

FETAL OVERGROWTH AND ITS SIGNIFICANCE IN LABOR.*

By **GEORGE W. KOSMAK, M.D.**,
NEW YORK CITY.

IN writing this paper, my purpose is to present certain conclusions drawn from personal experiences in the delivery of large fetuses, both at the Lying-In Hospital and in private practice.

Generally speaking, it may be said that overgrowth of the fetus depends on two causes. In one, we are dealing with a pathological condition, such as is found in true cases of chondrodystrophy. In the other, we have to do simply with an overgrowth, due in most instances to a continuance in the development of the fetus after the time for normal labor has elapsed. The first class of cases are monstrosities and do not concern us in this connection; this paper is devoted to the discussion of the latter class only.

By way of introduction to the discussion of our subject proper, it seems necessary to determine over just how much time a normal pregnancy ought to extend. A number of factors must be considered before we can assume that in any given instance the prolongation has or will have a pathological significance. Thus, in the case of a woman with a large pelvis, a fetus of more than ordinary size may be expelled without difficulty, although the normal length of pregnancy may have been exceeded. On the other hand, a fetus of normal size may be unable to pass through the mother's pelvis on account of its contracted diameters even before the full term has been reached. The latter aspect of the question will also interest us in connection with some of the other statements about to be made, and will, therefore be referred to again later on.

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An exact diagnosis of the length of the pregnancy in any particular case is often surrounded with a great deal of doubt. The medico-legal aspect of the question has apparently received more attention than the purely obstetrical phases of the same, but the consensus of opinion seems to show that for all practical purposes, a full term pregnancy extends over a period of at least 280 days from the first day of last menstruation. This rule is probably subject to a number of exceptions, as it is often difficult to determine which menstrual period is the one from which the calculation must be made, but if there is any doubt, the progressive growth of the uterus as shown by the rise of the fundus will, in most instances, serve to confirm the estimate. As the expected date of confinement is often found to vary from the physician's prediction, it may be necessary to allow a leeway of a week or two in either direction. In those cases where conception takes place during a period of amenorrhœa, we can only depend on observations, based on the growth of the uterus for our estimate. The length of the fetus also affords us a means, though an uncertain one, of calculating the length of pregnancy, and Spiegelburg has proposed the following measurements of the fundus above the symphysis:

22nd to 28th week..	24 to 24.5 centimeters
28th week.....	26.7 centimeters
30th week.....	28.4 centimeters
32nd week.....	29.5 to 30 centimeters
34th week.....	31 centimeters
36th week.....	32 centimeters
38th week.....	33.1 centimeters
40th week.....	33.7 centimeters

These measurements, however, are subject to considerable variation, as they are dependent, not only upon the size of the fetus contained within the uterus, but also upon the degree of distention of the abdominal contents. Nevertheless, in cases in which we possess no other data, they occasionally afford us information of very considerable value.

The subject of fetal overgrowth is referred to more or less extensively by a number of writers in text-book literature, although some apparently disregard the possibility of its occurrence as a factor in labor.

The following were among the most noteworthy references found:

Gallabin and Blacker in their "Practice of Midwifery" (7th Edition, 1910) state that the excessive size of the fetus may, among other causes, be due to post-maturity, for very large children with unusually ossified bones have been born when labor has not occurred for several weeks or even a month beyond the expected date. They likewise claim that in fourteen to fifteen per cent. of all children weighing over 8¾ lbs. (4,000 grams) the pregnancy has lasted more than three hundred days, but that the ex-

cessive size of the fetus is rarely so extreme as to cause much difficulty in a perfectly normal or wide pelvis. Combined, however, with slight degrees of narrowness in the maternal passages, a large fetus is one of the commonest causes of difficulty in labor.

In discussing the treatment, Gallabin and Blacker believe that protracted labor from excessive size of the fetus is to be treated in the same way as that due to equable contraction of the pelvis. They consider that in general, extraction by forceps will be sufficient to meet the case.

In discussing overgrowth of the fetus, Hirst, (*Text-book of Obstetrics*, 6th Edition, 1909), considers that excessive growth is quite rare and states that in one thousand children delivered in the Maternity Hospital of Philadelphia, only one weighed more than twelve pounds. The largest child he had ever seen personally weighed fifteen pounds. He believes that the causes of overgrowth in the fetus include the prolongation of pregnancy, oversize and advanced age of one or both parents and multiparity. The author believes that prolongation of pregnancy is the most common cause, and states that in six per cent. of women pregnancy may be expected to be prolonged beyond the three hundred days, and for every day that the fetus is retained beyond the usual time, there is an increase in size and weight beyond the normal. He states further that so much difficulty and danger may be experienced from this cause that it is a good rule in practice to allow no woman to exceed the normal duration of pregnancy by more than two weeks. By inducing labor at that time, one occasionally interferes unnecessarily, but often avoids complications and difficulties of the most serious nature. He considers that overgrowth of the fetus is one of the most difficult conditions to diagnose with precision.

In a "Clinical and Forensic Study on the Prolongation of Pregnancy," by Dr. Maria Ciulla (*Zeitschrift für Geburtshülfe und Gynäkologie*, Bd. LXVII), the author's observations on a series of two hundred and fifty-two cases of prolonged pregnancy in Professor Bossi's clinic at Genoa are summarized as follows:

I. A prolongation of pregnancy was noted in 7.61 per cent. of the cases. These figures seem to be influenced by the race of the patient, by the individual, and also vary in different years, months, and seasons.

II. Certain factors in the production of this condition include the age of the patient; the appearance of the first menstruation; length of the latter, and of the intra-menstrual period; occupation of the patient; rest during pregnancy; stature; conformation of the pelvis and overdistention of the uterus. The most important etiological factor, however, undoubtedly resides in the uterus, and is believed by the writer to consist of an excessive and premature fatty degeneration of the uterine muscle during pregnancy.

For this reason, it is important to pay greater attention to the general health of the patient, the number of her pregnancies, her health during pregnancy, and to their repetition.

III. Prolonged pregnancies constitute a true complication for the following reasons: (a) Because labor, especially during the period of dilatation becomes prolonged, owing to the weaker character of the labor pains, which are almost always the rule in prolonged labor, and as the result of which atonic hemorrhages are very apt to follow the delivery of the placenta. (b) Because operative interference is often required and aside from this a large percentage of other injuries are apt to result. (c) Because even where the maternal prognosis is favorable, this does not apply to the children, in which the mortality in this series was found to be 7.48 per cent.

IV. Excessive development of weight of the late male fetuses is not a constant characteristic. A more important criterion is their excessive length. Therefore, it might be more proper in cases of prolonged pregnancy, to speak of true fetal macrosomia with early calcification and advanced development of the cranial bones.

V. The placenta likewise undergoes an increased development beyond the normal as regards its weight. This corresponds to the increase in the development of the fetus.

Ciulla's figures are based on a series of 3,331 cases observed during a period of sixteen years. Of this number, 2,332 only reached the end of their pregnancy, and among these 252 cases of prolonged gestation were noted. This writer considers that the normal pregnancy does not extend beyond 289 days.

Williams in his text-book on "Obstetrics" states that the average infant weighs about 3,250 grams (seven pounds). He also quotes T. F. Riggs, as having made a series of observations on seven hundred and seven full-term white children at Johns Hopkins Hospital, in which the average length was 49.64 cm. and the average weight 3,316.9 grams (7.54 pounds). The largest child in this series weighed 4,053 grams (nine pounds twelve ounces). A series of colored infants studied by Riggs showed a difference in weight of about 200 grams (7 ounces) in favor of the white race. Williams states that perfectly healthy full-term children may vary from 2,500 to 500 grams in weight, rarely exceeding the latter figure, but believes that in the majority of cases where weights of fifteen or more pounds are spoken of, a careful inquiry will usually show that the weight is not the actual one, but merely estimated.

Hecker (*Klinik der Geburtskunde*, 1861, No. 49) found in 1,096 cases that only two children weighed over 5,000 grams. Winkel ("Neue Untersuchungen über die Dauer der menschlichen Schwangerschaft." *Volkmann's Sammlung Klinischer Vorträge*, New Series, Nos. 292,

293, 1901) found five in three thousand five hundred deliveries and Starcke ("Ueber Geburten bezw. Spätgeburten bei Riesenkindern, etc." *Archiv. f. Gyn.*, 1905, LXXIV, 569-619) found sixteen in three thousand four hundred deliveries. Ludwig states that out of one thousand five hundred and sixty-six children, only one weighed 5,300 grams, and Vonyear found only six children that exceeded 5,000 grams at birth in a service of seven years at the Baudelocque Clinic in Paris. Williams himself, in a series of six thousand deliveries in his service reports the largest child as weighing 5,833 grams (twelve pounds eight ounces). He also quotes a number of other exceptional cases of large children and believes that the size of the fetus, increases with the age of the mother up to the twenty-eighth or thirtieth year, if the pregnancies have not followed in too rapid succession; also that the size is dependent to a considerable extent on that of the parents, especially the father. The social condition of the mother, and the comforts by which she is surrounded are also stated to have a marked influence on the child's weight.

In addition to the weight of the fetus, the diameters of the head also play an important part in the question of prolonged pregnancy. The normal diameters of the fetal head, according to Williams average as follows: Occipito-frontal, 11.75 cm.; Biparietal, 9.25 cm.; Mento-occipital, 13.5 cm.; Sub-occipito-bregmatic, 9.5 cm. The greatest circumference of the head averages 34.5 cm. The length of the fetus is usually believed to afford a more accurate criterion of the age of the child than its weight, and the average length is believed to be about 50 cm. (20 inches) at term.

While engaged in the preparation of this paper, a publication along similar lines by Professor A. H. Wright of Toronto came to my attention. Dr. Wright has advocated practically the same procedure to which I am personally committed and in a recent number of the *Canadian Medical Journal* (October, 1911), he replies to certain questions and criticisms as follows: "Observations have shown that the growth of the child in utero after viability is very rapid. At the end of the seventh month, the average weight is 1,400 grams, at eight months 2,200 grams, and at nine months 3,470 grams—the increase in the latter month being nearly 58 per cent. The probable increase in the tenth month is, therefore, about 2,000 grams. In other words, a seven pound baby at term will weigh almost eleven pounds at the end of another month and a nine pound baby thirteen to fourteen pounds. In addition to this, the child loses some of its flexibility, universal flexion is less marked, the head becomes harder and the difficulty of delivery is increased. As to the criticism that one cannot tell when a patient has reached term, it may be stated that careful examinations conducted at proper in-

tervals are usually satisfactory, and if there is any doubt one may wait at least a week. It seems safer, however, to induce labor one week before term than two weeks after."

Dr. Wright believes that protracted pregnancy occurs in about 15 per cent. of all cases and states that careful observation and increased experience have fully confirmed his opinions previously expressed. He thinks that it would be well for both mother and child to make it an ordinary matter of routine to induce labor in all cases within a few days after term.

In most instances, we are able to estimate the length of a given pregnancy quite fairly accurately from the menstrual history, and Naegele's rule affords us a simple means for calculating the date of expected labor. The result obtained ought always to be considered in connection with the observations on the rise of the fundus.

The latter at four months is usually a little above the symphysis, at the fifth month is about midway between the latter and the umbilicus, at the sixth month, it is at the level of the latter, at the seventh month, it reaches a hand's breadth higher, at eight months still another hand's breadth, and at eight and a half months, it is at the level of the ensiform cartilage. Subsequently, between this period and the end of the term, it sinks down until it reaches the same level as that occupied at the eighth month. If labor does not come on when this lowest point has been reached, the fundus again begins to rise as before. In this description, calendar months are referred to in preference to the lunar months, because most women are found to calculate their pregnancy in terms of the former than of the latter. The statement may be quite safely made that if labor does not come on within two or three weeks after the fundus has begun to descend, that the physiological time has been exceeded.

Many theories have been advanced to account for the onset of labor, none of which can be regarded as the sole one. It is very likely that several of these taken together have an influence in producing this phenomenon. In most women who are active, labor comes on within a few days of the expected time, but a reduction in bodily activity, which is often coincident with the end of pregnancy, may do much to cause a postponement of labor. This occurs not only in private practice, but also in the hospital service, where patients who had been admitted within a few days of labor, and with all the evidences of the beginning of this process, have ceased to continue, and go for a week or more without anything further happening. It is quite generally conceded that the prognosis in cases of labor, with very large children is most unfavorable for the child and also to a certain extent for the mother, for the passage of an abnormally large child always means a prolonged labor with its possible evil consequences.

The skull of an overtime fetus cannot be as readily molded, because in addition to its size, nature has also to contend with bones which are less elastic because of the increased degree of ossification present. Even if the mother does succeed in forcing such a large head through the brim and into the pelvis, the effort entailed usually results in an inertia of the uterus or a tonic contraction of its musculature, with the possibility of post-partum hemorrhage, and in addition to this complication, we also have to consider the possible pressure effects on the brain of the child. From a consideration of these facts, it would appear necessary to note carefully in every instance, the growth of the uterus in relation to the supposed length of the pregnancy, and if labor does not come on within a reasonable length of time after this limit has expired, that steps be taken to induce the process. I am quite convinced from personal observations, that large fetuses are almost invariably due to an extension of the time of pregnancy beyond the normal limits. This statement does not, however, refer to a dystocia due to the true pathological conditions already mentioned.

An examination of the records of the Lying-In Hospital shows that in 500 serial cases delivered in the wards, the average weight of the infants was 3,366.70 grams (6.01 pounds). This series does not include any babies weighing less than 2,700 grams. The average weight of the babies born in the hospital is less than that of the cases in the outdoor department, where the average weight in a series of over 9,000 cases (estimated in 1896) was found to be 7.7 pounds. This discrepancy may be accounted for by the fact that the hospital records included many women that were either sick with complicating diseases, homeless, poorly nourished and in whom labor was induced prematurely for various complicating conditions. The outdoor patients, on the other hand, were mostly multiparæ and provided with homes. Of the 500 cases delivered in the hospital, the greater number of the babies weighed between 3,000 and 4,000 grams, forty-five weighed between 4,000 and 5,000 grams and only five of the series 5,000 or over.

We are apt to meet with simple overgrowth in private practice more often perhaps than in a hospital service, because these women are less active before labor, and in many cases their musculature, including that of the uterus, is in a greatly relaxed condition. This makes it even more incumbent upon us to watch these cases carefully.

As instances of prolonged pregnancy, I desire to briefly relate the histories of the following characteristic cases which were personally observed. The first one being typical of a large class I will report somewhat in detail.

Case I. Mrs. B. G. married; age forty four; birth-place Ireland; para XIV; seven children living, four miscarriages, two forceps deliveries,

seven easy labors; was admitted to Dr. Davis' service at the Lying-In Hospital on February 26, 1911 (C. N. 19162). Date of last menstruation, May, 1910, date of expected labor, February 5, 1911. She gave a history of having been in labor for three days, during which time several attempts at forceps extraction had been made. The woman was stout and well nourished, and the pelvic measurements were normal. The membranes had ruptured on the day previous and the uterus was in a state of complete inertia. The abdomen was greatly distended and examination showed the presence of a large child in the R. M. A. position, the face being moderately engaged in the brim. An attempt was made to convert the face into a vertex by the Schatz method, but was found impossible of execution. The conditions for a version, however, were favorable, and this, in view of the large pelvis seemed to offer the best chance for saving the child. The cord pulsated very feebly and infrequently, although the fetal heart had not been heard for some hours previously. The cord, which had prolapsed alongside the face, was accordingly pushed back and the anterior leg seized and brought down. The other leg was likewise delivered and the body of the child readily extracted until the umbilicus presented. During these manipulations, the cord, which was very long, again came down and was found to be pulseless. The arms were extended and the anterior one was delivered first, but with some difficulty, resulting in a fracture of the humerus. In view of the fact that the child was dead, a craniotomy of the after-coming head was decided on in order to relieve the mother from the danger of any possible injury. Pressure on the head by an assistant through the lower segment of the uterus was first tried, however, and much to our surprise the head slipped through the pelvis without any difficulty. The placenta was delivered by Credé, thirty minutes later and the patient returned to bed in good condition. Examination of the fetus showed a medium degree of caput succedaneum over the right cheek and temporal region. The weight was 6,050 grams, the total length 65 cm. the vertex coccygeal, length 39 cm. The diameters of the head and trunk were as follows: Occipito-mental, 14.5 cm.; Occipito-frontal, 13.5 cm.; Sub-occipito, bregmatic, 10 cm.; Bi-parietal, 10.5 cm.; Fronto-mental, 8 cm.; Bi-zygomatic, 10 cm.; Bis-acromial, 15.5 cm.

The circumferences were as follows: Sub-occipito-bregmatic, 37.5 cm.; Occipito-frontal, 41 cm.; Bis-acromial, 53 cm.

The nails of the child were prolonged beyond the edges of the digits, the subcutaneous fat was abundant, the various folds deep, but aside from the large size nothing abnormal could be found. The cord was 111 cm. long, and inserted centrally into an oval shaped placenta which measured 16 x 25 cm. In the latter, there was consid-

erable degeneration of both the fibrous and calcareous variety. The cord was very much attenuated and apparently entirely free from Wharton's jelly. The venous trunk was very much distended and on histological examination, a partial obliteration of the arteries was found to have resulted from the presence of an endarteritis. In other words, there seemed to have been a marked interference in the fetal circulation, both from the parital obliteration of the umbilical arteries as well as a congestion of the umbilical vein. This probably accounted for the diminished heart action, as well as the condition of asphyxia in the infant before birth. The large amount of fibrous and calcareous degeneration in the placenta, no doubt, likewise contributed to this condition. It might be argued that this interference with the fetal circulation would retard rather than favor the growth of the fetus, but the overgrowth probably occurred before the obstruction had become sufficiently marked.

In this instance, we were probably dealing with a case of missed labor at term and the size of the fetus bears out the belief of the patient that she exceeded her time by at least four weeks, if not longer. In this case, the induction of labor at the proper time would undoubtedly have resulted in the delivery of a living child.

The following cases may be cited as additional instances of failure of labor to come on at term with resulting large child and are taken from personal records of private cases.

Case II. Mrs. I. M., para II, age thirty, pelvis roomy, with the internal conjugate undetermined. The previous labor somewhat prolonged necessitating a low forceps. The first child was large, well developed and weighed somewhat over ten pounds. The present pregnancy was normal, last period occurred April 28, 1910, and the labor was expected about February 2, 1911. Abdominal examination on December 16, 1910, showed a moderate degree of hydramnios with the fundus at seven and a half months. No signs of labor had appeared by February 14th. The cervix remained thick, one and a half fingers dilated. The uterus was very much distended and the head large and only slightly engaged. A Vorhees bag, size No. 2 was introduced, resulting in the production of a few pains. During the next day, the patient did not have any pains, but by evening the cervix was two and a half fingers dilated and very much softer. A gauze pack was introduced at this time and removed twenty-four hours later on the evening of February 16th. This had resulted in the production of only a few weak pains and the cervix was still fairly thick and three and a half fingers dilated. Manual dilatation was then easily carried up to four and a half fingers and the membranes ruptured. The head began to come down and the patient continued to have pains for about two hours, after which they ceased. On the

morning of the next day (February 17th), the cervix was completely dilated by the hands and pushed back over the head. The pains became stronger and more frequent and the child was born about an hour and a half later. The baby was well developed, with plenty of subcutaneous fat, projecting finger nails and weighed slightly in excess over ten pounds. The patient made an uninterrupted recovery.

In this case, even the various manipulations failed to bring on satisfactory labor pains, and it would appear that unless the pregnancy had been terminated by artificial means, labor would not have come on at this time.

Case III. Mrs. N. S., age 28, para III, with a very irregular menstrual history and an account of being generally nervous, irritable and in not very good general health. The first labor was very difficult, lasted three days and a baby weighing over nine pounds was finally delivered by forceps. The chief complaint during the puerperium referred to the bladder (pains and inability to void), continuing for a number of weeks. In taking the history of the present pregnancy, the date of last menstruation was stated to have been May 3rd, 1909, but owing to the irregular character and omission of several periods previous to this, this date could not with certainty be stated to have been the correct one from which to figure the length of the pregnancy. The patient was believed to be due on February 7, 1910, but even before that date everything pointed to the presence of a large child in the uterus with considerable liquor amnii. The pelvis was very roomy, but on account of the history of the prolonged labor with her first pregnancy, it was deemed wise to induce the process this time before the period for normal labor had gone by. The cervix was thoroughly softened and was about one finger dilated. There was no evidences whatever of labor pains, even after the usual administration of a large dose of castor oil. Labor was induced on February 9, by the insertion of a No. 2 Vorhees bag and after its expulsion the next morning, the cervix gradually dilated until complete dilatation was reached on the next evening. The membranes were then ruptured and the pains immediately became strong, resulting in the expulsion of the child about twenty minutes later. The baby weighed ten pounds six ounces, was well nourished and the head without caput or molding. Aside from a disturbance of the bladder similar to what had occurred in her first pregnancy, the patient passed through a perfectly normal puerperium, except that the involution of the uterus was somewhat delayed, probably on account of the over-distention to which it had been subjected. The baby, however, after the first few days became very sluggish and failed to cry at nursing time. It seemed to be developing a condition of toxemia from which it only recovered after vigorous eliminatory and stimu-

lating treatment extending over several days. The child gave one the impression of being considerably overdue and in a state of mental apathy and torpor. After it had lost some of its weight and became reduced to apparently more normal proportions, it was soon restored to the condition of an ordinary nursing infant.

It may be stated by way of comment that in this instance the irregular menstrual history did not afford a definite clue for determining the actual length of the pregnancy, but the excessive size of the child and the marked abdominal distention certainly pointed to a prolongation of this process, and if this child had been born somewhat earlier, it is very doubtful whether this condition of very nearly fatal toxemia would have developed.

Reviewing the facts noted in the foregoing paragraphs, the question remains as to the most rational procedure to follow in an ordinary and otherwise uncomplicated case of pregnancy, to avoid the possibility of dystocia from a prolongation of the process beyond the normal limits. Shall we induce labor at the time when the latter was expected, or shall we wait for the phenomenon to be initiated by natural means? Many will insist that the question is a difficult one to answer and it is undoubtedly true that unless the condition is carefully considered from every standpoint, we may sometimes be rewarded by the birth of a premature rather than an overdue child. It was noted in a study of the statistics at the Lying-in Hospital, referring to children weighing over 5,000 grams, that in a number of instances the labor, notwithstanding the size of the child, proceeded without great difficulty. In most of these cases, however, we are dealing with multiparæ with large pelvis and relaxed soft parts, but even in these cases and in others of a similar kind seen in private practice, the babies of large size did not apparently get along as well during the first few weeks as those of a smaller stature. The initial loss of weight in these cases is often considerable, the babies are sluggish, do not nurse well, and sometimes their elimination appears to be interfered with to such an extent that toxic symptoms of a serious character may result (*e. g.*, Case No. 4, III). On the other hand, the fact was also noted that a large proportion of children weighing between 4,000 and 5,000 grams, were also the cause of dystocia to an extent more noteworthy perhaps than in those of a greater weight.

It would appear from what has been said that the only way in which the best interests of both mother and child can be safeguarded against the possibility of complications from an overtime pregnancy, is for the attendant to keep a careful watch, whenever this is possible, on the growth of the fundus and the signs of impending labor, confirming this by a careful inquiry as to the date of the last menstruation and a calculation of the expected time of labor from the same. The growth of the fundus offers only presumptive

information during the middle months of a pregnancy, but between the sixth and eighth months, two or three observations will usually permit a fairly accurate diagnosis of the time of impending labor. As shown by Brodhead's statistics, the date of expected labor may be calculated in a very large proportion of cases from the last regular menstrual period.

Another sign which may be employed to determine the approach of term is the descent of the presenting part into the brim of the pelvis, coincident with the dropping of the fundus uteri. When elicited, this is almost diagnostic of the second week before impending labor, and may usually be confirmed by a bimanual examination to determine the position of the presenting part and the size of the fetus. Where, in the case of a vertex presentation and a normal pelvis, the head fails to remain engaged in the absence of other complicating features, we can be absolutely certain that its growth has progressed beyond the normal. In such instances, particularly if palpation of the body of the fetus bears out the original observation, it is not well to rely for too long a period on the probable or possible spontaneous passage of the head through the birth canal.

Coming now to the practical treatment of such cases, we may inquire as to the most rational procedure to adopt in order to prevent these complications attendant upon the birth of a large child. The fact has already been referred to, that women coming into the hospital apparently in active labor often cease to have any further pains and may go for a considerable period before delivering themselves. As this is probably due to cessation of the active exercise to which they are accustomed, we may draw from this a lesson, not to permit patients to relax their activities before labor, but to urge them to be up and about as usual, even if this is productive of some discomfort.

Impressed by the risks to both mother and child which have already been referred to, the writer in his own practice has adhered to the following procedure with good results in those where the evidence points to a pregnancy at term. On the evening of the expected date of labor or a few days later, a dose of castor oil, varying from one to two ounces, is given to the patient, which, in addition to producing a thorough evacuation of the bowels, also stirs up labor pains in many instances. Quinine has also been recommended as a suitable drug to be given with the castor oil, but it has been observed that the uterine contractions in such women are not regular and often inefficient. If the castor oil fails to bring on pains, the dose may be repeated on the following evening. After the lapse of two or three days, and in the absence of any other indications for previously terminating the process, steps may then be taken to initiate labor pains by more radical means. These means are directed primarily to the dilatation of the cervix

by hydrostatic bags or gauze packings. The preparations for the same should be as carefully conducted as for any other operative delivery. The patient's genitals are shaved and cleansed with soap and water, followed by irrigation with 1 per cent. lysol solution. Vaginal douches are not necessary. A small sized Vorhees bag (No. 1 or No. 2), is introduced through the cervix, if necessary, exposing the latter by the aid of a speculum, where this can be done. Otherwise the bag may be introduced through the medium of touch alone. If the cervix is not sufficiently dilated, this may be satisfactorily accomplished with the finger. The Vorhees bag should be inserted well within the cervix and care should be taken not to rupture the membranes. After the bag is in position, it is slowly distended with warm sterile water and in addition a gauze strip may be packed into the cervix and around the same, filling up the entire vault of the vagina. After tying the tube of the bag with tape, the same may be pushed within the vagina, and I have not found it necessary in any of my cases to attach a weight or to direct a nurse to pull on the bag at intervals. In place of the dilating bag, a plain gauze strip, one inch wide, may be packed into the cervix and vagina, the results from this procedure being quite as good, although somewhat slower than those from the bag, in dilating and softening the cervix and inducing labor pains. In most cases, the pains will come on some time during the next twenty-four hours, after which the bag or gauze is removed and the effects of the same observed for several hours. If the pains cease, or remain weak and irregular, a second bag or gauze packing may be introduced. This is usually sufficient to induce pains and to initiate dilatation of the cervix, and I have avoided the use of the largest size Vorhees bag on finding that it may displace the presenting part, so that a normal vertex presentation is converted into a face or even a shoulder as occurred once in the writer's experience. As a rule, the labor continues from this time without any further trouble, but in exceptional instances the pains are not satisfactory even after these measures, and in several cases, the writer found it necessary to resort to manual dilatation of the cervix and rupture of the membranes before satisfactory labor pains were produced. If carefully and conscientiously done, no fear need be felt of any possible infection in these cases from the necessary manipulations.

The employment of a bougie or a soft rubber tube provided with a stilette has also been suggested for the purpose of inducing uterine contractions and Dr. Lyttle of Montreal, has reported excellent results with this procedure. It is necessary, however, to introduce such devices between the membranes and the uterine wall up to the fundus, and as this may be attended with considerable uncertainty and risk in the hands of those not particularly expert in its execution, it does not seem advisable to recommend it for gen-

eral adoption. It is stated by those advocating this measure that from twenty-four to forty-eight hours usually elapse before the pains come on, and comparing it with the method advocated in this paper, it is seen that no greater interval elapses with the use of the gauze packing or the elastic bag, and the latter procedures are easier to carry out. A rupture of the membranes, moreover, is more likely to occur during the introduction of a bougie than either of the other measures referred to.

After labor has been initiated by the means referred to, it ordinarily proceeds in the usual manner, and if, as already stated, the procedure is carried out with the proper care and caution, no harm will result to the mother or child.

In a certain limited class of cases where pregnancy has proceeded beyond the normal limit, the routine procedure advocated may merely result in the loss of valuable time. This includes instances where labor has failed to come on, particularly in primiparæ, and the head and more often the shoulders are too large for proper passage, either through the bony canal or the soft parts at the outlet. In such cases, one should not hesitate too long before advocating an abdominal Cæsarean section, as the most certain and effective means of solving the problem, with the least chance of damage to the mother and child. In such instances, the prolonged molding which a large head must undergo in passing through the birth canal, with the possible subsequent employment of the forceps, and the dangers attending both of these conditions, often gives wish to the thought that a more radical or more rapid and satisfactory procedure had been resorted to such as the abdominal Cæsarean section.

While this paper contains certain definite recommendations for the induction of labor at term, in cases where this may be necessary, the writer at the same time wishes to urge very strongly the exercise of great care and precaution before resorting to such interference. The patient should have been carefully watched during the latter months of her pregnancy and the growth of the uterus observed. The attending physician should never be led into the false position of inducing labor, in order to meet his own convenience, and this phase of the question obviously needs no further discussion. On the other hand, if any uncertainty exists in the mind of the attendant, the opinion of a second physician should be sought for. In presenting these recommendations, the writer is well aware of the prejudices which exist in the mind of the majority of the members of the medical profession against unnecessary interference in labor, and there is no intention whatever to divert from this stand. It may be justly claimed, however, that such preventative measures as are here advocated, cannot be classed as unnecessary, and the observations of those who have seen the evil consequences of waiting too long for labor to

come on by natural means, have already led to the publication of a number of papers advocating a more radical treatment of the matter. It is quite generally believed that sepsis, in many instances, is brought about by the introduction of pyogenic organisms during the vaginal examinations in labor and for this reason, it is advised that such examinations be reduced in number as much as possible. In a labor, however, prolonged beyond the normal limits, as would naturally happen in a case of a large overtime baby, the number of necessary examinations would probably be very much in excess of what would occur in a case where the decision was made to induce labor and then carried out. Moreover the tissues at this time are more resistant to the entrance of a possible infection, because the trauma which accompanies a prolonged labor is absent. Dilatation of the cervix, and the introduction of elastic bags and gauze packing can be readily enough carried out under aseptic conditions without endangering the mother, and if the question were carefully studied, it would be found that septic infection is much more prevalent in those cases that have gone through a prolonged labor than in any in whom labor may have been induced for the reasons mentioned. In my own experience with the class of cases, in which labor was deliberately induced, no ill-effects resulted and in each instance it was felt that the patient's recovery was hastened by the step.

SUMMARY.

1. It is an accepted fact that in a certain number of women, the period of gestation is prolonged beyond the normal limits. This results in the production of large fetuses which rapidly increase in size and offer a possible obstruction to safe and satisfactory labor.

2. The progress of gestation in each patient should, therefore, be carefully watched, and if the date of expected confinement obtained from the menstrual history is confirmed by the growth of the fundus, labor should be induced within a reasonable period by appropriate measures, if it does not come on spontaneously at the proper time.

3. The induction of labor under these circumstances if properly conducted, is not attended with any risks to mother and child.