CERTAIN OBSERVATIONS REGARDING PROLONGATION OF PREGNANCY*

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ONE of the main reasons for presenting a paper upon this subject is that in my early days as an obstetrician I was constantly bothered by the fear of serious results which might follow a prolongation of pregnancy. I, of course, had the experience common to all, that 6-8 per cent of pregnancies went beyond the expected date, but later I realized that for the most part such a fear is without any foundation. For a long time this knowledge has been a comfort to me, knowing as I do, that in the light of our present-day experience it is no longer needful to be alarmed at the mere continuance of pregnancy beyond the calculated date. In making this statement I do not wish to be misunderstood. I do not deny that rarely pregnancy may be prolonged so far beyond the so-called normal limits that if the case be not properly handled there may be very serious results to the child and mother, but what I do affirm is that this true prolongation is really rare and that when it occurs it can be detected in ample time to permit the handling of the case in an intelligent manner and with no more hazard to either child or mother than is a necessary accompaniment to the conduct of labor in the presence of relative degrees of contracted pelvis.

My belief as to the infrequency of prolongation is substantiated by the fact that a careful study of cases reported in the literature as being of this nature, so frequently shows a lack of evidence to substantiate the diagnosis. For instance, in one of the best papers on this subject which can be found in the literature, that of Ballantyne, there is a long list of cases with a synopsis of the salient points in their histories and my first intention was to make a study of these cases for the purpose of this paper, but a very superficial investigation convinced me that it was a useless expenditure of time as most of them were either so imperfectly reported by the original writers that no one could rightly judge of their value, or the facts stated were unsupported by suitable evidence. In other words the acceptance of the unsupported testimony of a patient relative to the date of fruitful coitus, is hardly in accord with the rules of scientific testimony. However, there is no question that occasionally a pregnancy may continue for decidedly longer than the usual period, and it is theoretically interesting to consider the possible causes of such a prolongation. As is well known, not having any knowledge as to what causes labor to start, it is not to be supposed that we will be able to determine the reasons for a prolongation. Various theories, however,

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have been advanced. Most of them can only be considered as foolish; for instance von Winckel thought that the male sex was more likely to result in a prolongation of pregnancy than would be the case if the child were a female. Why any such opinion was ever advanced by such a man, it is hard to realize. Again, it has been thought that absence of the head from the lower uterine segment might be a cause of prolongation. In support of this the known frequency of anencephaly in cases of prolonged pregnancy has been cited. It has also been stated that a woman who has a thirty-day type of menstruation is more likely to have a prolongation than the woman with the usual menstrual interval. One of the later theories for prolongation is founded on the idea that the fetal pituitary gland may play a part in inciting uterine contractions. Those who advance this theory call attention to the above-mentioned relative frequency of anencephalic abnormality, in which case the pituitary gland is generally absent. This belief is of course more in accord with the present-day fashion but is nevertheless purely and simply theoretic.

The *difficulties in diagnosing postmaturity* is another reason for my disbelief in its frequency. From the clinical standpoint the only symptoms which may be considered of value are of course those demonstrable during life, and of primary importance are any which may be found before birth. Those usually given are the weight and size of the child, the condition of the skin and the nerves and the degree of ossification both of the skull and long bones, together with the condition of the placenta, cord membranes and liquor amnii. It is not necessary in this paper to consider the postmortem signs though it may be said that even the postmortem signs are not necessarily proof of postmaturity. In fact, there are only two points which may really be considered before birth; first the size of the child, and second, the degree of ossification in the long bones, as shown by the x-ray. If careful studies have been made throughout pregnancy, and if *pari-passu* with the prolongation beyond the expected date, there is a steady increase in bulk in the size of the baby beyond the usual development, there may be a certain amount of importance attributed to the apparent size of the child. Though it must be remembered that the nutritional process going on in intrauterine life may be markedly accelerated, so that a child at the eighth month is often as large as another baby at full term, or later. With regard to ossification, it is unfortunate that the earlier ideas as to its value as a diagnostic sign of fetal development have been found to be fallacious, but we now know that the x-ray cannot be of as much value in this matter as might have been expected, since it has been determined that the period of appearance of the centers of ossification varies so much that none of them can be depended upon to establish fetal age within the limits of a month.

One of the main questions to be considered is how frequently pro-

longation of pregnancy is met with. The laity in general would, I am sure, affirm that it is a very common condition; one of the bothers of the obstetrician's life being the insistency of nearly all women that they must be going beyond term, when the earliest estimated date of their delivery has just been passed. Many of you have been frequently put to it to convince such patients that they have no cause to be alarmed and, if you believe as I do, to convince them that there is no need of induction of labor, in the great majority of instances. This opinion, namely, that prolongation of pregnancy is an entity frequently met with, is also held by many physicians as an inheritance from remote antiquity and it has been, and in my opinion continues to be, much too prevalent a belief even among many specialists in this branch. I fancy that some of those present can remember many cases seen in consultation, because of the fear on the part of the physician in attendance that the pregnant patient had so far passed term that serious dangers were imminent. As an example of the attitude assumed by some teachers of obstetrics, I may refer to a recent article comprising a series of 150 induced labors in which a prolongation of pregnancy, as evidenced by slight disproportion, was the reason for interference in 65 instances. The writer of this paper remarks that very probably the commonest indication for the induction of labor in the future will be prolongation of pregnancy.

Before an intelligent opinion for or against the frequency of prolongation of pregnancy may be formed, it is necessary of course to determine the normal period of gestation, and secondly what constitutes a true prolongation. We will all agree that we are most densely ignorant as to the number of days which constitute the period of gestation, not only in the human female, but also in the higher mammalia, and I am of the opinion, sharing it with many others, that there is no definite and fixed number of days which can be predicated as the normal. In other words, as I do not believe that a real prolongation is a common happening, neither do I believe that there is, even scientifically considered, a fixed gestation period; certainly there is none for practical everyday use. The reasons for this belief will help in clarifying some of the obscure points of this subject, at least as far as they have a bearing upon practical everyday questions of prognosis and treatment. They may be briefly stated and are as follows:

1. *Inadequacy of reports.* This has been previously considered.

2. *Analogy.* It is found that the cow, whose gestation period is analogous to that of the human female, and in which the date of insemination is controllable, varies in the duration of different pregnancies very decidedly. Thus Spencer found in a series of cases that there was a variation in the period of gestation of 93 days, while Tessier in a series of 446 cows found 19 with pregnancy lasting over 300 days and one in which it lasted 321 days. Of course the date of insemination was

absolutely certain in both instances just cited. Again Krahmer found that the same cow in her successive pregnancies has a very various insemination birth period. Cow 1 varied from 277 days to 286 days in seven pregnancies. Cow 2 from 276 to 283 in seven pregnancies. Cow 3 from 250 to 283 in eight pregnancies. Cow 4 from 280 to 292 in six pregnancies. Cow 5 from 299 to 304 in four pregnancies. Cow 6 from 276 to 295 in four pregnancies. Cow 7 from 275 to 303 in six pregnancies. Cow 8 from 275 to 321 in seven pregnancies.

Now when we consider the duration of pregnancy in the human female by analyzing a considerable series of cases we also find a decided variation. Thus, Reed in 500 cases (last day of flow positive) found that 112 women gave birth between the 281st and 287th day, 63 between the 288th and 294th day, 28 between the 295th and 301st day, 8 between the 302nd and 308th day, 6 between the 309th and 316th day, and 1 at the 301st, 311th, 314th, 315th and 316th day. Von Winckel in a series of 30,500 pregnancies in which the first day of the last period was known and from which the pregnancy was calculated, found 31 cases showing a duration of from 302 to 322 days. Merriman studied a series of 114 pregnancies (last day of last menstrual flow positive) and found 4 in whom pregnancy lasted from 302 to 306 days. Further, if one considers the variable factors with which one has to deal in attempting to determine the gestation period in the human female, one will certainly be convinced that the question of prolongation of pregnancy in any given case is a matter of great uncertainty. We generally can get definite knowledge of the first day of the last period and occasionally the date of insemination (it is to be remembered that spermatozoa may live three weeks in the tubes) but we, of course, can never obtain the date of ovulation or conception. As to conception while it usually undoubtedly occurs within three to four days after insemination and rarely later than the tenth day, there is nevertheless a possible interval of delay which may amount to twenty-three days. All we know about ovulation is that while it usually occurs from the eighth to the fourteenth day of the cycle and is, therefore, most constant just after the flow, it may on the other hand occur at any time during the cycle. It is, therefore, in all probability not unusual for conception to take place just before the first missed period instead of just after the last normal one. In other words, it is to be remembered that when we estimate the probable date of confinement as we calculated from the last period we are not estimating the period of gestation but only the menstruation-birth period, which experience has shown to be the most valuable criterion of the duration of pregnancy available to us, but which actually is but a very uncertain approximation of the actual period of gestation, which, moreover, may itself vary in rather wide limits also. Thus, experience shows that 50 per cent of births occur from the 274th to the 280th day after cessation of the last period, and that most of the re-

maining 50 per cent go into labor between the 260th and 274th day or between the 280th and 294th day, but that in from 4 to 6 per cent of cases pregnancy continues beyond 300 days. If we can obtain the actual date of insemination we find that usually the insemination-birth period may be estimated at 275 days, but naturally such data is in the vast majority of instances unavailable, and even if positive there is still a rather remarkable fraction of error which suggests the question as to whether there can be a postmenstrual conception by a premenstrual spermatozoa. Duncan, in 46 cases with date of conception established, found the average date of labor to be 275 days later. Ahlfeld in 425 cases found it to be 271 days later, Hecker, 273 days later, and Veit in 43 cases found it 276 days later. Now while there is not a very great discrepancy shown in the just-mentioned figures there is certainly a possible suspicion as to the verity of the dates of coition, and this is made more suggestive by the statistics of Nürnberger who, in 206 cases of pregnancy occurring in the wives of soldiers in the late war in whom the date of a single coitus was established without the possibility of error, found that labor occurred from 253 to 297 days afterwards. Another interesting point which may be gleaned from statistics of the recent World War is the relation which a single coitus resulting in pregnancy bears to the period of the menstrual cycle. Thus, Siegel found in a series of 300 one-time cohabitations which resulted in pregnancy, that there were 159 (53 per cent) on the sixth day following the beginning of the last flow; and Nürnberger, in 215 cases, found that in 41.3 per cent cohabition had occurred early in the postmenstrual period, in 9.3 per cent in premenstrual period and in the remaining 49.4 per cent at various times during the interval. In a word, when estimating the probable duration of any pregnancy which has apparently passed well beyond the so-called "term," it is a good practice, in the absence of certain knowledge of the date of insemination, to subtract 23 days from the elapsed time. If, for instance, a woman shows a duration of 300 days, counted from her last period, she may well be only 277 days actually pregnant and, therefore, not a case of prolongation at all.

In the previous résumé of facts enough has been said to emphasize the uncertainty of the calculations upon which in ordinary cases estimation of the age of any pregnancy depends, and as a consequence the foolishness of establishing treatment whether active or passive based upon such necessarily fallacious data must be admitted. A realization of this fact develops the real intent of this paper which resolves itself into a plea for the study of every pregnant woman not alone or chiefly from the standpoint of the subjective history but rather from the standpoint of the physical findings which the individual case may present. That pregnancy may continue until in itself further prolongation is fraught with danger, must be admitted, though, as has been said, such a continuance is in my opinion unusual. Therefore it is essential that one

should be in a position to determine from physical examination whether or not an individual case falls in this category, since the danger of an actual continuation of pregnancy beyond term often results in such an increased size of the child, with special reference to cranial and bi-sacromial diameters and advanced ossification of the skull, that serious results to child and mother are only avoided by skillful treatment. In other words, as was said in the early part of this paper the problem is identical with that presented by a case of relative pelvic contraction. Barbour has said that the head of the child is the best pelvimeter and that is true today and always will be true. In my opinion it is far from necessary that the recent graduate of medicine should be qualified to perform a cesarean section; the student should not even be taught the application of the forceps to the truly high head, but he should be trained, at least during his attendance at prenatal clinics in his interneship, so that he may be able to form an intelligent opinion as to the degree of adaptation between the fetal head and the maternal pelvis. As a result of many years' experience with senior medical students and internes I am forced to the conclusion that those of us who are teaching are falling far short of our responsibility in this regard. While it is true that this estimation of relative size demands experience and practice to enable one to determine the possibilities in the more narrow relationships which may exist between head and pelvis, it nevertheless has been a pleasure to me to observe how rapidly an interne will come to a correct conclusion in the ordinary case after the technic, well-established for this examination, has been demonstrated to him. Nowadays it is a universal practice among experts in obstetrics and also among intelligent general practitioners to study the pregnant woman during the last two months from the standpoint of her pelvic capacity and the relationship existing between it and the fetal presenting part. If such an examination shows a true disproportion between the passenger and the passage the case should be appropriately handled no matter whether she be supposedly a month before term, a month after term, or just at term. The methods of treatment suitable to the varying conditions do not interest me at this time though it may be well to state that it is years since I have felt called upon to induce labor for prolongation of pregnancy either in my private work or in the hospital services under my care; moreover in over 70,000 midwife case reports which have routinely passed through my hands during the last ten years, we have had but six cesarean sections for all causes and no woman has died as a result of forceps or version. We have had one craniotomy and some 60 cases of fetal deaths from forceps trauma, or other injury at birth which could be attributed to oversize of the child. When it is remembered that these operative deliveries are performed in the homes of these patients with no skilled assistance and by doctors of very varying

degrees of experience in this department of surgery, it seems justifiable to me to believe that prolongation of pregnancy in the series just quoted played but a very small part in the dystocia met with. In conclusion I affirm it as my belief that all available evidence supports the hypothesis with which this paper began; namely, that a true prolongation of pregnancy is unusual. On the other hand there is no intention to deny its occasional occurrence. As the induction of labor is not as simple and harmless a procedure as some would have us believe, my plea is for the study of the conditions presented by the individual case taking the history into consideration but subordinating it to the physical findings. It is the ascertained relationship of the presenting part to the fetus which should decide for or against interference rather than any fixed number of days of elapsed time.

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(*For discussion see page* 769.)

DR. WILLIAM R. NICHOLSON read a paper entitled **Certain Observations Regarding Prolongation of Pregnancy.** (For original article see page 745.)

DISCUSSION

DR. RICHARD C. NORRIS.—This very conservative presentation is to be commended. In France and Austria 300 days is given as the legal limit for full term. In England and this country it is based on a study of the individual case. The trend of modern physiology is that conception really begins during the week preceding the missed period, but the time of expected confinement has been based upon the last menstrual period, a time when we know the woman is not pregnant. Dr. Nicholson should not stress the cow as a standard for studying women. The sex of the newborn cow has been determined very accurately by studies of the maturation of the ovum and regulating the date of impregnation. Not so with the woman whose ovum does not mature in a similar manner and in whom the date of impregnation cannot be regulated. A woman does not, as a rule, go very much over time or fall into labor very much ahead of time, without an explanation for it. There is, however, such a thing as prolongation of pregnancy, and there is such a thing as danger to mother and child from this condition. It was interesting to look over records in the Preston Retreat as related to this subject. In the first 5,000 cases of my service, in which we seldom induced labor for prolongation of pregnancy, there were 140 cases of induction (2.8 per cent). Of these, only 15 were for prolongation of pregnancy; that is once in 333 cases. As my experience grew I found many difficult labors, with high forceps and overgrown babies with extensive lacerations, sometimes partially detached placenta, in the cases permitted to go too long beyond calculated term. I then made it a rule not to permit a case with a floating head to go more than ten days beyond carefully calculated term. In the last 1500 cases we have induced labor 88 times for all causes (5.8 per cent), and 24 times for prolongation of pregnancy, or 1 in 63 cases. Studying the infant mortality in which we induced labor for prolongation of pregnancy, we found a marked improvement. In two cases labor was induced on dead babies, due apparently to prolongation of pregnancy. Just today a woman thought she was at her term, but after careful study of her history we concluded that she was probably about three weeks overdue. Yesterday she was in labor all day and her baby was dead. To deliver the shoulders, amputation of both arms was necessary. The baby's weight was nine pounds and fourteen ounces. That woman had given birth easily at term to other babies weighing 7½ and 8 pounds. One has to make some fixed rule for guidance,—a time beyond which one will not let patients go without the careful special study that Dr. Nicholson has outlined. My rule now is ten days. First, we consider an accurate history as to menstruation and fetal movements. The more uncertain the history the more uncertain is the conclusion in that particular case. Second, as to the size of previous children and the character of previous labors, if a multipara, with the presumption that each child up to the fourth will probably be progressively larger. The size of the pelvis must be accurately known. The stature and size of the father's head. Is the patient an elderly primipara? Is the position occipitoposterior, resting high at the brim, incompletely flexed and with no descent into the pelvis? Is it a breech?

Such cases are prone to prolongation of pregnancy. The oftener I see a woman in the ordeal of labor the more I am convinced that her nervous system is a very important factor as to how her uterus will function and to what extent pain will inhibit uterine function. As some women vary in their ability to digest a meal, so the uterus may vary in its function during labor. The proper functioning of the sympathetic nervous system is of the greatest value. When it fails it may make her obstetrically unfit. Prolongation of pregnancy often occurs in this type. The modern, neurotic, nerve-stressed girl of ultrafashionable life, when labor begins, often goes to pieces, and you have to resort to narcotics and anesthetics early and more often deliver with forceps after helping dilatation by some mechanical means. When this type is allowed to go too much overtime, all these difficulties will be magnified. Now what is the danger of inducing labor for a woman who has gone ten days over her time, in whom you find, after this critical study, some of these conditions to make you believe that she has rather a difficult labor ahead of her? Naturally, infection is thought of as the greatest danger. In all my experience I have seen but two women die from sepsis following induction of labor, and they died after induction of labor done by someone else, and subsequently I was called upon to operate—on one of these a cesarean section. I have never had a patient die after induction of labor done by myself for prolongation of pregnancy. The inherent dangers are dependent entirely upon the one who does it; his technic and the subsequent handling of that case. Once in 300 cases prolapse of the cord has jeopardized the fetus. There is, of course, a greater degree of aseptic technic required in induction of labor and delivery of the patient than in a normal delivery. I think it is often apparent to those who have a wide experience that patients who go ten days or two weeks over the calculated time often have large babies, with large well-ossified heads, with more obstetric complications and more skill required at delivery. I often say, I think if nature permitted the modern woman to have her babies at eight or eight and a half months it would save a lot of trouble. I believe that prolongation of pregnancy has its added dangers. If I have a primipara and she goes ten days overtime, the head not fixed in the inlet, and especially, if she has a high posterior occiput; if she is not obstetrically fit; if her pelvis is on the border line as to size, I usually induce labor by the simplest means at my disposal. I think Dr. Nicholson has overestimated the value of measuring the head with a pelvimeter. I would rather depend upon palpation of the head overlapping the symphysis and the accurate measurement of the pelvis than to hope to reach a conclusion by attempting to push the head into the pelvis.

If the patient goes ten days beyond the calculated period, suppose there has been an error in her menstrual history and suppose we make an error of acting two weeks too soon, the infant will not be endangered. In multiparas there is a wider field for interfering even more promptly. The woman who has had one or two normal labors comes to term with the head riding high above the pelvic inlet, perhaps a posterior occiput, and her pregnancy is prolonged. She gets nervous, her family is nervous, her body chemistry is under stress, she sleeps badly, and daily she becomes less fit, obstetrically, for her labor. It has been as much to my comfort as to my patient to have her enter a well-equipped hospital and, after taking a large dose of castor oil, the following day, under strict aseptic precautions, to dilate her cervix with two fingers, gently detach the lower pole of the fetal sac and give her five minims of pituitrin. The intermittent dilatation is continued for twenty minutes. With few exceptions, labor begins. Anything that makes labor easier for the woman, she deserves to have. Bringing on labor in a hospital properly equipped is not to her detriment, as I have done it over and over again; and as my practice and my experience has grown I have resorted to it more and more. I do not wish to convey the idea that I believe in confinement by appointment: but I believe that, with hospital equipment, if these cases of prolonged pregnancy are so treated, instead of waiting perhaps two or three weeks for Nature, the obstetrician is not taking ad-

vantage, for his patients' real benefit of the good things that have come out of the past and is clinging to what I believe is behind the times.

DR. GEORGE M. BOYD.—I believe that it is exceedingly rare for a woman to go over the normal length of gestation. In cases where the pregnancy seems to be prolonged, it is usually an error on our part brought about by our inability to determine just when conception took place. I agree with Dr. Norris that we should study carefully the patient as she approaches term and note any feto-pelvic disproportion. One objection to the Müller test is that it often necessitates full anesthesia. I do not believe in the routine induction of labor at term as has been recommended. To follow out such a course will invite trouble, for the methods of inducing labor are not always satisfactory. When feto-pelvic disproportion exists, a test of labor is invaluable, for a normal labor with a large infant is apt to be safer than an induced one with a smaller infant.

DR. CHARLES MAZER.—Regardless of whether the unborn baby is postmature or two weeks short of term, if, in our opinion, the head as compared with the inlet of the pelvis is growing too large, it is our duty to prevent damage to mother and baby by inducing labor as near term as possible. Whether we use the classical methods of gauging the size of the head or a method of our own, we can easily foretell a tendency to overgrowth. I induce labor in these cases by giving castor oil, quinine and pituitrin, which is successful in six out of ten cases. In the unsuccessful cases I let nature take her course rather than resort to instrumental induction of labor, because I honestly believe that a version or even a cesarean section is no more hazardous to mother and baby than instrumental induction of labor.

DR. NICHOLSON (closing).—Dr. Piper is perfectly correct when he speaks of the early ossification of the sutures in fontanels and, as I said in my paper, I thoroughly agree that such cases are often not postmature at all. It has been proved that the x-ray will not help in determining the question of maturity, based upon the condition of the sutures in fontanels. I am also thoroughly in accord with Dr. Boyd's disinclination to induce labor without very definite indications. I think it is a grave mistake for any Society such as this to go on record as advocating either the routine induction of labor at term, or the induction of labor without very definite indications, and the whole purpose of my paper was to call attention to the fact that postmaturity of the unborn child is a much more rare condition than is supposed. I fully believe that if the general profession should undertake to induce labor as a routine procedure, there would be a very unfortunate increase of morbidity and mortality. I have no special objection to the surgically trained obstetricians' adoption of the plan of routine induction, though I personally believe it is an uncalled-for procedure, but this is a totally different question when the general profession is advised to interfere in pregnancy, either because the earliest estimated date for the delivery has been passed, or because it is more convenient to the doctor and the patient that labor be brought on at a certain specified date.