The Determination and Treatment of Postmaturity

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A PREGNANCY may create the impression of postmaturity if it lasts more than 280 days after menstruation. However, such an abnormally long pregnancy does not necessarily indicate postmaturity, for either the information given by the patient concerning her last menstruation may be wrong, or, in the case of an abnormally long cycle, the date of delivery calculated by the Nägele method will be incorrect, since the commencement of pregnancy does not coincide with the onset of the last menstruation, but with the day of the subsequent ovulation, which physiologically occurs on the fifteenth day before the beginning of the following menstruation. How, then, can the obstetrician best guard against such miscalculation of the date of delivery?

A reliable estimate of the date of confinement will be obtained if calculation is based on the menstruation data for the year preceding the pregnancy. If menstruation data are available for at least one complete year, they can be used to determine the patient's ovulation time, and the commencement of pregnancy can be narrowed to this period. It follows that the careful keeping of a menstrual calendar is not only indispensable for the determination of the time of ovulation and conception, but also provides the most reliable basis for estimating the date of confinement, as delivery is to be expected 39 wk. after ovulation.

This calendar method of timing ovulation and conception is an absolute method for distinguishing between alleged and actual postmaturity and does not require recording of the basal body temperature, as suggested by Stewart.[14] There can be some hope that girls can be educated to keep a menstrual record, but we cannot expect that all women will take their temperature

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every morning on waking throughout their matrimonial life in order that the obstetrician be able to determine the individual time of ovulation and confinement in case they become pregnant. The simplest and the least inconvenient method—that is, keeping a menstrual record—will be accepted by the majority of intelligent women as soon as they are informed of the beneficial consequences of an accurate determination of the time of ovulation, conception and confinement.

The following highly informative data obtained by observation of five consecutive pregnancies in the patient, G. Z., the wife of a forester, will illustrate the importance, to correct calculation of the date of confinement, of a knowledge of variations in the patient's menstrual cycle.

CASE REPORT

First Pregnancy

The patient's last recorded menses began Feb. 7, 1932. As delivery was to be expected on Nov. 14, 1932, and the patient was living in the Bohemian Forest, an isolated rural district, the obstetrician she consulted in Prague advised her to enter a Prague maternity hospital as early as the beginning of November. When the patient was more than 2 wk. past her expected date (Nov. 14, 1932), as calculated by the Nägele method, the obstetrician established a diagnosis of "postmaturity" and on Dec. 3 ruptured the membranes in order to induce labor. On the same day the patient was delivered of a female infant weighing 3750 gm., in a face presentation, extracted by forceps. The infant died of pneumonia on the third day postpartum, while the mother contracted febrile endometritis and thrombophlebitis in both legs, remaining in the hospital for 4 mo. This apparently "postmature" pregnancy lasted 301 days after menstruation, and the child was lost.

Second Pregnancy

With the last recorded menses beginning Aug. 4, 1935, delivery was expected on May 11, 1936. I advised the patient to enter my clinic toward the end of April. At this time she again went past her expected date, and attempts were made on May 22, 26, 30, and June 4 to induce labor by medical methods—without success. However, on June 14, the patient was spontaneously delivered of a male infant weighing 3800 gm. and measuring 52 cm. in length. This second pregnancy was also of exceptional duration—namely, 316 days post menstruation, a circumstance liable to mislead the obstetrician and therefore demanding of him careful judgment. After this successful delivery the patient was instructed to keep a menstrual calendar, in order that the beginning and termination of the next pregnancy could be determined with greater accuracy.

Third Pregnancy

This pregnancy commenced after a last recorded menses beginning on Sept. 14, 1937. The patient had kept a menstrual calendar (Fig. 1A) for 14 months, and this showed that her cycle varied from 34 to 79 days—for the first two cycles

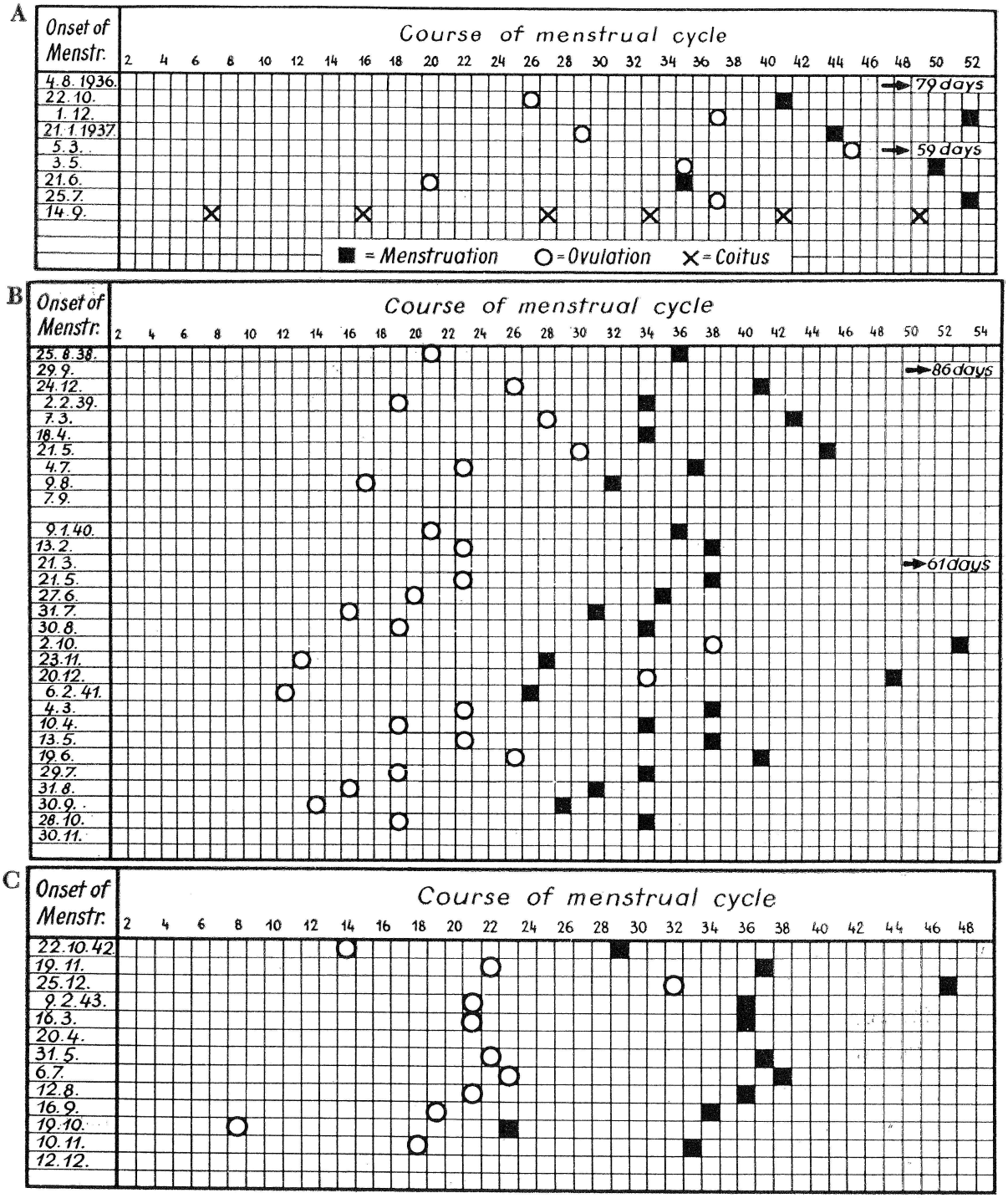

Fig. 1. Calendars of menstrual cycle kept by patient before (A) third pregnancy, (B) fourth pregnancy, and (C) fifth pregnancy.

cannot be considered as being biphasic. Ovulation must then have occurred between Oct. 3 and Nov. 7. Hence, with this very irregular and extremely long cycle, conception can only have occurred after coitus on either Oct. 10, 16, or 24, so that from the very beginning of this pregnancy it was possible to predict that delivery was to be expected not on June 21, as indicated by the Nägele method, but approximately 4 wk. later. In actuality, spontaneous delivery occurred on July 25, 1938, terminating an apparently postmature pregnancy of 315 days after menstruation, whereas the actual period of gestation was only 273 or, at the most, 288 days.

Fourth Pregnancy

The patient continued to keep her menstrual calendar (Fig. 1B) and thus ascertained that, over a period of 2 yr., her cycle had, in the main, varied from 26 to 37 days. She again became pregnant after a last menses recorded on Nov. 30, 1941 and gave birth to this child Sept. 10, 1942—i.e., only 4 days after the date calculated by the Nägele method. The explanation for the strikingly shorter duration of this fourth pregnancy lies in the considerable reduction in the length of the patient's menstrual cycle; consequently, the conception occurred between Dec. 11 and Dec. 22, and the actual duration of the pregnancy was only 261—273 days.

Fifth Pregnancy

After the fourth pregnancy the cycle was still very irregular (Fig. 1C), but varied in the main from 32 to 37 days, so that conception in the fifth pregnancy probably occurred between Dec. 29, 1943 and Jan. 3, 1944. The birth of this fifth child, a boy, occurred spontaneously on Sept. 27, 1944. Calculating by the Nägele method, birth was in this case 8 days overdue, the period of gestation being apparently 291 days, whereas, considering the stated period of conception, the pregnancy can in fact have lasted only 268–273 days.

This example of careful observation of five consecutive pregnancies and of all data relevant to the estimation of the dates of conception and delivery in one patient is probably unique. It shows how important is the regular keeping of a menstrual calendar for the correct calculation of the date of confinement and for distinguishing clearly between alleged and actual postmaturity.

Although postmaturity is only apparent in a large number of cases in which the patient goes past the date calculated by the Nägele method, it should not be denied that there are cases of actual postmaturity, of which one example is given in Fig. 2. Calculating by the traditional method, delivery of this child was to be expected on May 4, 1957, but it did not in fact occur until May 14, thus being apparently 9 days overdue. However, if we take the patient's ovulation time into account in calculating the date of

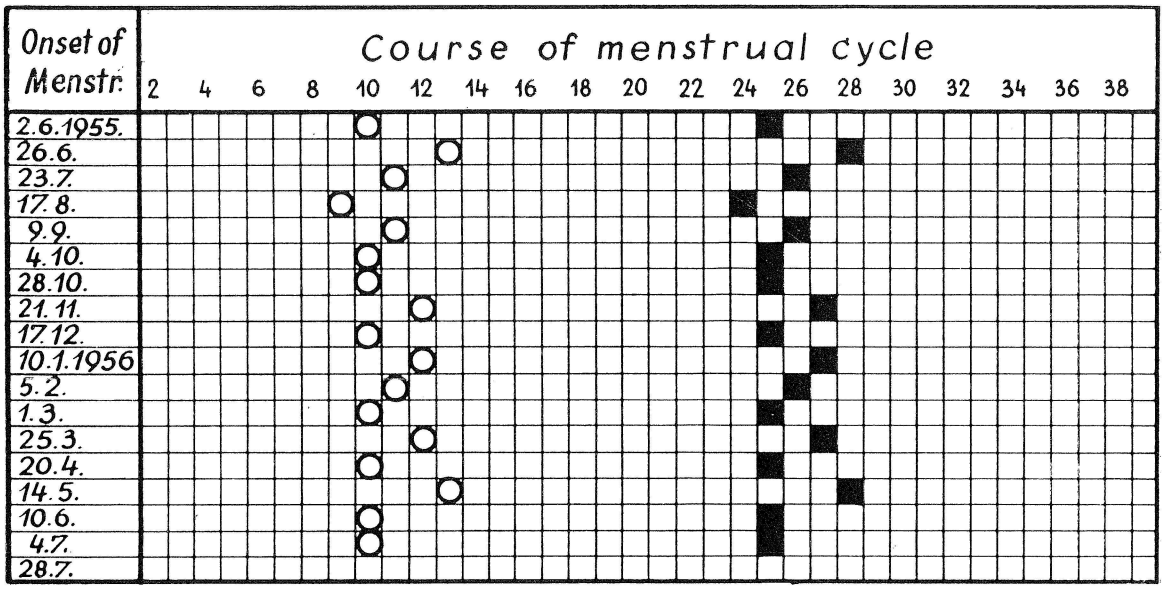

Fig. 2. Calendar of menstrual cycle kept by patient in case of actual postmaturity.

confinement, we determine a gestation period of 278 to 282 days, 5–9 days beyond the normal average of 273 days. This retardation of birth, amounting to only a few days, accords well with the abnormally greater weight and length of the newborn—4120 gm. and 54 cm. These data provide sufficient evidence that this was a case of real postmaturity.

However, if the indispensable data for the correct calculation of the date of confinement are not available and the patient has gone 10–14 days past her expected date (as calculated by the Nägele method) it is advisable to question her about the periodicity of her cycle, in particular on whether it was characterized by abnormally long intervals, which would explain her going beyond the expected date. If there are no indications of such abnormally long intervals in the patient's cycle, but there is, all the same, suspicion of actual postmaturity, the obstetrician should measure the circumference of the patient's abdomen—normally 100 cm.—and, what is even more important, ascertain the size of the fetal skull. Every obstetrician should devote particular care to acquiring and cultivating the diagnostic skill of assessing the size of the fetal skull correctly by use of Leopold's fourth grip, so that he can distinguish between a large and a small fetus by prenatal examination. For, if the patient has gone 10–14 days beyond her expected date and if, in addition, the fetus is large, the obstetrician will be justified in assuming postmaturity and in inducing labor in the interests of both mother and child.

THE INDUCTION OF LABOR

The decision to induce labor will be an easy one, provided that an effective, simple, and safe method is available. If the obstetrician has such a method at his disposal, he will be inclined to induce labor even within the normal period of gestation if the fetus is very large, causing suffering to the mother towards the end of pregnancy. I would even go so far as to say that the human gestation period is too long, and that it would be much better for both mother and child, if pregnancy terminated 2 or 3 wk. earlier. Every experienced obstetrician knows how quick and easy is the delivery of smaller infants born 2–3 wk. before term, with no greater postpartum hazards than those encountered by infants born at term.

In this connection, I consider it interesting that those mammals that are evolutionally our closest relatives—the anthropoid apes—have an average gestation period no longer than 34 wk. If we further consider that a full-grown female chimpanzee is as tall and heavy as a young woman, and that the female orangutan and gorilla are even much larger and stronger than a normal adult woman, it is very striking to note that the newborns of these large anthropoids are relatively small, having an average weight of only 1800 gm. The surprisingly low weight of the newborn anthropoids makes for an extremely quick and easy delivery, while in man delivery may be accompanied by many complications arising from the additional 5 wk. of gestation and the consequently larger placenta and fetus. What Nature can afford in man would lead to disaster in the anthropoid apes, which lack the mental capacity to assist in a difficult birth, so that delivery would be accompanied by enormous risk if the gestation period were not so much shorter. If we could shorten the human gestation period by a safe and reliable method, we would be employing the same means to facilitate birth as that used by Nature in the anthropoids.

Technic of Induction

There actually is a method by which, in my experience, it has been possible almost invariably to induce labor in the last months of pregnancy, so as to bring about delivery within 24 hr. in most cases. This method, described by H. J. D. Smythe,[1] is as follows. An S-shaped metal catheter, 35 cm. long, and guided by two fingers introduced into the vagina, is passed up the cervical canal. After the head has been pushed towards the symphysis pubis and the lower pole of the ovum has been lifted off the posterior wall of the uterus, the catheter is pressed into the amnion as high up as possible, thus

perforating it and allowing draining of the amniotic fluid as if through a water pipe. When all the amniotic fluid has drained off, the catheter is withdrawn from the uterus. No further treatment is given, and the onset of labor is awaited; this usually occurs within 3 hr. of intervention. Why is this sudden draining of the amniotic fluid so much more effective in inducing labor than the traditional method of rupturing the membranes beneath the head of the fetus? If the membranes covering the internal os are ruptured by means of bullet or corn-tong forceps, then the fore waters drain off first, followed slowly by the hind waters as the head makes way for it. The uterus therefore adapts itself very gradually to the changing volume of its contents, and thus is scarcely aroused from its state of sluggish inertia. On the other hand, if all the amniotic fluid is quickly drained off by means of a Smythe catheter, the distention of the uterus, which is inhibiting its activity, is suddenly reduced, and the latent muscular forces are released, so that labor sets in. This release of the pent forces of a uterus ready for labor, brought about by a sudden reduction of the extension of its muscles, creates conditions for the activity of the previously inhibited motor mechanisms of birth more favorable than any other method.

Results of Induction

At the Lainz Hospital, the Smythe method for the induction of labor has been used in 162 cases in the last 9 yr., 59 of the cases being primiparas and 103 multiparas. In 64 of these cases induction of labor by the described method was indicated for various reasons other than postmaturity, such as toxemia of pregnancy, cardiac defect, diabetes, tuberculosis, breech presentation, large fetus, hydramnios and subjective complaints. However, 98 of the patients had gone beyond the date of confinement, as calculated by the Nägele method, so that there was a possibility of postmaturity, and induction of labor by the Smythe method seemed indicated. In all of these 98 cases an attempt was first made to induce labor by physical or medical methods (castor oil, hot baths, pituitary, etc.). Only when these failed was labor induced by the Smythe method; its success demonstrated its superiority over all other methods of labor induction. The quantity of amniotic fluid drained off in each case after tapping the hind waters above the level of the bag of waters varied from 0 to 2100 cc., and averaged 700 cc. Although the period of latency between draining off the amniotic fluid and delivery varied from case to case, its shortness did, in the majority of cases, prove the efficacy of this surgical method of inducing labor. In 82 of the 98 cases

delivery occurred within 24 hr. of draining all the amniotic fluid. In 13 cases delivery occurred within 48 hr., and in only 3, within 72 hr. The minimum period of latency was 45 min. and the maximum 67 hr. No positive relationship could be established between the quantity of the amniotic fluid drained and the period of time elapsing between the intervention and confinement. In 88 of the 98 cases delivery was spontaneous, but in 10 cases delivery had to be completed by major surgical intervention. In 5 cases the infant was delivered by application of forceps and in 5 others, by cesarean section. None of these major surgical interventions was accompanied by any complication in the mother, but 4 children were lost. In 1 case each the cause of death was asphyxia and tear of tentorium cerebelli, respectively, in breech presentation; in 1 case the cause of death was aspiration of amniotic fluid in cesarean section, while in the last case the fetus was already dead *in utero* prior to the induction of labor and showed signs of maceration of the third degree. The Smythe method cannot be held responsible for the loss of these four—or, more correctly, three—infants, even if one applies the most stringent criteria; their death was the result of particularly unfavorable circumstances (two breech presentations, one toxemia of pregnancy), which would probably have had the same result even if labor had not been artificially induced.

In the 162 cases in which my assistants and I have, for a variety of indications, induced labor by the Smythe method in the last 9 yr., we have made an observation of paramount importance in safeguarding the life of the child. Whereas, at first we administered labor-inducing drugs if labor had not begun within 5 hr. after induction, we now refrain from medication of any kind for the purpose of intensifying labor and merely wait until the uterus begins to act of its own accord. There are two decisive reasons for this. First, pregnancy cannot continue after the membranes have been ruptured and the amniotic fluid has been drained. Second, there is today no longer any cause for anxiety that the mother will contract a dangerous infection, even though the period of waiting between this relatively minor obstetric operation and the onset of labor may be of some length. In the last 9 years I have not seen 1 case—let alone a fatal case—of puerperal fever. I can, therefore, confidently state that we need no longer fear this form of maternal mortality, which necessitated the exercise of the greatest caution as recently as the earlier decades of the present century. Puerperal sepsis, which made medical history when it was first brought to the notice of the world through the work of Semmelweis, seems to have disappeared forever from the city in which its genesis was investigated. Considering these facts, the experience

gained in recent years, and the excellent results obtained by the Smythe method, we can today terminate pregnancy at any time without risk, if such a course seems advisable in the interests of either the mother or the child. We can guard against the error of confusing alleged and actual postmaturity by calculating the expected date of confinement not from the last recorded menses but, as correctly recognized as well by Tompkins[13] and Stewart,[14] from the patient's ovulation time, and we can successfully induce labor with safety to both mother and child when postmaturity requires it.

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