POSTPARTUM OVULATION

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Introduction

The time of return of ovulation and menstruation after child-bearing has been studied by many investigators who have shown that partial or full lactation significantly influences these events of reproductive function and fertility. One of the first studies reported 75 years ago by Remfry drew conclusions which seem still valid today. Our sophistication in explaining his results has increased considerably in the years since his report because of the availability of techniques to determine more accurately the time of fertile ovulation and fertility.

In general Remfry stated that some women have absolute amenorrhea during lactation, others menstruate more or less, and some menstruate regularly. He also stated that impregnation does not take place as readily during lactation as at other times but that lactation was not as efficient in this regard as many imagined. His study showed the chances of impregnation during absolute amenorrhea, that is, before menstruation returned was 6 in 100, but the chances of conception if menstruation had returned were increased to about 10 fold.

Studies reported in the past 25 years, while confirming in general Remfry's conclusions regarding menstruation and risk of conception have been directed more toward determining the exact time of fertile ovulation and relating that ovulation to lactation or non-lactation. Other investigators have been more interested in the influence of certain factors upon the duration of lactation and have made it evident that supplementation of the infant's diet with liquids and solids especially in the early months of lactation may reduce the ultimate length of that lactation and influence the earlier return of ovulation and the risk of conception.

Only a few investigators have studied the return of menstruation and the time of fertile ovulation by the basal body temperature graph. Of all methods available for the detection of ovulation, the basal body temperature is the least complicated for both the investigator and the investigated. It is the method used among women whose experiences are reported in this study.

Materials and Methods

Some of the data collected for this report were furnished by my own obstetrical patients. About two-thirds of the data, however, was the result of excellent cooperation from the La Leche League whose members actively encourage long-term lactation. These members from coast to coast, from Canada and even Ireland sent data concerning

temperatures and brief lactation summaries for my use and made a valuable contribution to this study.

With a few exceptions all those women whose post-delivery experiences are reported in this study were able to provide basal body temperature recordings begun prior to the first menstruation so an interpretation could be made as to the ovulatory or non-ovulatory nature of the first menstrual period. Ovulation and anovulation were interpreted in the usual manner by the presence or absence of a thermal shift prior to menstruation. Figure 1, if a thermal shift occurred that was not sustained for beyond seven days, the ovulation was classified as infertile. This follows the suggestion of Chartier and Gillain first made in 1964 and used by Cronin in his study of ovulation among lactators and non-lactators reported in *Lancet* in 1968.

Another but similar infertile ovulatory temperature pattern observed in this series is the pattern of irregular shedding. In this pattern the thermal shift indicative of ovulation occurred but the hyperthermic plateau which usually ends with menstruation continues for several days after premature menstruation begins. This phenomenon is shown in Figure 1. This pattern has long been associated with infertility.

A post-ovulatory hyperthermic plateau of eight or more days, although shorter than the usual 11-14 days, was considered a fertile ovulation. An example of this is shown in Figure 2. This decision is based on the observation that this kind of shortened post-ovulatory phase occurs among normally fertile women.

In this series these temperature patterns just described in addition to the flat anovular pattern were frequently seen preceding the first and sometimes the second or later post-pregnancy menstruations among both lactating and non-lactating women.

Observations of First Ovulation Among Non-Lactating Women

When does fertility return in the non-lactating mother? The answer to this question has both theoretical and practical importance.

Sharman, whose series of observations on the occurrence of evidence of ovulation after delivery among non-lactators is the largest, found by premenstrual endometrial biopsy that no women were ovular prior to the seventh week or 42 days after delivery. Post-ovulatory changes in the endometrium were seen among many biopsies taken during the seventh week. Beyond that time the majority, if not all the women he studied, showed evidence of ovulation. Cronin, more recently, using the thermal shift of the basal body temperature as an indication of ovulation, found seven of 93 non-lactating women to have ovulated prior to the 42nd day after delivery. Of these seven, six had post-ovulatory hyperthermic phases of 9-14 days and, therefore, the ovulation was presumed to have been fertile. The risk, therefore, of a fertile ovulation before the 42nd day after delivery is not zero but almost one in twenty. The earliest ovulation observed by Cronin was on day 27. Another was on day 28 but the remaining five ranged from day 32 to 38.

Among 23 observations by basal body temperature graph on 16 postpartum women in this series only two ovulations occurred prior to day 42—one on day 36 in an irregular shedding pattern and, therefore, infertile, and one on day 41 with a fertile nine-day post-ovulatory phase. This agrees closely with the findings Chartier and Gillain in a study of 200 non-lactators reported in 1964.

In Table 1 is a summary of observations on 23 first and subsequent cycles after delivery. The experience shows that the longer the interval from delivery to menstruation the greater the chance of a normal fertile ovulation as reflected by a normal post-ovulatory thermal plateau. Conversely, the earlier the menstrual return the greater the chance that a fertile ovulation did not occur. The data also show that the second menses were not always preceded by a fertile ovulation but that third and fourth cycles were ovulatory and presumably fertile. Three pregnancies occurred in the second and third cycles, one of which terminated in a spontaneous abortion. Of interest is the observation that the average length of the post-ovulatory phase increased with each cycle. In Cronin's series, 30 of the 93 non-lactators or 30% had temperature evidence of ovulation as earlier defined. In this series 11 of 23 cycles exhibited a fertile ovulation. This may be just a sampling error. The average return of menses in this group was 60 days after delivery which compared to Cronin's 59 days and Salber's 55 days. The earliest menstruation in this series was an anovulatory flow at 36 days postpartum and the latest a normal ovulatory flow at 92 days.

At the present time it appears from Cronin's work that a normal fertile ovulation may occur as early as the 27th day after delivery although in this smaller series, the earliest presumably fertile ovulation was observed on day 41. More observations are necessary before this information concerning early postpartum ovulation can be reliably translated into practical use.

The First Post-Abortal Ovulation

The reported experiences of the time of ovulation following abortion and tubal pregnancy are meager. I have only a few instances in which temperatures were recorded from abortion to ovulation and menstruation. These temperature patterns show that a fertile ovulation invariably precedes the initial post-abortal menses in normally fertile women. The period of time from abortion or the completion of abortion by D & C to ovulation seems to depend on the length of time it takes for the basal temperature which was elevated at the time of abortion to return to a normal pre-ovulatory level. The more prompt the temperature drop following abortion the earlier ovulation and the first menstruation occur. The next two slides show two cycles that illustrate these observations. Figure 3 shows a temperature pattern in which the post-abortal temperature does not return to normal for 24 days. This lag period was followed by a normal post-ovulatory rise of 11 days and a normal menstrual period on the 48th day after spontaneous abortion. Figure 4 shows the thermal pattern following another abortion experienced by the same woman to be quite different. In this instance the basal temperature returned to the pre-ovulatory range within four days after the spontaneous abortion. The post-ovulatory rise followed soon after. An 11-day post-ovulatory phase and a normal menses

occurred 31 days after abortion or two weeks earlier than in the previous example. The only difference between these two graphs is the 24 day lag period from abortion to normal pre-ovulatory range. Whether or not progestogens are administered prior to the abortion did not seem to make a difference in the time of the first ovulation.

Lactation Ovulation and Fertility

What is the risk of early ovulation and possible pregnancy in the lactating mother? It has often been suggested that the first three months of lactation are infertile. In his study Cronin concluded that ovulation prior to the end of the tenth postpartum week was a rare event. Of the ten women that he reported who showed evidence of ovulation before the 90th postpartum day only one was lactating on the 90th day and she ceased lactation 9 days later. Most of these ten women had had a previous non-ovulatory menstruation prior to first ovulation. This evidence tends to confirm the clinical experience of obstetricians that women who supplement lactation early or wean early risk early conception. This apparently is not true, however, for the woman who does not supplement early and who totally breastfeeds.

In an effort to show this, the lactating women in this study were divided into two groups. In one group the mothers had breastfed their infants but without any special instructions except those given by the nurses on the hospital postpartum ward or found in give-away pamphlets. This group had a definite tendency to begin solid foods early in the nursing experience—often on the advice of a friend or pediatrician and to abandon nursing quickly if it did not go well. The other group was composed of La Leche League women who breastfed on demand and introduced solid foods slowly between four and six months of age—again as the infant seems to demand. Nursing techniques to promote increased milk production are routinely used by these women. Breastfeeding continues until the infant weans himself anywhere from six to 24 or more months after birth.

When the experiences of these two groups are compared there is a marked difference in the time of menstrual return and probable fertility as shown in Table 2. Only 14 (22%) of 63 La Leche Leaguers had one or more menses prior to six months after delivery while among the 34 non-La Leche participants 24 (71%) had experienced one or more menses by this time. Of the 24 first menses in the non-La Leche women, 15 were preceded by a fertile ovulation and nine were infertile. By the way of contrast—of the 14 La Leche League mothers with a first menstrual flow by six months post-delivery, 4 had that flow preceded by a fertile ovulation. In 10 the flow was not preceded by a fertile ovulation. In the La Leche group the infertile first menses all appeared after eight weeks and gradually increased in number, and, although not shown here, to the 8th month of lactation. In the non-La Leche group the majority of first infertile menstruations were earlier—between 8 and 12 weeks after delivery and 14 of the 15 fertile first menses occurred between 8 and 22 weeks postpartum. Contrast this to the 63 members of the La Leche group in which only one fertile first menses occurred prior to the 22nd week after delivery. After the 22nd week, however, the risk of ovulation prior to the first menstruation increased with the increasing interval since delivery. In the La Leche group six had anovulatory or infertile ovulations prior to 22 weeks and three of these had a second menstruation prior to 22

weeks which was preceded by a fertile ovulation at 20 or 21 weeks. These data can be interpreted to mean that the risk of pregnancy in a full breastfeeding amenorrheic mother prior to 22 weeks is very small but greater if a menstrual period has occurred. In this experience menstruation prior to 22 weeks in the fully-lactating mother is anovular but should be taken as an indication of returning fertility. A fertile ovulation may occur prior to the next menstruation. Figure 5 illustrates this point well.

Long Term Lactation and Ovulation

In this study we were interested in the return of ovulation and menstruation during long-time lactation. We were able to collect the basal body temperature graphs of 74 women who had breastfed for more than six months and who, with few exceptions, had recorded basal temperatures that documented the thermal changes, if any, that preceded the first menstrual period. In most instances the basal temperatures of the second and third menstrual cycles were also recorded and available.

Table 3 shows that 57 (77%) of the 74 were still without menses six months after delivery and only 17 (23%) had experienced one or more menses. There were 51 who had the required temperature records and who breastfed longer than nine months (39 weeks). Of these 31 (61%) were still without menses and 20 (39%) had had one or more menses by 9 months after delivery. There were 31 who had the required temperature recordings and who breast-fed for more than one year. Of these only 5 (16%) were without menses at the end of one year and 26 (84%) had experienced the return of menstrual periods. These data suggest that ovarian suppression is relaxed between 9 and 12 months of lactation in most women and the return of menses and fertility is to be expected. An occasional lactator will continue without menses for up to another year and rarely longer.

Of interest among these women is the frequency of infertile ovulation as previously defined, anovulation, and fertile ovulation preceding the first menstrual period. Table 4 includes this data in addition to the data seen on the previous slide. In the first column, of the 17 women with the return of menses within six months of delivery among the 74 mothers lactating longer than six months, nine or slightly more than one-half had one or more fertile ovulations according to our definition. One became pregnant. Seven were still infertile and in one the temperature record was not kept until after the first menstruation. Of those lactating for 9 months or more 15 had had a fertile ovulation by 9 months. Of those lactating 12 months or more 20 of 26 or nearly 80% who had ovulated had a fertile cycle. These data show that the risk of fertile menses increases with the duration of lactation. Although the data doesn't show it clearly there is also increasing risk that a fertile ovulation may occur without a preceding menstruation.

Conception during Lactation

What is the risk of conception during lactation amenorrhea? The risk of conception during lactation amenorrhea is decreased but the exact risk is unknown and may be greater than some suppose. It has been known and shown again in this study that pregnancy can and does occur without the first experience of a menstrual flow. Seventy-

three women in this series were still breastfeeding when menstruation returned for the first time. An additional six conceived without the return of menses. Although all of these women did not depend on lactation for fertility control there were a large number who used no family planning measures until after the first menstrual period. Each depended on the first flow to serve as a warning of returning fertility. To these 79 should be added another 44 who breastfed for a period of time—many of them for a long time—but who ceased lactation prior to the onset of menstrual flow or conception. None of these conceived without first having a menstrual period. This is a record of six pregnancies among 118 nursing mothers—only 5%, only 1% less than that reported by Remfry in 1895.

The six who became pregnant without return of menstruation are tabulated in Table 5 according to the postpartum week of conception and the outcome of the pregnancy. Only one conception occurred within six months of delivery. The time of each conception was verified by basal body temperature graph. The latest conception after delivery was in the 118th week of lactation. The basal body temperature graph showing the time of conception, ovulation and the persistent rise of temperature in early pregnancy is shown in Figure 6.

Seven more women also conceived during lactation while under temperature graph observation subsequent to the first menses. Because fertile ovulation is more likely to occur in cycles subsequent to the first menstruation many of the women began to use fertility control techniques after the first menstrual period. Because of this and because others continued lactation beyond the period of my observation the risk of pregnancy subsequent to the onset of menstruation could not be evaluated.

Summary

1. In non-lactating women fertile ovulation may occur as early as 27 days after delivery.
2. After abortion fertile ovulation prior to first menstruation usually always occurs.
3. Among lactating women who supplement or wean early, the risk of early return of fertility is great. Among mothers who totally breastfeed the risk of fertile ovulation without prior menstruation before 4-5 months is small.
4. A menstrual flow that occurs prior to about 20 weeks after delivery in the totally breastfeeding mother is likely to be anovulatory and is a warning of returning fertility.
5. The risk of return of fertile ovulations increases as the duration of lactation progresses and swings sharply upward among those women who breastfeed beyond 9 months.
6. Pregnancy during lactation amenorrhea does occur—the risk seems to be about 5-6%.

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(The following are given in the order attached to the paper.)

LACTATIONAL AMENORRHEA

Duration of Lactation

	>26 weeks	>39 weeks	>52 weeks
One or more Menses	17 (23%)	20 (39%)	26 (84%)
Amenorrhea	57 (77%)	31 (61%)	5 (16%)
TOTAL	74	51	31

* * *

CONCEPTION DURING LACTATION
NO PREVIOUS MENSES

IDENTITY	WEEK OF CONCEPTION POST-DELIVERY	OUTCOME
R.C.	25	Normal
D.L.	28	Normal
G.D.	32	Early Spont. Abortion
P.S.	48	Unknown
B.H.	54	Unknown
B.K.	118	Current

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LACTATION AMENORRHEA
INFLUENCE OF NURSING ON OVULATION AND
MENSTRUAL RETURN IN THE FIRST SIX MONTHS POSTPARTUM

	Week Postpartum						
	<8	8-12	13-17	18-22	23-26	Total	%
Infertile or No Ovulation							
NLLL	1	5	1	1	1	9/24	26
LLL	0	1	1	4	4	10/63	16
Fertile Ovulation							
NLLL	0	3	2	9	1	15/34	41
LLL	0	1	0	1	3	5/63	8

NLLL= 34 Non-La Leche League Participants % Menstruating by 6 months= 24 (71%)

LLL= 63 La Leche League Participants % Menstruating by 6 months= 15 (24%)

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LACTATION AMENORRHEA AND FERTILITY

	Duration of Lactation		
	≥26 weeks	≥39 weeks	≥52 weeks
Total	74	51	31
Amenorrhea	57 (77%)	31 (61%)	5 (16%)
One or More Menses	17 (23%)	20 (39%)	26 (84%)
Infertile	7	4	3
Fertile	9*	15**	20***
Unknown	1	1	3

* = one pregnancy

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POSTPARTUM MENSTRUATION
NON-LACTATING WOMEN

DELAY IN DAYS TO 1ST MENSES	NORMAL POST-OVULATORY PHASE (8 or > days) MENSES			
	1st	2nd	3rd	4th
70 or more	4/4	4/4	4/4	4/4
60-69	3/5	4/4*	3/3	3/3
50-59	3/7	6/7**	4/4	4/4
49 or less	1/6	4/6	5/5**	3/3
Normal/Observations	11/23	19/22	16/16	14/14
Average length of post-ovulatory phase (days)	5.7	8.5	12.0	12.2

*Spontaneous abortion ** Term pregnancy

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