

Atlas of
Obstetric technic

J. Robert Willson, M.D., M.S.

Second edition

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Preface

An author must of necessity justify his decision to revise a textbook of operative technic since the technical details of operative procedures vary little from year to year. If the decision to prepare a new edition of the *Atlas of Obstetric Technic* had been based only upon the need to alter the procedures described in the first edition or to add new operations, a revision would have been unnecessary. As stated in the preface to the first edition, "I have attempted to include enough text to make this book more than a collection of drawings of operations." It is the text, therefore, rather than the illustrations that has been changed. The section concerning the use of oxytocin for the induction of labor and for stimulation of dysfunctional labor has been rewritten, as has that on the management of the third stage of labor. Newer methods of placental localization are described. The use of the measurement of urinary estriol excretion and of the examination of amniotic fluid in an attempt to assess the status of the fetus in utero is described in appropriate places. A number of changes in recommendations for managing labor complicated by abnormal fetal positions have been made. The portion devoted to obstetric analgesia and anesthesia has been expanded. The new illustrations included in this area were prepared by Mr. Grant Lashbrook of the Medical and Biological Illustration Unit of the University of Michigan.

The concept that the book serve principally as a reference for residents and practicing physicians with a background in obstetrics has been retained. Although the book should be of greatest value to those who are actively practicing obstetrics, it can also be used to advantage by medical students. The step-by-step illustration of normal delivery and of the maneuvers designed to solve the various abnormalities that may complicate labor should provide the student with a means of understanding the reasons for and the effects of such complications and the ways in which they can be solved. I trust that all these physicians will find the book helpful to them and ultimately to their patients.

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Contents

Preface

- Chapter 1** The professional staff; labor and delivery room facilities, 1
- 2** Normal labor and delivery, 5
- 3** Shoulder dystocia, 38
- 4** Third stage of labor and postpartum hemorrhage, 42
- 5** Induction of labor, 64
- 6** Prevention and management of childbirth injury, 72
- 7** Forceps delivery, 86
- 8** Face positions, 174
- 9** Brow positions, 184
- 10** Breech delivery, 187
- 11** Transverse lie, 226
- 12** Cesarean section, 244
- 13** Placenta previa, 298
- 14** Craniotomy, 308

Chapter 1

The professional staff; labor and delivery room facilities

The increased safety with which women can have babies is in part a result of the expansion of hospital obstetric facilities and a concurrent decrease in home delivery. Naturally the application of the advances in general medical knowledge, the availability of blood transfusion, the development of antimicrobial substances, and improved anesthetic and surgical technics have also played a part in reducing maternal and infant mortality. Of at least equal importance is the fact that general practitioners have been better prepared in medical school and during their internships to manage normal labor and delivery and to recognize complications, and more trained and competent specialists are available for consultation when an abnormality does arise.

However, no matter how dedicated and skillful a physician may be, he is helpless when a complication arises unless the necessary facilities for its treatment are readily available for immediate use. One of the major responsibilities of the chief of an obstetric service and his staff is to determine what physical facilities, instruments, medications, and personnel are necessary for the care of normal pregnant women and those with complications, and to check periodically to make certain that they are available. If a department is inadequately equipped and consequently not prepared to render the best possible treatment, it usually is because the physicians have done nothing to correct obvious deficiencies. This often is a result of the fact that the department has not been well organized and, as a consequence, no single individual has authority either to establish policy or to act as the liaison agent between the staff members and the administrator.

STAFF ORGANIZATION

The professional staff may consist entirely of specialists, entirely of family physicians, or a combination of both. However, regardless of distribution, one individual should be appointed as the executive officer. Whenever possible, he should be an experienced, qualified specialist who is familiar with obstetric problems and who can develop and supervise nurse, intern, and resident training programs, establish policy, enforce departmental rules, and serve as professional consultant and as arbitrator whenever a difference of opinion concerning policy or patient management arises. It is important that he be interested in organizing and developing the department and willing to allocate a sufficient amount of time to the job. A chief should not be appointed because he is the most popular member of the staff or has the largest practice, or because it is his turn to serve. He should be appointed for a term of at least three years and should be eligible for reappointment if he has discharged his responsibilities ably and wishes to continue.

PROFESSIONAL PRIVILEGES AND CONSULTATION

Blanket privileges cannot logically be given simply because an individual is or claims to be a specialist nor be withheld because he has not had special training, because general practitioners may be more able and conscientious obstetricians than are some of those who have had formal obstetric and gynecologic training. The chief of the service, with the help of a committee of unbiased and competent obstetricians, should determine what each individual department member is permitted to do. Privileges may be expanded or reduced depending upon the activities of the individual as reviewed from time to time.

The conditions for which consultation is required or recommended should be clearly established for each individual and, as with operative privileges, are determined upon the basis of proved ability rather than rank. The most capable senior staff members are designated as consultants, and the other staff members should be encouraged to consult with them whenever a problem is anticipated or encountered. The free use of consultation can be encouraged if the consultant serves only as a consultant (offering advice, assisting in the delivery, or performing difficult operative procedures himself when necessary) and does not take over the entire care of the patient, finally appropriating her completely. If the latter situation occurs regularly, physicians will understandably be loath to ask for help.

In general there should be no fee for single consultations within the department; this is particularly true when consultation is mandatory. If the consultant must visit the patient several times, supervise unusual examinations or treatment, or actually deliver her, a fee is justifiable.

For the *specialist of proved ability*, consultation is desirable whenever a patient has a major complication. For *nonspecialists*, consultation should

be required before any cesarean section, before induction of labor, for patients who make unsatisfactory progress during twelve hours of either active or dysfunctional labor, in cases of malpresentation, hemorrhage, toxemia, major medical complications, and serious lacerations, and before performing operative delivery of any type.

LABOR AND DELIVERY ROOMS—PHYSICAL FACILITIES

The labor and the delivery rooms should be separated from the rest of the hospital, and the nursing staff should have no responsibilities in other areas.

Admitting room. An examining room in which patients who are being considered for admission to the labor-delivery area can be seen is desirable. Such a facility permits the screening of patients before they actually are placed in a labor room, thereby preventing the admission of women with infections, those who do not need to enter the hospital, and those who are best admitted to another patient care area. Such a room is best placed near the labor area and should be equipped with an examining table, sterile gloves and instruments, syringes, test tubes, etc. for obtaining blood, catheter trays, an accurate scale, a shower, and a toilet. The entire evaluation of the patient can be performed in the admitting room. If such a facility is not available, the patient can be seen and examined in the labor room in which she will remain until she is ready for delivery.

A small laboratory equipped for blood counts and urine examination is desirable unless reports can be obtained promptly at any hour from the hospital's general laboratory.

Prelabor rooms. Patients with ruptured membranes, those in early or preliminary labor, and those who may be in false labor are usually more comfortable in a facility separate from the labor and delivery rooms. When possible, this should be near the delivery area for ease in following the patient's progress. When this cannot be arranged, such patients may be sent to the obstetric floor until more active treatment becomes necessary.

Labor rooms. The suggested ratio of one labor bed for each 250 deliveries a year may be inadequate if the former must be used for women in questionable or preliminary labor or as recovery beds. Single labor rooms are preferable to multiple bed units, even though the beds are screened or are in cubicles, and they should be soundproofed and well ventilated or air conditioned. The doors should be wide enough to permit the labor bed to be wheeled in and out without difficulty. Suction equipment and a source of oxygen should be readily available. Each room should contain a bed with side rails, a straight chair and a more comfortable chair, a sphygmomanometer, a stethoscope, a fetoscope, a supply of gloves, lubricant, and a writing surface. Toilet facilities and wash basins must be in the immediate vicinity, and a call system is essential. There should be a utility room in the area for preparation and storage of equipment and linen.

Medications, except those used during and immediately after delivery, should be stored and prepared in the labor room area.

Two bottles of Rh-negative type O blood should be stored in the refrigerator ready for immediate administration in the event of an overwhelming hemorrhage. The blood should be replaced as soon as it has been used; if it is not needed, fresh blood should be substituted every three or four days. Five percent saline solution, 20% dextrose in water, and some sort of plasma expander, as well as the necessary equipment for their intravenous administration, should be provided. A sterile cut-down set should be readily available. A constant supply of fibrinogen is essential.

Delivery rooms. Delivery rooms are used for no other purpose and are equipped like an operating room. Each should contain a suitable delivery table, stools for the anesthetist and the obstetrician, a completely equipped anesthetic machine, and all the instruments that may be necessary for normal or operative delivery, for postdelivery examination of the birth canal, and for the repair of lacerations. A heated crib should be adjacent to a suction apparatus and a supply of oxygen, and the necessary equipment for tracheal intubation and resuscitation of the infant must be at hand. Materials for identification of the infant are also important. Equipment and solution for intravenous therapy must be available.

Delivery room medications include oxytocics (such as methylergonovine [Methergine], ergonovine [Ergotrate], and oxytocin), epinephrine (Adrenalin), ephedrine, phenylephrine (Neo-Synephrine), methoxamine hydrochloride (Vasoxyl), and nalorphine (Nalline). If others are needed, they can be obtained from the supply in the labor room.

One delivery room should be equipped with an operating table and instruments for the performance of emergency cesarean section. This room can also be used for vaginal deliveries.

Women with definite infections must be isolated from the rest of the labor patients. This can be accomplished by conducting the entire labor and delivery in a labor room or a delivery room. The rooms must be cleaned before other patients are admitted to them.

The linen and instruments used in the labor and delivery rooms should be kept separate from those used in the rest of the hospital. They are most easily processed and stored in workrooms, sterilizing rooms, and storage rooms in the delivery room area.

Recovery rooms. A recovery area in which the patient can be kept under constant observation until she has reacted and seems to be progressing normally provides an additional safety factor. One nurse can check several patients, recording pulse rate and blood pressure, palpating the fundus, and watching for abnormal bleeding. The normal patients usually are kept in the area for an hour or so before being taken to their rooms, and patients with complications are usually kept until they no longer need continual care and can be moved safely. Labor rooms can be used as recovery rooms if there are enough of them.

Chapter 2

Normal labor and delivery

ADMISSION

The patient who enters the hospital for delivery is conducted to an admitting area where she is questioned and examined to determine whether she actually is in active labor and, if so, how far it has advanced. These decisions are best made by a physician, who should see the patient promptly after she reaches the admitting room. If he finds that labor is in progress and that there are no obvious abnormalities, he performs a complete physical examination, determines the hemoglobin concentration or the hematocrit level, and tests the urine for protein and sugar. It is not necessary to shave the pubis, but the vulvar and perineal hair should usually be removed. If the rectum is filled with fecal material, an enema or a suppository may be administered. Neither is necessary if the presenting part has descended deeply into the pelvis or if the cervix is well dilated and labor is advancing rapidly. An enema is contraindicated if there is unexplained vaginal bleeding. Patients may use the toilet during early labor. However, primigravidas who are well along in the first stage and most multiparas whose contractions are recurring frequently should use a bedpan.

CARE DURING LABOR

After the patient has been prepared, she is transferred to a labor room, where she will remain until she is ready for delivery. Many women are more comfortable in a chair than in a bed during early labor. However, as the contractions become stronger, they usually prefer to lie down. Any patient who has had medication should be confined to a bed with protective side rails to prevent her from falling out if she is disoriented or unusually active. No patient who has been sedated should be left alone.

The gastric emptying time is prolonged in women in labor, particularly those to whom sedatives have been given. Food and fluid ingested during labor will remain in the stomach and may be regurgitated and aspirated when an anesthetic is administered for delivery. This complication can be

avoided by prohibiting patients from taking any type of food or fluid orally until they have been delivered. Medications are administered hypodermically, and fluids that are necessary to prevent dehydration during prolonged labors or in unusually hot weather are given intravenously.

Each patient and her infant in the labor area must be constantly attended by a physician or a trained and experienced labor nurse, because an alert observer can often detect complications at their onset or even anticipate them before they develop. The blood pressure should be taken and recorded and the fetal heart rate counted at least every half hour. If either is abnormal, more frequent observation is necessary.

PAIN RELIEF DURING LABOR

Some women, particularly those who have been trained in one of the psychoprophylactic methods, can go through an entire labor and even deliver the baby without any great discomfort, but for most the process is painful. The severity of the pain can almost always be reduced to a tolerable level without adding to the risk of either the mother or her infant and without eliminating consciousness in the former. Although a patient must never be forced to take sedative drugs, suitable methods for reducing discomfort should be made available to those who want them. There can be no routine method for relieving pain during labor, because the needs of patients vary, and that which may be quite adequate for one may be contraindicated for another. Each dosage of medication should be prescribed by a physician, who makes his decision as to which particular drug or combination of drugs to use and the amount to be administered on the basis of the duration of pregnancy, the stage of labor, the patient's reactions to labor, and the condition of the infant.

Systemic analgesia. The pain during the early part of the first stage of labor is relatively slight, but many patients are somewhat anxious and tense. During this period ataraxic preparations are more suitable than opiates. Promethazine hydrochloride (Phenergan), 50 to 100 mg., or another similar preparation will usually relax the patient between contractions and keep her reasonably comfortable until the pain becomes more severe. These preparations do not influence uterine activity and will not interfere with the normal progress of labor.

Most women become uncomfortable by the time the cervix has dilated 4 to 5 cm., and if labor is progressing normally and the mother requests medication, an analgesic drug can be administered at this stage. All drugs given to the mother cross the placenta and affect the infant; consequently, the dosage of the preparation used should be no more than the amount thought necessary to control discomfort. The physician's aim should be to reduce pain rather than to eliminate it completely. The patient who is properly sedated will be relaxed between contractions but will be able to cooperate with the attendants and respond logically.

Meperidine (Demerol) or *morphine* will control the pain adequately, and either may be administered to normal patients. The effectiveness of both is enhanced by the addition of an *ataraxic preparation*. For the first injection, 50 mg. Demerol or 6 to 8 mg. morphine sulfate and 50 mg. Phenergan will usually produce the desired reaction in the mother. If an ataraxic drug has already been used during the early stages of labor, it is well to eliminate it or at least reduce the dosage when the opiate is administered. If the patient had Phenergan more than six hours previously, an additional 50 mg. may be given with the first injection of Demerol; if Phenergan was given two to four hours previously, the second dose should be reduced to 25 mg.; if it was given less than two hours previously, the opiate alone may be given.

In most multiparas there is no need to use more than a single injection of medication during the entire labor; however, in primigravidas it may be necessary to reinforce the original amount after four to six hours. A second injection of 50 mg. Phenergan combined with 50 mg. Demerol or 6 to 8 mg. morphine sulfate usually will control the patient's discomfort until delivery is imminent.

It is unwise to give Demerol or morphine to patients who will probably deliver within an hour and a half or two hours, because the infant may be born while still somewhat depressed by the drug. Late in the first stage the patient may be given 60 mg. alphaprodine (Nisentil) intramuscularly if delivery is not anticipated within an hour. The action of this drug is much shorter than that of morphine or Demerol.

Gas analgesia. The discomfort toward the end of the first stage of labor can also be controlled by intermittent inhalations of *nitrous oxide* (75% to 80%) and *oxygen* (20% to 25%). The gas is administered by an anesthetist during each contraction. It is most effective if the patient begins to inhale the mixture as soon as a contraction can be palpated by an attendant rather than when she first becomes aware of discomfort.

Regional analgesia. The pain during labor can also be controlled with *caudal* or *epidural* anesthesia, which can be continued as the anesthetic for delivery. Caudal and epidural technics are particularly advantageous during premature labor and for women with heart disease, pulmonary disease, and diabetes because they control pain and relax the voluntary pelvic muscles without interfering either with uterine contractions or with oxygenation of the infant. Caudal or epidural anesthesia is more useful in primigravidas than in multiparas in whom short labors and easy deliveries can be anticipated. They should be administered only by trained individuals who can remain with the patients during the entire labor and reinforce the initial injections whenever the pain recurs.

Pain can also be relieved with *paracervical block*, in which the anesthetic agent is injected superficially in each vaginal fornix just lateral to the cervix. This technic is effective for both multiparas and primigravidas.

When the termination of the second stage of labor is imminent, the patient is moved from the labor area to the delivery room in which her infant will be born. In most instances, the move is accomplished most rapidly and safely by wheeling the patient in her bed rather than placing her on a stretcher, because, as sometimes happens, the head or the entire infant may be born while she is being moved from bed to litter or from litter to delivery table. If the number of such transfers can be kept to a minimum, the chance of the baby's being injured by falling is reduced.

ANESTHESIA

A few women, particularly those with relaxed or unusually elastic pelvic supporting structures, can be delivered with minimal anesthesia or none at all, but some form of pain relief usually is desirable for normal delivery and is essential for operative delivery. Since no single method is suitable for routine use, the obstetrician should have several anesthetic technics available from which he can select the one most appropriate for each patient.

Inhalation anesthesia. Some women demand inhalation anesthesia either because they are fearful of conduction methods or because they want to be unconscious during the birth of the baby. General anesthesia is quite satisfactory when it is properly administered; however, there are certain hazards that accompany its use. The most serious complication is *vomiting* and *aspiration*, as a result of which many mothers die each year. The incidence of aspiration can be reduced by forbidding the ingestion of food and fluids after uterine contractions begin. If a patient has eaten recently, a regional technic should be used or her stomach emptied before a general anesthetic is administered.

Prolonged deep inhalation anesthesia will *reduce the intensity of uterine contractions*, thus increasing both the need for operative delivery and the incidence of serious bleeding in the third stage of labor. The infant can also be depressed by prolonged anesthesia, with a *resultant delay in onset of respiration* following his delivery. With the exception of vomiting, these complications generally need not occur when general anesthesia is used for normal delivery.

Nitrous oxide-oxygen mixtures alone may provide enough pain relief for normal spontaneous delivery but are generally inadequate for the performance of episiotomy and forceps extraction unless the oxygen content is reduced to a dangerously low level. Deeper anesthesia can be obtained by adding *ether* or *trichloroethylene* to the mixture. The analgesic effect of nitrous oxide-oxygen is usually better if the gas has been administered intermittently during the second stage of labor than if it is started when the patient is in the process of expelling the infant.

Ether has a wide margin of safety as an obstetric anesthetic agent. However, when given alone, it is unpleasant for the patient and the induction time is prolonged. For the usual delivery it is used most effectively

to reinforce the anesthetic effect of nitrous oxide-oxygen mixtures. Most deliveries can be successfully accomplished using this combination. An important use of ether is the provision of complete uterine relaxation for breech extraction or version. It is one of the few agents with which uterine activity can be abolished safely. The induction time is prolonged to fifteen to twenty minutes, and bleeding will be increased because of the inhibition of uterine contractions. The blood loss can be minimized if the anesthetic is stopped when the version is completed or the legs are brought down in a breech position; during the extraction the patient will usually recover to a point at which spontaneous uterine contractions will recur.

Trichloroethylene (Trilene) is an analgesic agent that can be used alone for rapid spontaneous delivery but generally is inadequate for operative extraction. It can be used effectively to reinforce the effect of nitrous oxide-oxygen if certain precautions are taken. It should never be given in a closed-circuit apparatus because it combines with soda lime to produce phosgene and dichloroacetylene. For the same reason a closed-circuit machine should not be used to anesthetize a patient who has inhaled Trilene during labor. Trilene also may cause cardiac arrhythmia when given in too high a concentration. Although the nitrous oxide-oxygen-trichloroethylene combination is effective, it should be administered by an experienced anesthetist and with machines that have been converted for its use.

Cyclopropane has advantages and disadvantages as an obstetric anesthetic agent. It produces good uterine relaxation, and the induction is rapid and relatively pleasant and can be accomplished with a high concentration of oxygen. The ease and rapidity with which a patient can be induced, however, may be a disadvantage unless an experienced anesthetist is in charge. An anesthetic level far deeper than that necessary for the contemplated delivery will often result, and the infant may be depressed despite the high oxygen concentration; this is particularly true when the anesthetic time exceeds eight to ten minutes.

Conduction anesthesia. Conduction, or regional, anesthesia, when properly used, is generally safer than inhalation anesthesia for both the mother and her infant. It does not alter the uterine contraction pattern significantly and, unless the maternal blood pressure falls, does not interfere with oxygenation of the baby. The methods of conduction anesthesia that depend upon nerve root block (spinal, caudal, and epidural) are more hazardous than those which anesthetize the peripheral nerves (local infiltration and pudendal nerve block).

Nerve root block. *Caudal and epidural anesthesia* provide excellent pain relief and relaxation of the pelvic muscles without affecting the uterine contractions or fetal oxygenation. Since it takes some time to insert the needle or catheter properly and to obtain an effective anesthetic level, it is more satisfactory when used as an analgesic during labor and continued as an anesthetic for delivery than when administered only as a

terminal anesthetic. Caudal and epidural technics are not satisfactory for general use because of the potential dangers (massive intrathecal injection and infection), because of the need for constant supervision by experienced individuals, and because many women do not need this much anesthesia. They are of particular value for women with heart disease, pulmonary disorders, and metabolic disorders such as diabetes, and during premature labor and delivery.

Saddle block, or low spinal anesthesia, provides excellent pain relief and pelvic muscle relaxation but is potentially the most dangerous of all the methods. Unless it is given with the greatest of care by experienced individuals to carefully selected patients, the mortality will be higher than with any other anesthetic. The principal cause of death is shock and respiratory paralysis from an ascending level of anesthesia, either because too much of the agent was administered or because of improper technic. It is most often used for the delivery of primigravidas. However, it provides excellent anesthesia and voluntary muscle relaxation for more difficult forceps rotation and extraction. Spinal anesthesia has little effect upon uterine muscle contraction; consequently, it is not suitable for version and extraction or for breech extraction except for the operative delivery of an infant in complete breech position when the feet lie in the vagina and can be reached without inserting the entire hand and forearm into the uterine cavity.

Intrathecal anesthesia is contraindicated in women who are bleeding profusely or who are in shock, those with moderately severe hypertension, those who have diseases of the central nervous system or spine, those with local infections near the proposed puncture site, those who claim sensitivity to local anesthetic agents, and particularly those who wish to be asleep or who fear spinal anesthesia.

I prefer the saddle block technic, using 3 to 5 mg. Pontocaine in 10% dextrose, which usually provides a level of anesthesia to about the tenth thoracic vertebra. The blood pressure, pulse rate, and fetal heart tones must be checked every minute for at least ten minutes, by which time a stable level has usually been obtained. A fall in blood pressure from vasodilation in the anesthetized area may reduce uterine blood flow and fetal oxygenation, which will be indicated by a decrease in fetal heart rate. If this does occur, it can usually be corrected by raising the mother's legs and administering oxygen.

Peripheral nerve block. Local block of the peripheral nerves can be used successfully to relieve the pain accompanying the delivery of most multiparas and many primigravidas. Women who are unusually fearful, those who react poorly to discomfort, and those who are unusually active are poor candidates for local anesthesia. The procedures are safe, simple, and effective, require a minimum of equipment, and can be utilized in both large and small hospitals as well as at home. A rapid and relatively

long-lasting anesthetic effect is produced by 0.5% to 1% lidocaine (Xylocaine) without epinephrine. Local anesthesia is usually more satisfactory if the patient has had some sort of analgesic drug during labor. A combination of Demerol and Phenergan usually produces mental and muscular relaxation as well as analgesia and serves as an excellent premedication.

Local infiltration is the easiest method for peripheral nerve block and is usually quite suitable for spontaneous vaginal delivery and for the performance of episiotomy. A 12.5 cm. narrow-gauge needle is inserted through the skin midway between the anus and the ischial tuberosity, and the anesthetic solution is injected in a fanlike pattern within the area bounded by the tuberosity of the ischium and the descending pubic ramus, the lateral border of the distended vaginal introitus, and the midline of the perineal body. A similar injection is made on the opposite side.

Pudendal nerve block provides more complete anesthesia than does simple local infiltration and is quite adequate for the delivery of most multiparas and many primigravidas. The physician can perform episiotomy and low forceps extraction without difficulty. However, the anesthetic effect usually is inadequate for midforceps delivery or for operative rotation of the head. If pudendal block alone is not adequate, a small amount of nitrous oxide-oxygen with or without Trilene can be administered during the actual delivery. In primigravidas the injection is best made when the presenting part reaches the perineum; however, in multiparas the anesthetic must be given slightly earlier. The necessary manipulation cannot be performed properly when the head is too deep in the pelvis.

DELIVERY

Whether the delivery is accomplished with the patient in the lithotomy position, dorsal position, or lateral position is a matter of personal choice. However, most obstetricians prefer the lithotomy position, even though it does place the perineal structures under unusual tension, because the necessary manipulations are easier and contamination can be prevented better. The lithotomy position is certainly preferable for all operative vaginal deliveries and for the performance of episiotomy. However, the dorsal or lateral position is more comfortable for the patient and quite adequate for spontaneous delivery of multiparas, particularly those with relaxed musculature in whom episiotomy is not necessary and lacerations are not likely to occur. If the lithotomy position is to be used, the lower part of the table should never be removed until the physician is gowned, gloved, and ready to proceed; occasionally, the infant is propelled from the birth canal during an intense uterine contraction, and fatal injury may be sustained if he falls to the floor, whereas little damage will occur if he is born on the cushioned delivery table.

When the physician is properly prepared, the patient's feet are elevated, and she is pulled toward the foot of the table until her buttocks extend