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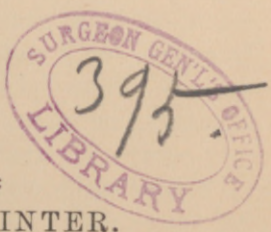

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INDUCTION OF PREMATURE LABOR.

By BYRON STANTON, M.D.,
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Being impressed with a sense of the obligation which I, as one of the foundation members, owe to this Association, organized for the "cultivation and promotion of knowledge in whatever relates to abdominal surgery, obstetrics, and gynecology," I proceed to the discharge of my duty by submitting some remarks upon the subject of induced premature labor—a subject in regard to which an increased interest has been awakened in my mind by some recent experience.

The distinction between induced premature labor and induced abortion is well understood, and what I have to say applies only to cases in which the fetus has reached the period of viability. In recent works on obstetrics this subject is treated of at full length. In older works it was disposed of in a few lines or passed by wholly unnoticed.

The induction of premature labor was undoubtedly practised by the ancients, but by them its application was limited to cases of contracted pelvis. In later times its application has been extended to many other conditions. Two centuries ago it was resorted to in some cases of unavoidable hemorrhage, but there has always been a class who have strongly condemned it, regarding it as an unsafe and unjustifiable procedure. In the last century it was denounced as criminal and, according to Denman, it was not until 1756 that the English authorities decided upon its propriety and morality. As late as 1827 the Royal Academy of Medicine, of France, pronounced against it as immoral, and less than sixty years ago (1831) the operation was first performed in that country. Within the last half century it has been opposed by Osiander, Stein, Joerg, and others. Baudelocque opposed it strongly. The only cases in which

he admitted the propriety of its performance were those of great uterine hemorrhage, and then only when the child was probably destroyed and the safety of the mother compromised. The arguments which were used against this operation were based on the ground of its immorality as well as its uselessness, and would apply with equal or greater force to the use of forceps, turning, and all obstetric operations. Cesarean section is looked upon as a recognized and well-established operation; yet its statistics as regards the result to the mother will bear no comparison with those of induced labor, and as regards the fate of the child it has but little advantage. Craniotomy had a stronger opposition and yet, fraught with danger as it is to the mother and fatal, of course, to the child, it has had the endorsement of the profession. If such an operation can be looked upon as a justifiable obstetric procedure, an operation which does not add materially to the risks of the mother and which has a record of half of the children saved, needs no defence. Indeed, like the resort to turning and the use of the obstetric forceps, the operation will do much to obviate the necessity of having to choose between craniotomy and Cesarean section. Its object being not only to save the life of the child, but to diminish the dangers to the mother, we may cordially agree with the late Dr. Bedford that "it is the most precious boon which science has yet bequeathed to suffering woman."

The *morality* of the procedure may, I think, be regarded as recognized.

An argument against induced labor is that there are some risks incurred by the mother that she does not have to encounter at full time. The maternal passages have not fully undergone the changes which nature effects during pregnancy; the uterus is not in a condition of best muscular development to effect delivery and expedite involution; the detachment of the placenta is more frequently delayed, and malpresentations are of more frequent occurrence. On the other hand, it may be stated that malpositions in the last two months of pregnancy are not likely to be rectified, if there is pelvic deformity, at full time; that the child is of smaller size and the head more yielding and more easily adapts itself to the shape of the pelvis; that the mother escapes the dangers incident to protracted labor, and if craniotomy becomes necessary it is more easily and

safely performed. The other dangers, such as fever, pelvic inflammation, etc., are no greater and no less than in labor at term.

Statistics show that artificially induced labor is not attended with any more risk to the mother than accidental premature labor, not much more than normal labor at term, and is much less hazardous than the operations for which it is the alternative—craniotomy and Cesarean section. The propriety of the induction of labor has also been questioned on account of the high infant mortality attending it. Among the more recent writers Winckel, Litzmann, and Spiegelberg have been quoted as holding that such intervention is dangerous as compared with spontaneous labor. Strauck, of Moscow, in *Archiv für Gynäkology*, Band 31, Heft 3, concludes that on account of the great infant mortality the induction of premature labor should give place to Cesarean section, since there is every reason to believe that the latter operation will lower its mortality as operators become more practised. Is there not reason to believe that with improved methods of inducing labor, and the greater care bestowed upon the infant after birth, induced labor will also lower its mortality? Strauck, in his estimate of the operation as relating to the child, bases his conclusions, I think, upon erroneous data. For instance, in twenty-one of his cases where labor was induced because of contracted pelvis, he gives the measurements of the *conjugatæ veræ* as from $1\frac{3}{5}$ to $3\frac{1}{2}$ inches. The induction of labor in a woman with a conjugate of $1\frac{3}{5}$ inches, could but result fatally to the child, and such cases should be excluded from consideration, in determining the propriety of inducing labor after the seventh month. The choice would be between induced abortion and Cesarean section. But in Strauck's own cases, of which he reports twenty-eight in all, twenty-one of the children lived, and eight were stillborn. Of the twenty-one living children, ten died in hospital, and eleven were discharged healthy. Whether the deaths were all due to conditions connected with premature birth, I do not know, but granting that they were, eleven healthy children is a good result in twenty-eight cases, in twenty-one of which the operation was performed because of contracted pelvis, with conjugates ranging from $1\frac{3}{5}$ to $3\frac{1}{2}$ inches—better than would have followed the operative procedures that might have been required at term.

In those conditions which jeopard the safety of the mother and child at full term, nothing will so greatly diminish mortality as

recourse to the induction of premature delivery. Its *safety*, then, may be regarded as established.

The great number of cases in which it has been performed with success, when previous labors have been attended with loss of infant life, may be regarded as demonstrating its *utility*.

That it is resorted to in cases in which it may not be necessary, is no doubt true. The same may be said of all the aids to labor. That many cases to which it is applicable are permitted to go to full term with loss of life of mother or child is, no doubt, also true.

The *morality*, *safety*, and *utility* of the operation being generally admitted, the next thing for us to determine is to what classes of cases the artificial induction of labor is applicable.

The points involved in determining this question are:

1st. Whether the case is one in which delivery at term will involve the death of the infant, and subject the mother to much suffering and danger, and yet permit delivery at seven or eight months.

2d. Whether the conditions are such that the life of the mother will be imperilled by continuance of pregnancy to the full period of gestation, by hemorrhage, or some intercurrent disease, or by aggravation of some chronic ailment which can be averted or removed by earlier delivery; and

3d. Whether there is a history of infant fatality in several successive pregnancies at some regular time after the age of viability.

In the first case, delivery would be induced rather in the interest of the child than the mother; in the second, more in the interest of the mother; in the third, purely in the interest of the child.

Reference has already been made to the fact that this operation was first resorted to only in cases of contracted pelvis, and ever since the operation was first suggested this has been the condition which has most frequently called for premature delivery. Dr. Merriman has laid it down as a rule that it should be strictly confined to such cases, but it now has a wider range of application.

In the determination of the question as to what cases of contracted pelvis it is applicable, there are given two extremes of measurement which limit the operation. These extremes have been variously stated, the maximum ranging from 3 to 3.75 inches, and the minimum from 2.75 to 2.25 inches. Should there be a measurement

in excess of the maximum stated, the operation is commonly regarded as uncalled for. I say *commonly* so regarded, for the reason that in exceptional cases a greater diameter may demand premature delivery, where for several successive pregnancies the child has attained such size that it could not be born alive. In such a case the propriety of the operation is to be determined more by this fact than by the diameter of the pelvis.

Should there be a contraction below the minimum above named, the question to be determined is between induced abortion and Cesarean section.

It is difficult to fix exact measurements within which the induction of labor is justifiable. The difficulties of labor depend to some extent upon the character and location of the deformity. Delivery is more easily effected through a flat pelvis than through a generally contracted pelvis with the conjugate of the same measurement. Deliveries are also easier, *cæteris paribus*, when the narrowing is at the superior strait. Contraction of the same degree at the lower strait causes more delay, and more frequently calls for the application of forceps. If both straits are contracted, the difficulties are increased, for energetic uterine action might overcome the resistance of obstruction at one strait, but not be sufficient to overcome the resistance of a pelvis narrowed at both extremities.

In some cases natural delivery has been successfully accomplished when there was a contraction to 3.75 inches, but with an ordinary sized fetus the labor is more difficult, and consequently more dangerous. A fetus of average size could seldom be delivered through such a pelvis, so that a maximum for our guidance in determining the propriety of induction of labor can only be approximate. The same may be said in regard to a minimum. Children have been born through pelves measuring 2.25 inches (M. Depaul). The measurements, then, must vary with the size of the child, and the amount of compressibility of the fetal head, and these points cannot always be exactly determined. It is impossible to determine exactly the size of the fetal head, and in the determination of the diameters of the pelvis we can only make approximations. Even the most approved instruments do not give exact measurements, and under all these uncertainties the question is to be determined for each case by itself. The circumstances of individual cases are so various, that it is impossible to lay down strict rules for their

management. We may agree upon general principles, but, at last, each case must be examined and decided on its own merits, under the lights of our experience. As the induction of premature labor is mostly called for in parous women, we have in a majority of the cases the history of previous deliveries to assist us. The induction of premature labor is seldom called for in primiparæ.

As approximations we may take for the extremes 3.5 and 2.5 inches. Between these the interest of both mother and child will call for the operation before the full period of gestation. Spiegelberg places the maximum at 8 c.m. (3.15 inches). He says that the resort to artificial induction of labor is of doubtful propriety when the contraction is not below that measurement, and even then it is not to be performed unless there is reason to suspect from the circumstances of previous labors that the infant may be of large size, the cranium unyielding, and the presentation unfavorable.

In some cases in which several previous deliveries have been attended with loss of life of the child because of its large size, labor should be induced before term, although the conjugate may measure more than the maximum above stated. In illustration of this class of cases, I give the following:

Case I.—Mrs. —— is a woman of small stature and very small frame, about twenty-three years of age. She was a patient of Prof. Wm. B. Davis, of Cincinnati, by whom I was called in consultation in two labors preceding the one in which labor was induced. In the first confinement, at the time I was called, she had been in labor twenty hours. Uterine action had been vigorous for most of the time, but was beginning to fail. The membranes had been ruptured several hours, but the head, which presented by the vertex in the O. L. A. position, had made no descent into the pelvis. Chloroform was administered by Prof. Davis, and the Elliott forceps applied without a great deal of difficulty, but I was unable to advance the position of the head. It was then determined to resort to version, or, in the event of the child being dead, to perform craniotomy. On introducing the hand, it was found that the fetal pulsations had ceased, and the perforator was used. After a reduction of the size of the head, the forceps was again applied to the base, but the body could not be brought into the pelvis. I then turned and delivered an enormous child. Its exact weight was not determined, but I think it was as large a child as I ever saw.

Eighteen months later she was again in labor, and I was again called to Prof. Davis's assistance. The patient had been in active labor for several hours without making progress. The vertex presented in the O. L. P. position. The forceps was applied under anesthesia, but to no effect. Version was then performed, but it was with much difficulty that the head

was brought into the pelvis. Forceps was reapplied and the head extracted but the child was dead. The weight of this child was less than the first but it was a large child.

If a mistake was made in this case, it was in not resorting to version at first instead of applying the forceps. The delay was at the superior strait, and was due to the relative disproportion between the fetal head and the pelvic brim. The advantages of version in such a case are, first, that the soft parts of the child better prepare the maternal parts for delivery of the head; second, that the after-coming head can be delivered through a narrower brim than the fore-coming head; third, that the forceps occupies a faulty position, being applied to the forehead and occiput; fourth, that the compression produced by the forceps increases the biparietal diameter, which corresponds with the contracted conjugate. These are criticisms easier made now than at the time, but with so large a child I doubt whether it could have been delivered alive through the pelvis by any means.

The next year conception had again occurred and it was determined, in view of the experience in the first two pregnancies, to resort to induction of labor some time after the seventh month, the exact time to be determined by the estimated size of the fetus as the gestation continued. At about the thirty-third week of pregnancy, as nearly as we could determine, labor was induced by Krause's method. At four o'clock in the afternoon an elastic bougie was introduced about seven inches into the uterus between the membranes and the posterior uterine wall, where it remained until labor was fully established. Labor pains began in sixteen hours, gradually increased in severity, and in six hours delivery was safely accomplished without very great difficulty. The weight of the child at birth was five and a half pounds. Lactation was soon established, and the child did well. It weighed nine pounds at six weeks of age, and twenty-two pounds at nine months. It is now a vigorous, healthy child.

A possible criticism in this case might be that labor was induced slightly earlier than was necessary. We estimated the antero-posterior diameter of the pelvis to be a little over 3.5 inches, but with the history of the preceding deliveries of children of such unusual size we thought it not safe to defer action to a later period. The severe pains necessary to effect delivery, and the size of the child, so much beyond the average weight at that period of gestation, lead me to believe that delivery could not have been successfully accomplished if much longer deferred.

The time at which labor should be induced will depend principally upon the size of the pelvis. We must keep in mind the general fact that each day of intra-uterine life increases the chances of survival of the infant, and, therefore, we must not be too hasty in operating nor must we, on the other hand, postpone it until the

child is too large and the head too firmly ossified for safe delivery. Each day of delay, after the limit of safe delivery, adds to the danger to both mother and child—to the child because mutilation is more frequently required, and to the mother because the difficulties of mutilating operations increase with the increasing disproportion between the fetal head and the pelvis. Ritgen, M. Figueira, and others have made measurements of the fetal head at different periods of gestation, and, from these, tables have been prepared for our guidance in determining the time at which labor should be induced.

Beginning at the seventh month, the earliest time at which labor should be induced, the biparietal diameter, which in cases of antero-posterior contraction must correspond with the conjugate, is 2.75 inches. Allowing for some compression of the head in consequence of incomplete ossification, a fetus at seven months could safely pass through a pelvis measuring 2.25 inches; hence, with that amonnt of contraction, the induction of labor should not be delayed much after the end of the seventh month. There seems to be a general consensus of opinion that if the conjugate is 2.5 inches, the time of election should be about the thirtieth week. Starting from this point, it might be stated in general terms that for each quarter of an inch increase in the size of the pelvis one week may be added to the time that gestation may be permitted to continue.

This general estimate of the time as dependent upon the size of the pelvis does not exactly conform to the calculations of Ritgen, whose estimates would call for operation one week earlier. One writer, M. Busch, a number of years ago, fixed upon the end of the twenty-eighth week as the proper time for inducing labor when the conjugate is 2.75 inches. This is certainly unnecessarily early when the pelvis is of such dimensions. It might, with safety, be deferred three weeks.

There are some exceptions to the rule given and to the tables published, fixing the time of operation in different degrees of deformity. Primiparæ generally bear smaller children and might be permitted to go a week or two longer.

There are two difficulties in these cases. One is in determining the period to which gestation has advanced. But, counting from the date of last menstruation and from the period of quickening, a sufficiently accurate estimate can generally be made. In cases of doubt,

when the pelvis is so contracted as to call for operation early in the seventh month, it is recommended that two weeks be added to the time that gestation may continue in order to prevent too early delivery of the child. The other difficulty is our inability to determine exactly the diameters of the pelvis in the living subject. Pelvimetry is not an exact science, but a well-practised finger will give sufficiently accurate information.

What has been said in regard to the induction of labor in contracted pelvis, applies as well to cases where the genital canal is so narrowed by tumors connected with the pelvic organs or with the pelvic walls, that a child cannot be born at term.

The induction of labor is called for in some conditions entirely unconnected with pelvic distortion. Cases occasionally occur in which pregnancy is associated with various constitutional diseases, in such a way as to render it incumbent upon the physician to induce premature labor, with the view of saving the patient's life or of mitigating great suffering. It is difficult to specify all of the conditions in which the operation is justifiable. In general terms, it may be stated that when the life of the mother or child is imperilled by continuance of pregnancy to term, by complications due to or aggravated by pregnancy that can be removed by delivery, the induction of labor is not only a justifiable operation, but is a duty of the physician. A few of these conditions may be referred to.

Unavoidable Hemorrhage.—A condition in regard to which there can be but little difference of opinion as to the propriety of resorting to induction of labor, is unavoidable hemorrhage. This is the second condition in point of time for which it was performed. This is the only condition in which Baudelocque made any exception to his rule of condemnation of artificially induced labor. In the *London Practice of Midwifery* is the following aphorism in regard to unavoidable hemorrhage: "He that determines to deliver early has determined that his patient shall not die." Cases of accidental and unavoidable hemorrhage are often so urgent that labor must be induced for the sake of both mother and child. I think there is as general agreement in regard to resort to the operation in these cases as in cases of contracted pelvis. Dr. Thomas urges rapid induction of labor in placenta previa, as we then have better chances of saving both mother and child, for we will then be dealing with a woman not exhausted by hemorrhage, the obste-

trician can be present at the beginning of labor and be better prepared to control flooding, while the pressure that controls the hemorrhage dilates the os. The following is a case in point.

CASE II.—Mrs. B., a multipara, to whom I was called July 1, 1888. On my arrival at the house I found that she was bleeding profusely, but labor pains had not been felt. She had not expected labor until the latter part of the month. It was her opinion that she had advanced about one week in the last month of pregnancy. She had had a hemorrhage six weeks before, but not so profuse as now.

Recognizing the case as one of placenta previa, a vaginal tampon was inserted, which arrested the bleeding. In two hours slight labor pains were felt. They gradually increased in severity, and at times it became necessary to introduce more cotton to control the bleeding. In seven hours, the pains becoming energetic, and the hemorrhage recurring, Prof. Mackenzie, who had been called to my assistance, gave an anesthetic, and I removed the tampon. Finding the os sufficiently dilated to permit version, I separated the placenta at its posterior border sufficiently to permit the introduction of the hand to the upper part of the uterus, when the membranes were ruptured and the feet brought down. Speedy delivery of a living child followed. The recovery of the mother was slow, owing to the great loss of blood.

In this case I was not called upon to induce labor, but to a woman bleeding before she had experienced any labor pains. The treatment which I regarded as best calculated to arrest flooding was that sometimes resorted to, to excite uterine action, and in this case a double indication was fulfilled by the tampon. The prompt action in this case and the delivery of a living child, were fortunate circumstances in a condition well calculated to excite the gravest fears. If labor had been induced before the occurrence of the second hemorrhage, much blood might have been saved to the mother and a source of danger to both mother and child avoided.

PUERPERAL CONVULSIONS.—In eclampsia, with or without albuminuria, when the attacks are so severe or frequently repeated as to threaten life, and the means usually invoked to arrest the convulsions have failed, the operation is indicated. In regard to this, however, there have been and still are some differences of opinion. Some writers go so far as to advocate the induction of labor in cases of persistent albuminuria, although convulsions may not have occurred. Simpson reported to the Edinburgh Obstetrical Society that he had induced labor in a case of pregnancy, on account of extreme dropsy and dyspnea with albuminuria. The patient

who was apparently dying at the time, made a speedy recovery. Chailly, Krause, Tarnier, and others have advised premature delivery in these cases. Playfair says, "I should not hesitate to adopt this resource in all cases in which the amount of albumen is considerable and increasing, and in which treatment has failed to lessen the amount; and, above all, in every case attended with threatening symptoms, such as headache, dizziness, or loss of sight. The risks of the operation are infinitesimal compared with those which the patient is running in the event of puerperal convulsions supervening, or chronic Bright's disease becoming established. As the operation is seldom likely to be indicated until the child has reached a viable age, and as the albuminuria places the life of the child in danger, we are quite justified in considering the mother's safety alone in determining on its performance" (*Science and Practice of Midwifery*, 3d Amer. ed., p. 201). This is stronger advocacy of the operation than we generally find among *American* writers. Dr. Fordyce Barker, in an article in the *American Journal of Obstetrics* for July, 1878, opposes the induction of labor in albuminuria until after appropriate treatment has been thoroughly and persistently tried without success, and the symptoms are so grave that there is strong probability of the death of the mother. Convulsions do not always occur when albuminuria is present, or, if they occur, they may not cease on completion of labor. Again, cases are recorded of subsidence of albuminuria and convulsions under treatment, and the women have gone to full time and been delivered without convulsions returning. The occurrence of convulsions is not, in my opinion, a justification for resorting to induction of labor until all other means have been exhausted. If the labor can be deferred and treatment addressed to the renal disturbance which is present in almost all of these cases, the condition of the mother may be so far improved that delivery may take place with perfect safety and freedom from convulsions. To induce labor in such a case is often to add fuel to the flame. To the irritations which have excited the convulsive attacks are superadded the pains and exhaustion of labor. Cases in which induction of labor may be demanded by puerperal convulsions are of extremely rare occurrence. So experienced an obstetrician as H. L. Hodge said, as late as 1866, that he had not yet seen one case. Still there are exceptional cases where pregnancy is so far advanced that the child would encounter

but little risk, in which the operation might be of advantage. It ought not to be absolutely discarded.

Persistent Vomiting.—In the persistent vomiting of pregnancy there has not been general consent as to the propriety of the operation. The weight of authority seems to be against it. It is certainly seldom to be sanctioned. Fortunately, cases of continuance to the period of viability are of rare occurrence. So rarely does this condition prove fatal that, if the principle were sanctioned, the dangers to mother and child of artificially induced labor would result in the aggregate in greater loss of life than is occasioned by obstinate vomiting. So great is the distress of the patient and so urgent the solicitations of her friends, who are anxious only for her safety, that the physician may be tempted to yield his judgment to their importunities. If, however, all of our resources fail to give relief, and the life of the mother is threatened, premature labor may be induced.

Acute and Chronic Diseases.—The operation has been recommended and performed in a number of acute and chronic diseases, where pregnancy has endangered the life of the mother and where the end of gestation would enhance her chances of recovery—as acute dropsy, alarming hemorrhage from the bowels, heart disease, severe chorea, mania dependent upon pregnancy, and some other nervous disorders.

In some chronic affections which are necessarily fatal, sooner or later, to the mother, in which there are serious symptoms, the operation has been resorted to, but, in my opinion, improperly unless the disease is so favorably affected by the termination of pregnancy that the mother's life can be considerably prolonged.

In hydramnios and abdominal tumors causing great distention, it is sometimes required. In these cases premature labor sometimes comes on spontaneously.

In rapidly growing carcinoma and epithelioma of the uterus it may become necessary.

My limits will not permit me to consider at full length the propriety of the procedure in all of the morbid conditions in which it may be required, nor is it necessary if we keep in mind the general statement already made, that when the condition of the mother or child renders the continuance of pregnancy to full term dangerous to both, or to either of them, and the danger can be removed by

delivery in the seventh or eighth month without the substitution of a greater danger, the induction of labor is a justifiable procedure. If the operation is not indicated to save the life of the mother or child, it is criminal.

Methods of Induction.—The propriety of resorting to induction of labor and the time at which it should be done having been determined, the next question is: By what method can uterine action be started with greatest certainty and the least risk to the life of the mother and child? This is an important question. Upon its determination may depend the success or failure of the case. The operative procedure should be simple and safe, and the one that most surely induces uterine action without impairing the integrity of the ovum, is the one that will be safest for both mother and child. The more nearly artificial labor is made to correspond to natural labor the more likely is it to be successfully accomplished. It should go on as quickly as compatible with safety to the patient, and after action is excited it should not be hastened by further artificial means, except when the interest of the mother or child demands them. The indications for interference or assistance in these cases would be the same as in labor at term, keeping in mind that we are dealing with a child of low vitality, and that the operative procedures, such as version or use of forceps, would be more likely to result unfavorably than if the fetus had arrived at the full period of gestation. The physician who undertakes to induce labor owes to his patient his entire time, and the only attentions she should have at his hands should be those intended to conduct the labor most safely to a successful termination.

There are numerous methods of inducing labor, and great improvements have been made in them in the last few years. The choice of methods will, to some extent, depend upon the condition calling for the operation. A method applicable in contracted pelvis would not answer in a case of hemorrhage. The choice is not a matter of indifference. Some are safe but uncertain; some are certain but unsafe.

They may be divided into three general classes:

1st. Those supposed to excite uterine contraction by acting through the general system.

2d. Those acting by reflex irritation by excitation of some other organ, as the breasts, rectum, etc.

3d. Those acting directly upon the uterus.

Oxytocics.—Of the *first* class, ergot, cotton root, quinine, savin, rue, pilocarpine, and some other drugs, have been used. These are very uncertain, unpleasant, and unsafe. All oxytocic medicines are dangerous to the mother and child. If they have the power to excite uterine action, it is a tonic contraction not resembling uterine action in labor. Ergot was the medicine formerly most used, but its use is abandoned for exciting premature labor. Its use in labor at any time, is not, I think, admissible, except, *perhaps*, in the third stage,—certainly not until the maternal parts are in a condition that delivery can be soon completed if the uterine contractions are not effective. Quinine has also been recommended, but while it has the power of increasing uterine action when started, it cannot awaken it. Pilocarpine, first recommended by Schauta, of Vienna, is the newest agent of this class, but it is very uncertain as a means of exciting action, is attended with great distress, and sometimes gives rise to symptoms of poisoning. We may pass by all internal remedies that have yet been named as unsafe and uncertain.

Of the *second* class, it may also be said that they are uncertain. Scanzoni was induced to try excitation of the breasts by blisters, rubber suction-bulbs, etc., to excite uterine action from observing the active sympathy between the breasts and the uterus. This method has failed much oftener than it has succeeded, is painful, has excited mammitis, and has been correctly classed as "unscientific."

Electricity.—Of the *third* class of agents, those acting directly upon the uterus, there have been many suggested. Some are slow in action, some uncertain, and some are attended with danger. Direct stimulation of the uterus by electricity—galvanism and faradism—has been recommended, and a certain measure of success has attended its use; but if used strong enough to be surely effective, it may be dangerous to the child. Killian, Schrieber, M. Dubois, and many others have used electricity without success. Schreiber has tried galvanism, Dorrington and Simpson used electro-magnetism, Henning used faradism, but the weight of testimony seems to be against their reliability. Baird speaks very highly of faradism as a stimulus in uterine inertia, but whether it will be found to start true labor pains is yet uncertain. Experience has not borne out the hopes at one time entertained for the various forms of electricity.

Tampons.—Another method is by excitation of the cervix by means of tampons in the vagina. Cotton, bladders and rubber-bags filled with water, have been used, and this method has its advantages in some cases. They are especially useful in those cases in which labor is to be induced for arrest of hemorrhage, having the advantage of arresting bleeding at the same time that they excite uterine action and produce dilatation of the os. In cases of placenta previa they may be resorted to either alone or in connection with other methods of exciting labor.

Kiwisch's Method.—Hot water injections into the vagina were introduced into obstetric practice by Kiwisch. These douches were used somewhat warmer than the temperature of the body. They are very uncertain in the time required to excite uterine action, and sometimes fail altogether. They can be made more effective by using alternately hot and cold water.

Dilatation of the Cervix.—This has been resorted to by many obstetricians. It was first effected by means of compressed sponge. Berninghausen was the first to suggest it, but Kluge first practised it, and it is sometimes spoken of as Kluge's method. Simpson was the first to use this method in Great Britain. It has its advantages and disadvantages. It is speedy in action and keeps the membranes entire, but the introduction of the tents is not always easy, their action causes much pain, and as they favor rapid decomposition of the secretions, and cause more or less abrasion of the mucous membrane, they are attended with risk of septic infection. Metallic dilators have been used, and by their use the last objection to sponge-tents has been avoided, but they are painful and liable to rupture the membranes. Barnes has recommended the dilatation of the cervix by means of rubber-bags introduced in the os, and distended with water by means of a syringe These instruments not only excite uterine action, but they dilate the os, and the process is made closely to resemble natural labor. While, perhaps, not the most desirable method of exciting labor, the dilators are of great service in dilating the os after the uterine action is set up, and they will find a place in many cases, more to accelerate than to initiate labor.

Cohen's Method.—A method first suggested by Schweighauser, of Strassburg, about 1820, but first tried about forty-two years ago, by Cohen, of Hamburg, whose name it bears, consists in the injec-

tion of a small amount of water, at about the temperature of the body, between the membranes and the uterus by means of a syringe holding about an ounce to an ounce and a half. This method possesses the advantage of exciting labor so gradually as to dilate the os before the membranes are ruptured, but it is not free from danger. It is prompt in action in most cases, but sometimes requires repetition. It acts by separating the membranes, which awakens uterine contractions. The injection of air and carbonic acid has been resorted to for the same purpose.

Hamilton's Method consists in detaching the membranes by passing the finger through the os, and sweeping it around the lower portion of the uterus.

In *Mampe's Method* a bougie is used instead of the finger.

Lehmann, of Amsterdam, proposed and practised induction of labor by passing a bougie eight or ten inches into the uterus and immediately withdrawing it, the introduction being repeated if labor is not started within a day or two.

The last three methods excite labor in the same manner as Cohen's—by separating the membranes from the uterine walls. They are safe, if care is taken not to rupture the membranes, and are easy of execution, but they are not prompt in action. In one case I have known Lehmann's method to fail where Cohen's afterward succeeded. These methods are not adapted to cases in which the operation is done for hemorrhage.

Krause's Method.—Krause, of Dorpat, has suggested the use of flexible catheters or bougies, to be introduced into the uterus between the membranes and uterine walls and permitted to remain there until the uterine action is excited. This is superior to Cohen's method. It is more certain in its action, is not difficult of execution, but must be done with care lest the membranes be ruptured. It is not applicable to cases of hemorrhage unless associated with plugging the os or vagina.

Scheele's Method.—The method usually had recourse to fifty years ago, and on which great reliance was placed, was the sudden evacuation of the liquor amnii. It never failed to bring on labor, but the time varied from a few hours to a few days. Gradual evacuation of the water was also resorted to, but the former method was generally recommended for the reason that the sudden evacuation was more likely to excite brisk action.

These methods are unsafe because of the increased difficulty and danger in cases of too early rupture of the membranes. The danger of some of the other methods named, is their liability to interfere with the integrity of the ovum before the dilatation of the os has taken place.

From this brief mention of the methods of exciting uterine action, we see that there are many of them. I have not named all, but I have referred to most of those that have at different times been most relied upon.

The safest, and generally the simplest, methods are those by which the dilatation of the os uteri is effected slowly and gradually while the membranes are entire. Those methods that have for their object the rapid dilatation of the os and cervix are unsafe, and generally unnecessary.

It is important to get the child to present at the superior strait by the head and have it delivered by a head presentation, if a natural delivery can take place. If assistance is required and a choice is to be made between forceps and version, the question must be determined by the conditions of the particular case—conditions which it is not within the scope of this paper to consider.

The method to which I would give preference, except in cases of hemorrhage, is that of Krause, a flexible bougie in the uterus, to be followed, if necessary, by dilatation of the os by Barnes's dilator. In a case attended with hemorrhage, I would resort to plugging the vagina and after sufficient action has been excited, would introduce a Barnes's dilator into the cervix.

After labor, the child will demand especial attention. It must be kept warm continuously by artificial means. Its circulation is feeble and the bath usually given to newborn children *must be omitted.* The body may be rubbed with warm lard, warmly clothed, and kept in a room the temperature of which is uniformly high. Early feeding should be resorted to, the mother's milk, or that from some other woman, being drawn by a pump and fed to the child by means of a spoon until it has sufficient strength to nurse.