ANALGESIA AND ANESTHESIA IN OBSTETRICS

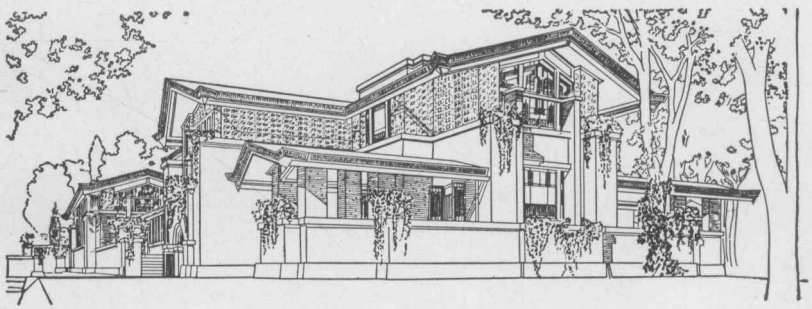
J. P. GREENHILL, M.D.

Analgesia and Anesthesia In Obstetrics

By

J. P. GREENHILL, M.D.

Professor of Gynecology
Cook County Graduate School of Medicine
Attending Gynecologist, Cook County Hospital
Attending Obstetrician and Gynecologist
Michael Reese Hospital
Associate Staff, Chicago Lying-in Hospital
Chicago, Illinois



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ANALGESIA AND ANESTHESIA IN OBSTETRICS

I

INTRODUCTION

ANALGESIA and anesthesia are now widely used during labor throughout the world but much more extensively in the United States than anywhere else. This is fortunate for American women, but the blessing is far from a perfect one. Every year a significant number of babies and many mothers die as the direct or indirect result of analgesia and anesthesia. In most instances the deaths result from injudicious use, either because the choice of the agent was erroneous, or because too much was used. However, occasionally even when a satisfactory dose of the proper analgesic or anesthetic agent is used a fatality may result.

By the term "analgesia" I mean "relief of pain," and by the word "anesthesia" I imply "loss of sensation or feeling." There may be general loss of sensation such as that produced by inhalation or intravenous anesthesia or local loss of feeling such as that induced by spinal, caudal or direct infiltration anesthesia. If loss of consciousness is used as the criterion of anesthesia, then the only anesthetic agents are those administered by the inhalation and intravenous routes. All the pain relievers, including spinal, caudal and local would then be called analgesics and not anesthetics. Of course, inhalation agents are both analgesic and anesthetic.

The striking increase in hospital deliveries during the last few years to reach about 86 per cent of all live births in the United States is the chief factor in the increased use of anal-

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gesics and anesthetics. When labor is conducted in the home, considerable restriction is placed on the use of obstetric analgesia. In the hospital a trained staff is in attendance throughout labor and, therefore, a wider choice of methods of analgesia is available than is possible in the home. Drugs are given throughout the entire labor rather than merely near and at the end of labor. Many agents to induce analgesia, amnesia and anesthesia are available.

The action of pain-relieving drugs, when administered during labor, involves complications which extend far beyond the range of the usual problems of anesthesia. The relief of pain becomes inseparably linked with factors concerned in labor when life or death may be in the balance, especially that of the child. The pain-relieving drugs used during labor are among the most powerful substances known in pharmacology. Their influence on the outcome of labor is so great that the risk involved for the mother and the child may be out of all proportion to the gain in pain relief. The selection of the drug and its dosage is an obstetric problem of the first magnitude.

II

AGENTS USED FOR OBSTETRIC ANALGESIA

THE ANESTHETIC agents which are used in obstetrics may be divided into four groups from the standpoint of their mode of administration:

1) Agents which are given by the hypodermic, oral or rectal route. These include morphine, scopolamine, meperidine (demerol), barbiturates, paraldehyde and Gwathmey's synergistic analgesia.

2) Inhalation agents, chiefly ether, ethylene, nitrous oxide, cyclopropane, chloroform and trichlorethylene (trilene).

3) Intravenous anesthesia, chiefly with pentothal sodium.

4) Block anesthesia, including spinal anesthesia, caudal injections, saddle block and direct infiltration. The drugs generally used for this purpose are procaine, metycaine, pontocaine and nupercaine.

The easiest agents to administer are the nonvolatile agents, including morphine, the barbiturates and meperidine, but this is not matched by simplicity in their action. Undesirable effects on the child and on labor may be of such magnitude that special precautions in their use are essential for safety. Despite the difficulties in the use of continuous spinal and caudal injection, the drugs used for spinal nerve block have negligible direct effects on the baby, although this is not the case in respect to their effect on the mother or on labor. Administration requirements limit the use of inhalation agents, but the control of their action from moment to moment and the wide range of analgesic effects promptly elicited with them, make them safe for obstetric analgesia.

A patient should not be told that labor will be entirely pain-

less. All that should be promised is relief of most of the pain of the first stage of labor and almost all or all of the pain in the latter part of the first and second stages. Furthermore, every woman presenting herself for antepartum care should be relieved of as much of the fear of labor as possible. Primigravidas who are frightened by friends and relatives should be assured that there is no ground for this fear, that most of the pain of labor will definitely be removed, and that the persistence of their fears may aggravate the pains of labor and perhaps complicate delivery.

There is usually no reason to prescribe drugs or sedatives during the early part of the first stage of labor for the patient who approaches labor in a calm and satisfactory psychologic state. Unless there is some contraindication, the patient should be encouraged to remain up, either sitting or walking about, until pains recur at fairly frequent intervals; that is, from six to 10 minutes. When there is evidence that labor is progressing normally, that the cervical canal is effaced and that the cervix is dilated several centimeters, analgesic medication is prescribed.

There is no single drug or method which is entirely satisfactory. To work out a procedure with which the obstetrician can accurately judge the relative merits of a given drug or method, and thus adapt the medication to fit the patient and the circumstances of the moment, four factors must be considered: (1) the amount of pain relief afforded; (2) the effect on the child; (3) the effect on the mother and especially on the labor mechanism; and (4) the facilities necessary for the safe use of the drug, such as the availability of trained anesthetists, nurses and special equipment for the use of the analgesic or anesthetic agent and to prevent and overcome complications which may result from the analgesic or anesthetic.

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III

HYPODERMIC, ORAL AND RECTAL AGENTS

MORPHINE

In spite of the well-known superiority of morphine and its derivatives for the relief of pain in many fields of medicine, it was not used widely for obstetric analgesia until scopolamine was introduced in 1902 as an adjuvant agent. Recent work has focused attention on the effect of morphine on the labor mechanism and has emphasized the importance of withholding morphine until there is evidence that the expulsive mechanism is functioning normally.

Potency in the Relief of Pain. The pain-alleviating action of morphine is related to three properties, according to Wolff, Hardy and Goodell: (1) elevation of the threshold at which pain is first perceived; (2) alteration of the usual psychologic reaction to pain, replacing anxiety and fear with feelings of indifference; and (3) induction of lethargy and sleep. Elevation of the pain threshold by morphine may amount to 100 per cent; the peak is reached at 90 minutes after 10 or 15 mg. (1/6 or 1/4 grain) is given intramuscularly. However, this threshold-raising effect is decreased or abolished if pain is present before the drug is injected, before morphine can exert its influence on the nerve cells. Hence, to account for the effectiveness of morphine we must turn to other effects, especially the psychologic interpretation of pain. Clinical observation clearly shows that with morphine and its derivatives it is possible to alter the interpretation of pain to a maximal degree in a desirable direction. Pain is not abolished with morphine but it seems to have much less importance. By altering the emotional response to pain and replacing the usual

anxiety, fear or panic with an attitude of indifference and freedom from anxiety, an opportunity is afforded for relaxation and even sleep between the intermittent pains of labor.

Effect on the Child. While the chief hazard in the use of morphine in obstetric analgesia is asphyxia of the baby, it is difficult to explain satisfactorily the origin of the asphyxia and, therefore, to prevent it. The question is whether the direct action of morphine on the baby, as a result of rapid transmission across the placenta, is the chief cause of the asphyxia, or whether interference in the mechanism of labor, decreasing the oxygen supply of the child, is the principal causative factor. Drug depression independent of anoxemia is of limited duration while oxygen want may be fatal. Observations on women who are morphine-addicts have shown that huge doses of the drug are tolerated by the fetus when given daily to the mothers for weeks or months throughout pregnancy; their children may survive, sometimes showing signs of morphinism. In contrast, a few milligrams of morphine administered during labor may lead to severe asphyxia of the child at birth; this suggests anoxic injury and narcosis. In premature babies the hazard is dangerously increased; hence, morphine is contraindicated in the presence of small babies. The administration of morphine within three hours of delivery greatly increases the incidence of narcotic depression at birth; the direct effects of morphine on the child reach a peak about one and a half hours after 10 mg. (1/6 grain) is given.

Effect on Labor. Morphine may prolong labor and thus increase the risk of fetal anoxemia. The variability of the functional efficiency of the labor mechanism in different women is increased after morphine and suggests that latent deficiency of the expulsive force is exaggerated. Morphine causes a delay in uterine emptying as well as in gastro-intestinal emptying. In causing fetal asphyxia, there is evidence that the action of morphine on smooth muscle is more important than its action on the respiratory center. Since prognosis as to the functional

state of the labor mechanism depends on direct observation during labor, morphine should be withheld until normal function is established.

SCOPOLAMINE

The introduction of scopolamine into obstetrics in 1902 was accompanied by great fanfare. The purpose of this drug was pain relief throughout labor and not merely at the time of delivery. It was based on the premise that the addition of scopolamine to morphine definitely enhanced the degree of analgesia attained by morphine but without the risk of fetal asphyxia. It was soon noted that the chief characteristic of scopolamine was its power to induce amnesia. Pain is felt during labor, but the memory of it is fragmentary or absent. Along with loss of memory, other mental processes are deranged. Behavior in the presence of environmental stimuli, especially pain, may be beyond rational control, and emotional responses are unpredictable. The disadvantages of the use of scopolamine during labor are the restlessness, excitement, hallucinations and delirium which the drug may induce, especially in the presence of pain. The prevention of these undesirable effects by regulating the dosage is difficult since psychologic effects are involved which vary widely in type and intensity despite a fixed dosage. Constant supervision of the patient by a trained staff is essential when scopolamine is used to induce amnesia during labor.

Potency in the Relief of Pain. According to quantitative measurements the pain threshold is not altered by scopolamine alone. Depressant effects on mental activity and certain motor responses are evident after the injection of 0.5 mg. (1/120 grain) of scopolamine; this effect becomes more pronounced when given along with 10 mg. (1/6 grain) of morphine. At a dosage level sufficient to induce complete amnesia with scopolamine alone, excitement is so great that physical restraint of a large percentage of patients is necessary.

Effect on the Child. No significant effect on the baby's respiratory system has been noted, although scopolamine readily passes across the placenta to the child.

Effect on Labor. No direct effect on the activity of the uterus during labor has been demonstrated.

The chief use of scopolamine has been in combination with other drugs such as morphine, rectal ether, paraldehyde and the barbiturates; the aim is to obtain amnesia and to control excitement. Each of these drugs passes readily into the baby's circulation, and may have a significant influence upon the outcome of labor. The effect on the mother and the baby varies with each drug, being different in duration, time of onset and potency. A new problem is presented by each drug when it is combined with scopolamine in obstetric analgesia.

MORPHINE AND SCOPOLAMINE

I employ 10 mg. (1/6 grain) of morphine sulfate and 0.4 mg. (1/150 grain) of scopolamine hydrochloride or 100 mg. (1½ grains) of demerol and 0.4 mg. (1/150 grain) of scopolamine hydrobromide with about equal frequency. I seldom give more than one dose of morphine and scopolamine and this is generally administered when the labor pains occur regularly at intervals of three or four minutes and the patient complains of pain. Usually at this stage the cervix is considerably effaced and dilated, about 3 or 4 cm. If labor is progressing rapidly, especially in a multigravida, there is no need to give an analgesic. There are three reasons for this: (1) the sedative may retard the progress of labor; (2) it may affect the baby because not enough time will elapse for the drug to be eliminated from the mother and the baby; and (3) the most severe pains of the second stage can be relieved by some form of local, inhalation or other anesthetic.

According to Chesler and Himwich, infant rats, both *in utero* and postpartum, are more resistant to the acute effects of morphine than adults because of the greater resistance of

their respiratory centers to the depressant effects of this drug. Snyder and Geiling proved that after morphine is administered to rabbits there is a definite increase in stillbirths. This is due to the effect of morphine on the mechanism of labor and not directly on the fetus. The latter is resistant to asphyxia in spite of large doses of morphine.

Instead of morphine other opium derivatives may be used, such as pantopon, the usual dose of which is 20 mg. (1/3 grain), and dilaudid, in a dose of 1.3 mg. (1/48 grain).

Twilight Sleep. When repeated doses of scopolamine are given with one or more injections of morphine, a form of analgesia and amnesia is produced which was popularized in Freiburg many years ago. The Freiburg method is as follows: After labor is well on its way, when the pains are four or five minutes apart and last 30 or more seconds, the first injection is given. This consists of 10 mg. (1/6 grain) of morphine and 0.4 mg. (1/150 grain) of scopolamine. Forty-five minutes after the first injection another one is given, but only 0.3 mg. (1/200 grain) of scopolamine is used. After this the injections are given every hour, using 0.2 to 0.4 mg. (1/300 to 1/150 grain) of scopolamine and, in prolonged labors, an occasional dose of morphine, 7.5 mg. (1/8 grain). The object is to maintain the patient in a state of amnesia and this is determined by testing her memory. Shortly after the second injection the patient is asked if she remembers what has gone before and whether she has seen the nurse or intern. If she remembers, another dose is given. If not, nothing is done for an hour when, if the mind seems clearer, 0.2 mg. (1/300 grain) of scopolamine is given. Usually after one and a half hours the patient drops off to sleep, the face reddens, the throat becomes dry, the pupils contract, the conjunctivas become congested, the pulse is 90 to 120 and the skin is slightly warm and dry. During the pains the patient moves about restlessly, turns from side to side, or grunts a little and occasionally opens her eyes, only to drop off to sleep again when the pain passes. She

will respond to questions, but incoherently. As the second stage draws near its end she becomes restless. Occasionally several persons are required to hold her to prevent her from clutching the perineum with her hands.

The patient wakes up within one to six hours after delivery and usually has little or no recollection of labor. The degree of amnesia varies considerably and the state of the patient during labor is no criterion of the depth of the amnesia.

I am opposed to twilight sleep for the following reasons: (1) Restlessness is produced in many women and thus constant and ample supervision is required. The method is particularly not applicable in a home because a patient may have to be restrained physically by one or more individuals for long periods of time. (2) Asepsis is difficult to maintain because of the tendency of many women to try to insert their fingers into the vagina and because of restlessness during actual delivery. (3) The incidence of operative delivery is distinctly increased. (4) The neonatal mortality is increased because of the cumulative effect of the drugs on the child's respiratory center and because of the increased necessity for operative intervention.

MEPERIDINE (DEMEROL)

Meperidine (demerol) is being used as a substitute for morphine more and more; it possesses a mild atropine-like action and has no relation chemically to the opiates. The pain threshold-raising effect of meperidine lies between that of morphine and codeine. In analgesic effect, a dose of 100 mg. (1½ grains) of meperidine has been compared with that of 10 mg. (1/6 grain) of morphine, although the duration of its action is briefer. The psychologic responses after meperidine are less regular than after morphine. Transient euphoria may occur or, on the other hand, anxiety and apprehension may be evident. Habituation may occur but is less likely than that following morphine. Lethargy, mental impairment and sleep are much less pronounced with meperidine than with morphine.

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