesthesia is not necessary for its safe conduct. This would again indicate that

Mortality due to anesthesia is preventable and makes the choice of anesthesia and analgesia on the basis of safety even more important.

3. Labor may last for many hours. Thus any analgesia used in labor must be suitable for long time use.

4. Labor usually begins without definite warning. Therefore, many obstetric anesthesias have to be administered soon after a full meal which increases the risk of vomiting and aspiration.

The factors mentioned above when added to the normal anesthetic variables in the mother or prematurity or other signs of distress in the fetus make a routine choice of obstetric analgesia and anesthesia impossible. The conduct of each labor should be determined by the condition of the mother as she presents in labor, the condition of the fetus and the experience of the physician. It is important that the physician have at his disposal several different methods of analgesia and anesthesia and that the mother be well prepared and informed by her physician concerning the conduct of labor.

PART II PELVIC INNERVATION

In order to understand the methods of anesthesia in labor and delivery, a knowledge of the source of labor pains and the innervation of the reproductive tract is essential. Labor pains are thought to consist of three components.[14] The first component is the rhythmic pain associated with contractions. These are thought to originate in the corpus and fundus of the uterus. The second component is the backache which is associated with dilitation of the cervix. The third component is due to the stretching of the lower birth canal and perineum. The compression of the bladder and rectum may also contribute to this pain.

The sensory and motor innervation of the uterus is sympathetic in nature. The sensory impulses pass through the uterine, pelvic, hypogastric and aortic plexuses to the dorsal roots of the eleventh and twelfth dorsal segments.[13] The motor nerves originate from the fifth to the tenth dorsal segments and pass to the uterus through the aortic, hypogastric, pelvic and uterine plexuses.

The innervation of the cervix is essentially the same as that of the uterus and enters the spinal cord at the eleventh and twelfth dorsal segments.[14]

The innervation of the external genetalia and perineum is chiefly by the pudendal nerve whose branches are the inferior hemorrhoidal nerve, the perineal nerve and the dorsal nerve of the clitoris.[14] Additional innervation is from the ilip-inguinal nerve. These nerves arise from the first, second, third, fourth and fifth sacral segments.

Fortunately, the pattern of innervation is such that the lower segments are sensory in nature as far as labor is concerned with the motor segments above these. Thus, it is possible to block the sensory putput of the uterus, cervix, external genetalia and perineum without interfering with the motor function of the uterus.

PART III SYSTEMIC ANALGESIA

A number of drugs have been used as analgesics during labor. These include the barbiturates, narcotics, anticholinergics and tranquilizers. A great deal has been written about each but there seems to be a great deal of difficulty of control during a series of cases and the establishment of criteria for evaluation. All of these agents can have ill effects on the mother and the fetus. These range from excitement in the mother to respiratory depression of the fetus. All of these agents cross the placental barrier and therefore will have ill effects on the fetus, if present in excessive amounts.

There are, however, some effects which apparently work in some cases to protect the fetus from excessive depression. Root[28] showed that after an injection of secobarbital, the maternal blood level was initially high but within 5-10 minutes dropped to a relatively stable level. The fetal blood levels, however, started out low and rose rapidly to a level slightly below that of the mother and continued in this manner.

He felt that since the mother was often asleep and the infant awake, the blood levels of secobarbital were poorly correlated with its clinical effects. He further felt that the effects on the central nervous system may have been more a result of the initial high blood level than the following lower but steady level. These effects, though often present, are not consistently present as evidenced by the delivery of a depressed child from a mother who is awake.

King[17] in experiments with rats had some interesting results with pentobarbital. He showed that it disappeared slower in pregnant rats than in males or nonpregnant females. The fetal levels were 90 per cent of the maternal levels at 2-4 hours and 75 per cent at 12 hours. He also found that pentobarbital was present in amniotic fluid and that there was no fetal detoxification. The drug was eliminated only by maternal feedback.

Meperidine is one of the chief narcotics now used in obstetrics. Shnider and Maya[32] felt that 3 factors determined its effect on the fetus. These were the dose, route of administration, and the time between administration and delivery. They tested only the last factor. They found that within 1 hour of administration there was no significant difference

with the controls. From 1 to 2 hours, there was an increase in fetal depression. This was true even with doses as low as 50 mg. The period of depression was prolonged with increased doses or when barbiturates were administered simultaneously.

Spellacy and others[33] made a study of the effects of meperidine with secobarbital, hydroxyzine or a placebo on labor and delivery. In their series of 235 cases, all delivered with pudendal block, they found no significant difference in the length of labor, the Apgar rating of the infant or the bilirubin levels. They, however, reported that the group that received secobarbital had better pain relief than the other groups which were about the same when compared with each other.

Kliger and Nelson[18] made a study of fetal depression using meperidine and propriomazine. They divided 521 patients into four groups. One group received 100 mg. of meperidine, the second 50 mg. of meperidine and the third 50 mg. of meperidine and 20 mg. of propriomazine. The last group served as a control and received nothing. They found that 100 mg. of meperidine was effective but when repeated depressed the infant. The second group did not report significant pain relief. The third group reported significant

pain relief and the dose could be repeated as needed without depressing the infant.

Powe and others[27] reported on a study using meperidine and propiomazine or promethazine. Their patients were divided into three groups. One received 50 mg. of meperidine, the second had 20 mg. of propiomazine added and the third 50 mg. of promethazine added. These were repeated as needed. They reported the average Apgar rating of the infants in each group about the same. The latter two groups, however, reported better pain relief than the first group. Inmon[16] made a similar study using hydroxyzine and concluded that with the tranquilizer patients were more comfortable and better sedated with no significant infant depression. He also felt that the tranquilizer decreased the dose of meperidine necessary.

Most authors seem to agree that anticholinergics contribute to amnesia during labor. However, it frequently causes excitement and therefore the patient must be watched closely to prevent injury. One possible indication is the possibility of the use of inhalation anesthesia during delivery. Most feel that if a dose of atropine is given within 20-30 minutes[11] of the induction of anesthesia, the desired effect will be obtained.

PART IV CONDUCTION ANESTHESIA

Pudendal nerve block is probably the simplest of the conduction methods and is considered by many to be the safest method of obstetric anesthesia. Its simplicity, safety and lack of ill effects on the gastro-intestinal and respiratory systems are its chief advantages. The technique of this method is that the pudendal nerve is blocked transvaginally or transperineally in the region of the ischial spine. A variety of agents can be injected to accomplish this. This method does not relieve pain due to cervical dilitation or uterine contractions. If relief from this pain is needed, other methods of anesthesia must be used or the pudendal block may be supplemented with another method.

A number of authors have related their experiences with this method. The chief disadvantages pointed out are the possibility of breaking a needle during injection, intravascular injection of the anesthetic solution or an idiosyncrasy to the drug used.[14]

Scudamore and Yates[29] felt that the transperineal pudendal block offered little relief of pain and that most relief was a result of the local infiltration of the vulva carried out at the time of injection. They reported that 37 per cent of their cases were a complete success, 44 per cent unilateral success and 19 per cent failures. They reported that the transvaginal method was about twice as effective as the transperineal method.

Kobak and Sadove[19] felt pudendal block to be inadequate in many cases since it offers no relief during the first stage of labor. They reported good to excellent relief of pain in a series of 100 patients where both paracervical and pudendal blocks were used. The paracervical block was done at 4 to 5 centimeters of cervical dilitation and the pudendal block when complete. Of their patients, 59 percent also received meperidine and a tranquilizer during labor. They reported no maternal complications and no fetal deaths related to the anesthetic. They reported that epinephrine seemed to lead to an increased incidence of fetal bradycardia and therefore it was not used in the latter part of the series.

Brown, Engel and Douglas[1] reported on a series of 160 patients using paracervical block as anesthesia in labor. Of their patients, 83 per cent had good to

excellent results. They reported no serious maternal complications and transcient fetal bradycardia in 3.7 per cent of their cases.

Seley and Gold[30] reported on the management of 75 patients using paracervical block. Their technique was to inject 10 cc. of mepivicaine at 3 and 9 o'clock and 5 cc. of mepivicaine at 5 and 7 o'clock. This was done at 3-5 cm. of cervical dilitation. They reported that 76 per cent of their patients had excellent relief of pain. They, however, felt that all should have some type of systemic analgesia such as 25 mg. of promazine.

Nyirjesy and his group[23] reported on a group of 68 patients. They found that 15 pf their patients had fetal bradycardia after paracervical block. Paracervical block was felt to contribute to the death of one infant whose weight was 2000 g. and was at 35 weeks gestation. The mother was toxemic. Fetal bradycardia began soon after paracervical block with heart sounds absent after three minutes. They, however, reported good pain relief in their series and no evidence of any influence on the duration of labor.

Freedman, Tafeen and Harris[9] felt that fetal bradycardia following paracervical block was due to the rapid absorption of the anesthetic. They developed

a method of continuous paracervical block using a hooked polyethylene catheter which was left in place during stage I. The anesthetic solution was then given more frequently in smaller doses. They reported a decreased incidence of fetal bradycardia.

Epidural blocks have been reported for several years. In this method, the anesthetic solution is introduced into the epidural space by one of two approaches, the lumbar approach or by the caudal canal.

Cowles[4] reported on a series of 235 patients delivered with lumbar epidural anesthesia. He used 20 cc. of 1 per cent lidocaine. This was repeated each 45-60 minutes up to 5 times as needed. The repeated doses were introduced through a plastic catheter or a malleable needle which was left in place. He reported that 95 per cent of his patients had good pain relief. There were no fetal complications. Forceps rotation was three times that of a control group. This was felt due to the increase in muscular relaxation of the perineum.

Hellman[12] reported on a series of 26,127 cases where epidural anesthesia was used. He reported the following incidence of complications: total spinal anesthesia 0.04 per cent, convulsions 0.063 per cent,

hypotension (less than 80 mm. systolic) 1.3 per cent, occasional drowsiness, shivering, nausea, dural puncture, headache and transcient parasthesia. He reported no infection or paraplegia. Five contra-indications to epidural anesthesia were listed. These were abnormal clotting mechanism, infection at the site of injection, neurologic disorders, disorders of the lumbar skeletal system and previous dural puncture within one week. He went on to state that epidural anesthesia was the safest method known at that time.

Gunther and Harer[10] reported on a series of 531 patients given caudal anesthesia. In their series they used mepivicaine because they felt it acted longer and faster than lidocaine. They reported a 1 per cent solution as effective as 1.5 per cent solution. They concluded that the response was more dependent on the volume (30 cc.) of the solution used than the concentration. The felt that the lower concentration resulted in fewer complications because of the lower total dose. Of their patients, they were unable to place the needle in only four. A single injection was used in 91 per cent. The remainder had two injections of one-half the original volume. Ten

per cent had a fall in blood pressure of greater than 20 mm. systolic. Vasopressors were used in 6 per cent of the cases. They also reported an increased incidence of mid forceps deliveries due to perineal relaxation. They felt that mepivicaine was well tolerated by the mother and fetus. They reported that 493 of their patients had excellent pain relief and the remainder had good pain relief.

Another type of conduction anesthesia is saddle block. In this method, a hyperbaric anesthetic solution is introduced into the subarachnoid space while the patient is sitting upright. She maintains this position for 20-30 seconds after injection and then lies down. In this way, the block is confined to the area below the eleventh or twelfth dermatomes. The same precautions should be followed as for epidural anesthesia.

Phillips and others[25] reported on 2016 cases of spinal anesthesia. They reported the following frequency of complications: multiple puncture 4.4 per cent, hypotension 3.3 per cent, nausea and vomiting 1.6 per cent, bloody tap 1.6 per cent, lumbar spinal headache 0.9 per cent, paresthesia during puncture 0.7 per cent, high spinal 0.1 per cent and less than 0.1 per cent neurologic sequelae. In their series

only 1 per cent required any supplementary anesthesia or analgesia.

PART V INHALATION ANESTHESIA

The more popular inhalation agents used in obstetric anesthesia are nitrous oxide, cyclopropane, ethyl ether and halothane. Each has its own indications as well as dangers.

The chief advantages of nitrous oxide are that it is nonflammable, it has a pleasant odor and induction and recovery are rapid. Its chief disadvantage is its low potency as an anesthetic.[21] It is difficult to obtain anesthesia deeper than the first plane. Even at this level, a mixture of 20 per cent oxygen with 80 per cent nitrous oxide is necessary. When this is attempted, there is always a danger of hypoxia. This can lead to damage to the cerebral cortex, convulsions and even death. Thus, nitrous oxide is often restricted in use to induction of mixed with another agent at the onset.

Hustead[15] listed four uses of nitrous oxide during labor and delivery. These are psychologic hypalgesia,

pharmacologic hypalgesia, amnesia and surgical anesthesia. Psychologic hypalgesia is obtained by three or four breaths of a 75-80 per cent mixture of nitrous oxide with air. Pharmacologic hypalgesia is obtained by induction with a 80 per cent mixture and then reducing the concentration as tolerated to 30-50 per cent. Amnesia is obtained at 5-40 per cent above the hypalgesic concentration. The use of nitrous oxide for surgical anesthesia is only for induction.

Cyclopropane has the advantage that all stages of anesthesia and muscular relaxation can be obtained without the danger of hypoxia.[22] However, it is explosive, can lead to cardiac arrhythmias and recovery is sometimes accompanied by nausea and vomiting. It crosses the placental barrier within 5-10 minutes and causes fetal depression.

Ethyl ether also can be used to obtain sufficient anesthesia and relaxation for obstetric maneuvers. Induction is difficult and therefore nitrous oxide is often used for induction. It causes fetal depression and is almost invariably followed by nausea and vomiting.

There has been a good deal of controversy about the use of halothane in obstetrics. It is a potent, nonexplosive anesthetic with which induction and recovery are rapid and rarely accompanied by nausea

and vomiting. There is a tendency toward uterine relaxation, hemorrhage and jaundice with halothane.

Wilson and Vandewath[36] reported on a series of patients with whom halothane was used. They reported no increased incidence of fetal death or hemorrhage when used for vaginal delivery. They did, however, report an increase in the incidence of hemorrhage when used for cesarean section. They reported no jaundice in their patients. They related the incidence of complications to the length and depth of the anesthesia.

Koefoot[20] reported on a series of cases in which he used halothane. He concluded that if the concentration of halothane were held between 0.5 and 1 per cent that there was no significant uterine relaxation. He felt that there was a decreased incidence of vomiting. Others such as Crawford[5] feel that halothane has no place in obstetric anesthesia.

PART VI CONCLUSIONS

The choice of an obstetric anesthesic then rests upon a number of variables which must be considered in each case. The mother presents probably the greatest variety of variables. Among these are her degree of cooperation, recent ingestion of food, presence of respiratory or skin infection, central nervous system disease, heart disease, toxemia, presence of low back injury and a precipitous labor. The fetus should be observed for prematurity, presentation and signs of distress. The type of personnel available and their experience must also be considered. Finally, the physician and his experience should be considered.

The methods of analgesia and anesthesia to be used during the stages of labor have been listed as follows by Vandam.[34] During the first stage of labor, nothing can be used or any of the following singly or in combination: barbiturates, narcotics, tranquilizers, intermittent general anesthesia and regional anesthesia such as paracervical block, epidural or saddle block.

During the second stage of labor, general agents such as nitrous oxide, cyclopropane, ether or halothane can be used. Regional anesthesia such as pudendal block, local infiltration, saddle block or epidural anesthesia can be used. Also, as in the first state no anesthesia may be used.

The analgesia and anesthesia used during the first stage of labor deserves further discussion. First, the use of systemic agents will be discussed. Among these are the barbiturates, narcotics and tranquilizers. The chief dangers of the use of these agents are fetal depression and a delay in the progress of labor. Therefore, these agents should not be given until labor is well established and there is progressive dilitation of the cervix. The conduct of labor should be planned so that these drugs are not given within two hours of the expected time of delivery.

In the case of narcotics, narcotic antagonists can be injected before delivery or into the umbilical vein of the infant to combat respiratory depression.[11] The use of narcotic antagonists should be restricted to cases where respiratory depression is due to narcotics. Otherwise, they will increase depression rather than alleviate it.

When using these drugs, their basic action should be remembered. The narcotic drugs are the only ones acting as analgesics at ordinary doses. The barbiturates act only as hypnotics. The tranquilizers relieve tension and possibly potentiate the action of narcotics.

In all cases, the use of these drugs should be held to a minimum. Perhaps the best way to accomplish this is to have a patient who has been prepared throughout her prenatal period. She will know what to expect and understand the pregression of labor thus being less anxious and better able to cooperate. The reassurance and understanding of her physician, the nurses and others in contact with the patient during labor will also lessen the need for such agents during labor.

The second method of analgesia and anesthesia during labor is by conduction anesthesia. The methods available are paracervical block, epidural block and saddle block. Paracervical block has the advantage of simplicity and relative safety. It is especially valuable when used in connection with pudendal block during the second stage of labor. Paracervical block demands the presence of a person skilled in its administration and therefore may make undue demands upon a physician*s time.

The chief disadvantages of caudal block are the possibility of hypotension and the need for skilled personnel. It should never be administered unless intravenous solutions and vasopressors are immediately available. It can be used to relieve pain during both the first and second stages of labor.

According to Sherline, Epstein and Seymour,[31] the indications for epidural anesthesia are premature birth, maternal cardiovascular problems and recent food ingestion if other regional methods are not to be used. They state its contraindications as being precipitous labor, the need for immediate delivery, hemorrhage with present or impending shock, the possibility of the need for intrauterine manipulation, infection or dermatitis at the site of injection, central nervous system disease, history of low back injury or backache and any anatomic variation which might make placement of the needle difficult.

Saddle block has been declining in use in many centers as more caudal blocks are being used. The indications and contraindications of this method according to Sherline's[31] group are much the same as for caudal block. They felt that its main indication was a rapid labor in which there was insufficient

time for anesthesia to develop if a caudal block were given. An additional contraindication was a stormy second stage of labor. They felt that since saddle block increased uterine tone, it may cause premature separation of the placenta.

During the first stage of labor, intermittent general anesthesia with nitrous oxide or cyclopropane may be used. The same contraindications for its use here would apply as during the second stage.

Anesthesia during the second stage of labor can be either a general anesthetic or a conduction anesthesia. Sherline's group[31] listed the following as indications for general anesthesia during delivery: the need for instant anesthesia, shock or impending shock, the need for uterine relaxation and a contraindication for regional block. Their list of contraindications included the recent ingestion of food, the presence of an upper respiratory infection and prematurity of the fetus.

Regional methods except for pudendal block have already been discussed with the methods used in the first stage of labor. Pudendal block is a simple method and is especially valuable when no one is available to administer other regional anesthesia.

Its main disadvantages are that it relieves pain only from distension of the lower birth canal, vulva and perineum and the danger of intravascular injection of the anesthetic solution.

The use of hypnosis for labor and delivery has been discussed by various authors. All emphasize that the patient must be well prepared in advance. Even if not fully successful, it often reduces the need for other agents.[35] Many aspects of the preparation for hypnosis involve things that should be done no matter what method of analgesia and anesthesia is used during labor and delivery.

In general, it should be emphasized that with modern methods a woman can be relatively comfortable during labor and delivery. The use of analgesics and anesthetics should be held to a minimum. Unless contraindications to regional anesthesia are present or there are specific indications for general anesthesia, general anesthesia should be avoided.

GENERIC AND TRADE NAMES MENTIONED

Generic name	Trade name
Halothane	Fluothane
Hydroxyzine	Vistaril, Atarax
Lidocaine	Xylocaine
Meperidine	Demerol
Mepivicaine	Carbocaine
Pentobarbital	Nembutal
Promethazine	Phenergan
Promazine	Sparine
Propriomazine	Largon
Secobarbital	Seconal

BIBLIOGRAPHY

1. Brown, E. O., Engel, T, and Douglas, R. G.: Paracervical Block Analgesia in Labor. Ob and Gyn 26/2 (195-200) 1965

2. Bulfin, M. J.: Lessons Learned From Perinatal Death Studies. Ill Med J 124/6 (534-537) 1963

3. Campbell, S. M.: Anesthesia--A Preventable Cause of Maternal Mortality. Clin Obstet & Gyn 6/4 (874-878) 1963

4. Cowles, G. T.: Experiences With Lumbar Epidural Block. Ob and Gyn 26/5 (734-739) 1965

5. Crawford, J. S.: The Place of Halothane in Obstetrics. Brit J Anaesth 34 (386-390) 1962

6. Cullen, S. C.: Anesthesia. Year Book Medical Publishers, Inc. 1961

7. Davis, E. M.: Survey of Clinical Factors in the Prevention of Perinatal Mortality After Period of Viability. Clin Obstet and Gyn 4/2 (417-438) 1961

8. Eastman, N. J. and Hellman, L. M.: Obstetrics. Appleton-Century-Crofts, Inc. 1961

9. Freedman, P. D., Tafeen, L. L. and Harris, J. C.: Curled Catheter Stays Put. Med World News (91-92) Oct. 29, 1965

10. Gunther, R. E. and Harer, W. B.: Single Injection Caudal Anesthesia. Am J Ob Gyn 92 (305-309) 1965

11. Hartridge, V. B.: Anesthesia for Obstetrics. Surg Clin No Amer 45/4 (9619973) 1965

12. Hellman, K.: Epidural Anesthesia in Obstetrics: A second Look at 26,127 cases. Canad Anaesth Soc J 12/4 (398-404) 1965

13. Hingson, R. A. and Cull, W. A.: Conduction Anesthesia and Analgesia for Obstetrics. Clin Obstet and Gyn 6/4 (87-107) 1961

14. Hingson, R. A. and Hellman, L. M.: Anesthesia for Obstetrics. J. B. Lippincott Company 1956

15. Husted, R.: Nitrous Oxide in Obstetrics. Clin Anesth 1 (97-114) 1964

16. Inmon, W. B.: A study of the Effect of Hydroxyzine Hydrochloride on Labor and Delivery. Am J Ob Gyn 86 (853-55) 1963

17. King, J. E.: Sex Divverences in the Response of Rats to Pentobarbital Sodium. Am J Ob Gyn 89 (1019-25) 1964

18. Kliger, B. and Nelson, H. B.: Anesthesia and Fetal Depression with Intravenous Meperidine and Propiomazine. Am J Ob Gyn 92 (850-55) 1965

19. Kobak, A. J. and Sadove, M. D.: Combined Paracervical Block and Pudendal Nerve Block--A Simple form of Transvaginal Anesthesia. Am J Ob Gyn 81/1 (72-79) 1961

20. Koefoot, T. Jr.: The Use of Fluothane in Obstetrics. Nebr Med J 48 (216-218) 1963

21. Kretchmer, H. E. and Vasicka, H.: Inhalation Anesthesia in Obstetrics. Clin Ob and Gyn 4/1 (68-85) 1961

22. Lund, P. C.: The Choice of Anesthesia in Obstetrics. Arizona Med 20 (121-30) 1963

23. Nyirjesy, I., Hawks, B. L., Hebert, J. E., Hopwood, H. G., and Falls, H. C.: Hazards of Paracervical block. Am J ObGyn 87 (231-35) 1963

24. Phillips, O. C., Frasier, T. M. and Davis, G. H.: Factors in Obstetric Mortality. Am J ObGyn 87 (71-76) 1963

25. Phillips, O. C., Nelson, A. T., Lyons, W. B., Graff, T. D., Harris, L. D., and Frazier, T. M.: Spinal Anesthesia for Vaginal Delivery. Ob and Gyn 13/4 (437-41) 1959

26. Phillips, O. C., Jaroslav, F. H., Vincent M. and Cristy, W. C.: Obstetric Mortality: A 26 Year Survey. Ob and Gyn 25 (217-22) 1965

27. Powe, C. E., Kiem, I. M., Fromhagen, C and Cavenagh, D.: Propiomazine Hydrochloride in Obstetric Analgesia--A Controlled Study of 520 Patients. JAMA 181/4 (290-94) 1962

28. Root B.: Analgesia, Sedation and Amnesia. Clin Ob and Gyn 4/1 (51057) 1961

29. Scudamore, J. H. and Yates, M. J.: Pudendal Block--A Misnomer. Lancet 1/7427 (23-24) 1966

30. Seley, J. E. and Gold, E. M.: Paracervical Block in the Management of Labor. Ob and Gyn 27/1 (116-21) 1966

31. Sherline, D. M., Epstein, H. M. and Burge, E. S.: A Changing Trend in Obstetric Anesthesia: Four Year Report. Post Grad Med 32 (476-80) 1962

32. Shnider, S. M. and Maya, F.: Effects of Meperidine on the Newborn Infant. Am J Ob Gyn 27/2 (209-15) 1964

33. Spellacy, W. N., Shattuck, C. A. and Loffer, F. D.: A Double Blind Study of Comparative Effects of Meperidine with Secobarbital, Hydroxyzine or a Placebo on Labor and Delivery. Ob and Gyn 21/2 (290-93) 1966

34. Vandam, L. D.: Anesthesia for Obstetrics. New Eng J Med 270 (1299-301) 1964

35. Weinbert, G.: Hypnosis in Obstetrics and Gynecology. Clin Ob Gyn 6/2 (486-513) 1963

36. Wilson, K. B. and Vandewath, S. L.: Halothane in Obstetrics--Five Years Experience. Anesth Analg 44 (34-38) 1965