THE CAUSES AND PREVENTION OF PREMATURITY

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THE CAUSES AND PREVENTION OF PREMATURITY

(Including a study of two hundred premature births from the records of the Chicago Maternity Center).

STATEMENT OF THE PROBLEM

Griffith and Mitchell state that from one-quarter to one-third or more of all deaths in the first year of life are due to prematurity. In Wisconsin in 1937, 33.5 per cent of all infant deaths were due to this cause.

The total mortality of premature infants is given by Griffith and Mitchell as 50 per cent or more, although some more recent estimates give a figure of around 30 per cent.

Almost all sources agree that prematurity is the greatest single cause of neonatal mortality, and that neonatal deaths account for 60 per cent of all deaths occurring during the first year of life.

From the obstetricians viewpoint, hazards of prematurity begin during delivery itself. In addition to the fact that the skin of a premature is more friable, its bones more breakable, and its delivery more apt to be precipitate because of its size, there are other more important considerations which make the delivery of a premature more frought with danger than that of a term baby.

Prematurity is one of the important factors in the production of intracranial injuries at birth. Curtis quotes Yelpo as saying that the less mature the infant is at birth, the less resistant are the blood vessel walls. In addition the brain substance of premature infants is

of such soft consistency that it offers little support to the blood vessels. The friability of the blood vessels, the vulnerability of brain substance, and the mobility of the cranial bones are hence factors combining to the easy production of intercranial injuries in the premature.

Moreover, the respirations of a premature are irregular and superficial, and its temperature subject to wide variations. These and the absence of twitching (due to the fact that the brain is not so sensitive to mechanical stimulation) plus the fact that somnolence and the inability to swallow are more or less normal to prematures, tend to conceal the fact that a premature does have intracranial hemorrhage. Abnormal presentations are more frequent than at term and anomalies in separation and expulsion of the placenta are a little more common than at term.

Besides the deaths due to intracranial injuries, atelectasis, gastro-enteritis, broncho-pneumonia, congenital defects, asphyxia neonatorum, hemorrhagic disease of the newborn, and syphilis are apt to take their toll of the prematures in the first few hours of life, or in the neonatal period.

Prematures are prone to develop anemia, rickets or spasmophilia after a few months, and it has been demonstrated that in approximately 15 per cent of surviving prematures, mental and nervous disorders such as spasticity, mental retardation, or epilepsy may show up later in childhood.

From the above statements, it is evident that prematurity is a serious problem to the pediatrician and the obstetrician, the latter

especially since over 85 per cent of deaths due to prematurity occur in the first forty-eight hours.

Since in all considerations of treatment of a disease entity or problem, the question of prophylaxis is important, it would seem that a study of the causes and etiological factors concerned in prematurity, plus an appraisal of what could be used in the way of preventive measures would be of some value. It was with this idea that this study was undertaken.

DEFINITION AND INCIDENCE OF PREMATURITY

There have been various definitions of prematurity, most of them agreeing fairly closely, but for purposes of this study, we shall use Williams' definition: "Spontaneous termination of pregnancy after the period of viability has been reached - 28th week - but before the child has attained maturity. Children are designated as premature when weighing between 1500 and 2500 grams, or measuring between 35 and 45 cm. in length."

We would add, however, the admonition of Edgar: "Of these two conceptions of maturity, the merely chronological phase should be regarded as incidental, while the elements of the state of development of the fetus at birth should be regarded as essential."

The figures for the incidence of prematurity in the past have run all the way from 1 to 35 per cent, and within perhaps somewhat smaller limits, one can find almost any figure he desires at present, if he picks the right series.

FACTORS IN BRINGING ON FULL TERM LABOR

It is logical that in any discussion of the causes of prematurity or premature labor that first the causes of onset of normal labor at term be established in as much as possible in order that we may see what factor or factors have changed or have been added in the production of prematurity.

The theories of the cause of onset of normal labor as listed by Williams are briefly as follows:

1. Growing irritability of the uterus
2. Increasing distension of the uterus
3. Dilatation of the cervix
4. Increasing distention of lower uterine segment with the pressure on the nerves causing increased uterine contractions.
5. Changes in the dicidua as loosening, thinning, and thrombosis of vessels.
6. Excess of CO_2 or lack of P_2 in placental blood acting on the nervous centers
7. Menstrual periodicity
8. Anaphylactic action of fetal blood
9. Heredity and habit
10. Senility of placenta
11. Physical and emotional causes
12. Hormonic influences or circulation of fetal metabolic products.

Koff and Davis say that in the light of present knowledge only

two theories deserve mention:

1. Greater irritability of the uterus associated with an increase in the frequency and intensity of the intermittent contractions, finally eventuates labor. In support of this theory there is the increasing susceptibility of the uterus to mechanical stimulation and oxytoxics as term is approached.
2. The second is the hormonal theory which presupposes the elaboration of a hormone by the corpus luteum which desensitizes the uterus to the action of the posterior pituitary gland. As term approaches, this hormonal influence decreases, lowering the threshold to hormonal and oxytoxic stimuli from the pituitary.

These authors believe that in accordance with their experimental work, a combination of the two theories may reflect the truth. In the rabbit, the proper development of the pregnancy and its successful continuation to term are directly controlled by the maintenance of the corpora lutea.

The first experiments in prolonging pregnancy with corpus luteum extract were performed by Nelson, Pfiffner and Haterius using methyl alcohol extract of pigs corpora lutea in rats. Miklos also obtained the same results in rats, the results being a definite prolongation of pregnancy.

Mandelstamm and Tscharkowsky (1932) found that the corpus luteum extract of the cow delayed parturition in a mouse. Portman (1934)

also used corpus luteum extract to prolong gestation in rabbits.

Heckel and Allen, believing that the corpus luteum extracts of previous workers probably contained some estrin, performed their experiments with estrin-free progesterone. They found that with the subcutaneous injection of 1.5 mg. or more of progesterone per day in rabbits, beginning as late as the twenty-eighth day of gestation, they could effectively delay parturition in most cases.

Reynolds and Knaus had previously noted that corpus luteum extract relaxed uterine muscle. Knaus found that in vitro preparations of rabbits uteri, which are normally very sensitive to pituitrin, become refractory to the drug during the first half of pregnancy and during pseudo-pregnancy. In the latter part of pregnancy, the inhibitory effect of the corpus luteum diminishes, and the muscle fibers become more sensitive to pituitary extract so that the response of the uterus to pituitary extract when administered at term is immediate and powerful, and results in the volcanic onset of labor.

It is of interest in passing to note some of the other lines of research done on the duration of pregnancy.

Knorre from his work and the past work of Kustner had determined that the average duration of pregnancies coming to delivery in the summer was 285 to 286 days, and in the winter 277 to 278 days, a difference of eight days. Babies born in the summer averaged a trifle heavier than those born in the winter. Kustner theorized that there was more ultra-violet light from the sun in the summer than in the winter, and that the ultra-violet light caused some destruction or inhibition of the action

of the posterior pituitary hormone, thus delaying parturition.

Knorre showed that the average duration of pregnancy was longer in those areas located geographically so that they received more ultra-violet light from the sun the year round than in places where the average duration of pregnancy was shorter. Jolly lists cases to show that in women with short cycle menses, as every twenty-four days, birth occurs after almost an even eleven cycles (264 days) measured from the middle of the last menstrual period. He feels that the period of gestation is related to the length of the mother's menstrual cycle in any particular case. He believes that the physiological period of gestation extends over eleven cycles counting from the middle day of the last menstrual flow, not ten cycles as was once considered possible. In long cycle cases, twenty-seven days and upward, the law is commonly modified by a complication resulting from the age and size of the fetus, and birth is likely to take place when the tenth missed period following conception falls due, or shortly thereafter.

CONSIDERATION OF THE FACTORS IN PREMATURE LABOR AS GIVEN IN THE LITERATURE

Before going into a consideration of the factors in premature deliveries as determined by this present study, it might be well to note some of the factors as given in the literature and the amount of importance placed upon them by different authorities.

For a comparison of these factors as given by different authors, see Table I.

TABLE I

ETIOLOGICAL FACTORS IN PREMATURE BIRTHS

WILLIAMS	DE LEE	CURTIS (Litzenberg)	HARPER
1. Syphilis	1. Syphilis	1. Syphilis	1. Early rupture of membrane
2. Continuous overwork during the latter months of pregnancy	2. Nephritis, placental hemorrhages or infarcts	2. Chronic nephritis	2. Direct trauma
	3. Twins	3. Other toxemias	3. Hypertension
Lesser factors	4. Any tumor of abdomen large enough to interfere with uterine development.	4. Placenta praevia	4. Overdistension due to hydramnois or multiple pregnancy.
3. Abnormality of the product of conception.	5. Death of fetus due to disease of chorion, placenta, or fetus.	5. Excessive hydramnios	
4. Various toxemias		Questionable Etiological Significance	Kerr, Fergerson, Young and Hendry.
5. Chronic nephritis	Occasionally	6. Heart lesions	Two commonest causes:
6. Premature separation	6. Truamatic or emotional shock.	7. Lung infections	1. Toxemias, especially with chronic cirrhosis of the kidney.
7. Placenta praevia	7. Excessive sexual intercourse	8. Cervical operations (Too high amputations)	2. Syphilis.
8. Abnormal presentation			Other Causes
9. Lesions of the heart and lungs.		Curtis (Parmelee)	1. Hydromnios
10. Certain operations up on the genital tract		1. Twin pregnancies most common of known causes	2. Placenta praevia
11. Hydramnios		2. Syphilis less than 4 per cent	3. Chronic disease of the uterus such as metritis and tumors.
Davis			4. Possibility of irregular endocrine activity
Quotes Williams			

Williams, Litzenberg (in Curtis) and De Lee all agree that syphilis is the largest factor in premature labor. Parmelee (in Curtis) states that syphilis is greatly over-estimated as a factor and in reality in this country causes less than four per cent of the premature births, even the present French statistics giving syphilis as the cause in not over ten or twelve per cent of cases. There is further splitting of opinions in regard to the relative importance of other causes. Most authorities place toxemias, nephritic or otherwise, next. Then come multiple pregnancies, placenta praevia, abnormality of the fetus, and hydrammo's in somewhat indifferent order.

Williams called continuous overwork in the later months of pregnancy an important factor, and Harper emphasizes rupture of the membranes and trauma. Parmelee states that turn pregnancy is probably the most common of the known causes of prematurity.

Williams in his series of 334 premature labors found syphilis was the etiological factor in forty per cent, toxemias in eight per cent, placenta praevia in six per cent and fetal deformity in three and three-tenths per cent. Sentex as quoted by Williams in a series of 485 cases in Pinard's Clinic found syphilis in 42.7 per cent, albuminuria in 19.8 per cent, and abnormalities of the fetus in 11.1 per cent.

So far as certain psychological and emotional factors are concerned, Rupp quotes Seitz as saying that in women pregnant with illegitimate children, prematurity occurred in 13 per cent, while in his series of legitimate mothers, prematurity occurred in only 2 per cent. (For other figures refer to Table I).

STUDY OF 200 PREMATURE LABORS

Since so far as was known to this author, no very recent data on etiological agents of prematurity were available, a study was made of the records of the Chicago Maternity Center for the year July 1, 1937 through June 30, 1938. In this time, the Center took care of 2,661 confinements and delivered 2,701 babies. Of the 2,661 confinements, 200 terminated in the birth of one or more premature infants, there being ten sets of twins in this series. These figures give a percentage of 7.52 per cent of the confinements terminating with the production of a premature infant or infants. The prenatal and labor records of all 200 confinements ending in the delivery of a premature were carefully examined and all possible etiological factors recorded. In many cases, whether the factors tabulated were actually the cause of prematurity is unfortunately a matter of conjecture.

The value of such a tabulation, then, lies in the fact that it points out what should be considered. From Table II the factor accompanying premature labor most commonly seems to be a contracted pelvis which was present in 8 per cent of the cases. However, this figure is probably without significance since Reed and Serbin in Curtis state that in European clinics, 15 per cent to 20 per cent of all women coming to parturition have contracted pelves. They quote Williams as finding 8.96 per cent of white patients and 37.31 per cent of his colored patients with contracted pelves. Eight per cent is then rather under normal expectancy for the number of contracted pelves in this group of premature births.

Maternal syphilis which in the past has been so important ranks high in this tabulation, but the $5\frac{1}{8}$ per cent is only one-eighth as big a

factor as Williams placed it and is closer to Parmelee's estimate.

Multiple pregnancies are responsible for 5 per cent, but if the 2½ per cent of labors induced because of toxemias be added to the 3 per cent of prematures spontaneously delivered by toxemic women, toxemias are on a par with lues as a cause and are just one-half per cent ahead of multiple pregnancies.

Maternal heart disease in 3 per cent and abnormal presentations in 2½ per cent are of doubtful significance. From this Table only 2 per cent give evidence of an accident or of maltreatment of the mother, but this is the place where one might like to speculate and wonder how many accidents or emotional shocks never found their way into the history written by a Maternity Center physician, harrassed by lack of time and loss of sleep. The author knows of two cases not in this series, in one of which the mother spent the morning hanging clothes on a clothes-line for which she had to stretch upward and in the evening delivered her baby a month and a half ahead of schedule. In another similar case, the woman spent the better part of the day preceding delivery hanging curtains.

In the series given here, one mother had been poisoned by carbon monoxide. Another had had an abscessed tooth for four days before delivery and had been in agony from the tooth ache. One had been practically on a starvation diet for several months before delivery occurred. One patient fell on her left side four days before delivery and had pains till labor set in.

The various types of fetal abnormalities noted are listed below:

1. Hydrops fetalis

2. Spina bifida and tumor of the gum
3. Spina bifida occulta
4. Renal agenesis and congenital heart disease
5. Mucous membrane tag protruding from vagina
6. Supernummerary digits
7. Cleft palate
8. Absence of left kidney and ureter
9. Talipes equinus

Of the 8 per cent contracted pelves, 4½ per cent were described as justo minor pelves, 1½ per cent as generally contracted pelves, and 1 per cent as funnel pelves. Although the Maternity Center has about an equal number of white and colored patients, it was noted that twice as many contracted pelves occurred in colored women as in white women. This ratio is not as marked as might be expected since Williams gives the incidence of contracted pelves as 8.96 per cent in white females and 37.31 per cent in colored, as mentioned previously.

A tabulation of the periods of gestation in cases of prematurity was attempted, but it soon became evident that this period was so often a matter of guess work in which the physician put down 40 weeks or something close to it, that it was felt the table would be of no real value in determining at what period in gestation the majority of premature babies were born. If the frequent 40 week estimate were correct, it would seem that underdevelopment of the fetus rather than its chronological age played the important role in prematurity.

TABLE II

CONDITIONS ASSOCIATED WITH DELIVERIES OF PREMATURE INFANTS
(From records of 200 premature births)

Condition	Contracted Pelvis	Maternal Syphilis	Toxemias alone	Artificially induced because of toxemias	Twins	Fetal Abnormalities	Maternal Heart Disease
Number	16	11	6	5	10 pair	9	6
Per Cent	8%	5½%	3%	2½%	5%	4½%	3%

Condition	Abnormal Presentation	Accident to Mother	Abnormal Cervix	Abnormal Placenta	Uterine fibroid	Polyhydramnios	Dead fetus from nonluetic causes
Number	5	4	2	2	1	1	2
Per Cent	2½	2	1	1	½	½	1

PREVENTION OF PREMATURITY

Some of the conditions such as fetal abnormalities and multiple pregnancies which are probable factors in premature birth are obviously beyond our control, but toxemias can be prevented, syphilis can be controlled, organic lesions can be ascertained early and special care instituted, and within certain limits, physical and emotional trauma can be prevented.

Ideally, prophylaxis should start with routine examination of the adolescent girl. If she has menstrual disturbances, a study of her glandular system is indicated. If advisable, a basal metabolism test and a blood count should be done. Pelvic pathology should be looked for by rectal examination.

Again premaritally a physical examination with a serology determination, blood count and pelvic examination should be performed. As soon as pregnancy is suspected, the woman should go to her physician for diagnosis and she should be under his observation all through pregnancy. At the time of the first visit, the physician should elicit a complete history, make a complete physical examination, and record all the facts thus ascertained. The previous pregnancies, labors, and puerperia should be investigated in relation to toxemia, infection, or other complications. The duration and type of previous labors should be recorded. Abortion, premature labor, still birth, or death during the first weeks of life should be listed under date, period of pregnancy, and cause if known. The birth weight of previous children and their health subsequent to delivery should be ascertained. Any history of hypertension, cardiac, or renal disorders should also be carefully investigated.

In the physical examination it should be remembered to look for evidence of glandular disturbances. Pelvic measurements should be taken and the presence or absence of deformity determined. Naturally the patient's height, weight and blood pressure should be taken and recorded.

A vaginal examination should be made at this time to ascertain the actual existence of pregnancy, the position of the uterus, the presence or absence of any pelvic tumor, and the presence or freedom from venereal disease. A smear and culture should be made from any suspicious discharge. A routine hemoglobin determination, red and white cell count, and urinalysis should be performed on this first visit, and a blood sample for serological determination should also be taken.

Following the initial visit, the patient should be seen and examined by her physician at least once each month for the first six months, unless she presents complications, in which event she should report more frequently. During the sixth and seventh months the patient should report for examination every three weeks, and during the eighth month every two weeks and the last month once a week. The patient should be weighed and the blood pressure recorded at each visit. The development of the pregnancy is determined by abdominal palpation. Multiple pregnancy, abnormal presentation and monstrosities if suspected on palpation can often be diagnosed by roentgen-ray and the possibility of such complications should be investigated.

It is not the purpose of this paper to point out a detailed program for maternal health preservation during pregnancy, but situations which might apply to the prevention of prematurity will be discussed.

In the development of toxemias, the important warning signs in the approximate order of their appearance are a rise in diastolic blood pressure, a rapid gain in weight (say as much as five pounds in one month), a rise in systolic blood pressure, albuminuria, and finally edema. Development of the first warning signs should be treated by bed rest, salt free diet, and increased fluid intake. Protein intake should be adequate, but should not be given in excess of amount required.

A good nourishing diet with the necessary amounts of proteins, fats, carbohydrates, vitamins and minerals will go a long way toward keeping the prospective mother in good condition. It is important that the patient should get plenty of fruits and vegetables with a minimum of eight glasses of fluid each day.

In the matter of exercise, it is usually a safe rule to tell the patient to take all the outdoor exercise she can without becoming fatigued. Walking is probably the best exercise for pregnant women. The patient should wear low heeled shoes, should avoid fatigue, should avoid violent exercise, or sports such as skating or tennis where one is apt to fall down, should be warned against lifting children or heavy objects and should be cautioned against hanging curtains or "strap-hanging" in a street car. Golf, dancing and housework in moderation are probably all right. The patient should try to avoid rooms where recent painting has been done, and should not attempt any ladder climbing. Easy traveling by train or by automobile on smooth roads is not particularly harmful.

Sexual relations should not be allowed in the last two months of pregnancy, but if there is a history of previous abortion or premature labor, it should be interdicted earlier. The patient should take a daily

rest, an afternoon siesta being a good habit to develop.

Where a positive Wassermann reaction has been reported on a patient, or even where a woman has had syphilis previously and has been treated until Wassermann negative, adequate standard treatment with mercury, bismuth and arsenicals should be instituted. Even if the Wassermann is found negative before the fifth month, it should be repeated at the seventh month to guard against the possibility of infection late in pregnancy. Arsenicals should be given according to the standard treatment for early syphilis. Syphilis should be discovered as early in the pregnancy as possible so that treatment may be started then. An attempt should be made to give at least ten weekly injections of arsenical and to begin and end the treatment during pregnancy with an arsenical.

Untreated, a syphilitic mother will bring forth only one normal infant out of six pregnancies. Adequately treated (i.e. beginning before the fifth month) five out of six will be normal. (United States Public Health Report). If a toxemia of pregnancy develops, all luetic treatment should be stopped.

After post partum period, treatment of the mother should be resumed. If she should become pregnant again, she should be given another course of treatment, even though the Wassermann has become negative. In the standard treatment a minimum of thirty doses of an approved arsenical and thirty dose of an oil suspension of a bismuth salt is recommended. The drugs are given in courses of ten injections, giving one injection each week, beginning with arsenical, if no contraindication exists. The bismuth salts alternate with arsenical without rest periods, with the starts and

finishes of the heavy metal course overlapping the finishes and starts of the arsenical courses. Arsphenamine is used in average dosages of 0.4 gram for men, 0.3 gram for women, or neoarsphenamine 0.6 to 0.9 gram for men and 0.45 to 0.75 grams for women.

Where there is a history of previous premature deliveries, Harper suggests that intercourse should be restricted to infrequent intervals all through pregnancy and should be interdicted in the last three months to minimize trauma. The patient should wear a substantial maternity corset and guard against undue expenditure of physical as well as nervous energy by curtailing her domestic, her social, and especially her athletic activities.

When uterine activities are beginning and there is no apparent cause, Harper suggests one-half grain of codeine every four hours, or some other form of moderately deep prolonged narcotization, plus complete rest in bed. It is more likely that stronger measures as one-fourth grain of morphine sulfate with a follow-up of one grain of opium orally along with food every three or four hours would be more effective. Every effort to ascertain the cause of the onset of uterine contractions should be made so that suitable prophylactic measures might be employed to prevent recurrence.

In view of the experimental work done on the effect of corpus luteum hormone on the duration of pregnancy, some of the clinical applications of hormonal therapy are worth noting.

Hirst is credited with the first reported therapy for habitual abortion withcorpus luteum hormone in 1918. Since then numerous workers

here and abroad have reported use of corpus luteum extract, mostly with habitual abortion.

In 1933, Shea reported a case whose previous pregnancies had all terminated about the twenty-second month. The patient was given 1 cc. of corpus luteum extract (Armour) twice weekly after she showed signs of going into labor. A delay of a few days in the administration of the extract on a few occasions caused a recurrence of bleeding and bearing down sensations which again disappeared when injections recommenced. Injections stopped at two weeks before date of expected confinement, and five days after last injection membranes ruptured and two days later patient went into labor and delivered a live baby.

Kane in 1936 reported forty cases of habitual abortion treated with progesterone and thyroid extract. Thirty-six living children were born. Progesterone seemed more efficient to the author than corpus luteum hormone.

Krohn, Falls and Lockner used 1 cc. (rabbit unit) of lutein hormone intramuscularly twice a week for habitual abortion until the thirty-second week. One of these cases was treated successfully when symptoms of labor set in as late as the sixth month.

Robson and Paterson used progesterone in ten cases of pre-eclamptic toxemia and were able to report no maternal deaths or convulsions and a definite improvement of symptoms. They used progesterone in 5 mg. doses daily for the first three or four days and p.r.n. after that.

Since corpus luteum hormone has proven of value in the treatment

of habitual abortion, one would suspect that it might be of value in certain cases in preventing prematurity.

Dr. G. H. Stevens states that a case of his whose expected day of confinement was December 24, 1938 started to have labor pains on October 4, 1938 and achieved three to four centimeters dilatation with pains coming every three to four minutes. However, luminal grains one-half per four hours was started and 1 cc. of "Lutein" given intramuscularly. The patient was put at bed rest. The 1 cc of "Lutein" was continued once a day for two weeks and then continued once a week. The patient finally delivered on November 30, 1938, some eight weeks after the initial uterine contractions had been controlled. This case, although perhaps exceptional, indicates a definite value for the use of corpus luteum hormone in attempts to stave off premature labor in chosen cases.

SUMMARY

The mortality of premature infants is thirty per cent or more. Prematurity is the largest single cause of neonatal mortality, and is responsible for at least a third of all infant deaths under one year of age.

The onset of normal labor according to modern concepts is due to one of two theories or a combination of the two theories, i.e. First, Greater irritability of the uterus associated with an increase in the frequency and intensity of the intermittent contractions eventuates in labor. Second, The elaboration of a hormone by the corpus luteum desensitizes the uterus to the action of the posterior pituitary gland. As term approaches, this hormonal influence decreases lowering the threshold to pituitary hormonal and oxytoxic stimuli. Hence, anything increasing the irritability of the uterus or decreasing the stabilizing effect of the corpus luteum hormone could be assumed to tend to shorten gestation.

In 2,661 confinements from the records of the Chicago Maternity Center, 200 or 7.52 per cent terminated in the production of a premature infant or infants. In these two hundred cases, maternal syphilis was demonstrable in five and one-half per cent. There were multiple pregnancies in five per cent, fetal abnormalities in four and one-half per cent, toxemias in three per cent, coincident maternal heart disease in three per cent, abnormal presentation in two and one-half per cent, artificially induced labor because of toxemia in two and one-half per cent (making total for toxemias five and one-hald per cent), abnormal cervix in one-half per cent, polyhydrammos in one-half per cent, and dead fetuses from non-luetic causes in ten per cent.

Prophylaxis consists in proper prenatal care and observation in order that any abnormalities in the mother may be known and considered by the obstetrician early in the course of pregnancy. In order that toxemias might be treated in their incipient stages, that syphilis might be diagnosed early and treatment instituted, and that a proper routine of living be laid out for the patient to avoid fatigue or undue strain.

In addition, where uterine contractions have started, narcotics and bed rest may prevent premature labor. In certain selected cases, the use of corpus luteum hormone may aid in prolonging gestation.

BIBLIOGRAPHY

Adair, F.L.: Maternal Care, University of Chicago Press, 1937.

Davis, C.H.: Gynecology and Obstetrics, 1933, Vol. I, Chapter X, W. F. Prior Company, Hagerstown, Md.

De Lee, J.B.: Principles and Practice of Obstetrics. W. B. Saunders Company, Philadelphia, 1938

Edgar, J. C.: Practice of Obstetrics, Philadelphia, 1916.

Gonce, J.E.: Outline for Post Graduate Education. Bureau of Maternal and Child Health, State Board of Health of Wisconsin, April 21, 1937.

Griffith and Mitchell: Disease of Infants and Children. W. B. Saunders Company, Philadelphia, 1937, page 203.

Harper, P. T.: Clinical Obstetrics. F. A. Davis Company, Philadelphia, 1930.

Heckel, G.P. and Allen, W.M.: Prolongation of pregnancy in the rabbit by injection of progesterone. Am. J. Obst. and Gynec. 35:131-137, January 1938.

Jolly, W. A.: On the Period of Human Gestation. J. Obst. and Gynec. Brit. Emp. 35:258-270, 1928.

Kane, H.F.: Use of Progesterone in combating habitual abortion. Am. J. Obst. and Gynec. 32:110-133, July 1936.

Kerr, Fergerson, Young and Hendry: Textbook of Obstetrics and Gynecology. William Wood and Co., Baltimore, 1933, page 238.

Koff, A.K. and Davis, M.E.: The Mechanism of the Prolongation of Pregnancy in the Rabbit. Am. J. Obst. and Gynec. 34:2-37, July 1937.

Knaus, H.H.: Action of corpus luteum hormone on uterine muscle. J. Physiol. 61:383, 1926.
Idem: Arch. f. Gynak. 141;374, 1930.

Knorre, H.V.: Uber den Einfluss der Jahrezeiten aud die Dauer der Schwangerschaft. Zentralbl. of. Gynak. 57:2965-2968, Dec. 16, 1933.

Kustner, H.: Uber den Einfluss der Jahrezeiten auf die Bauer der Schwangerschaft. Zentralbl. f. Gynak. 56:1940-1942, August 6, 1932.
Ibid. 55:3240-3243, Nov. 7, 1931.

Krohn, L., Falls, F.H. and Lockner, J.E.: Use of lutein hormone, progestin, in threatened and habitual abortion. Am. J. Obst.

and Gynec. 29:198-206, Feb. 1935.

Litzenberg, J.C.: Obstetrics and Gynecology, Vol. I, page 1085 in Curtis. 1933.

Mendelstamm, A. and Tscharkowsky, W.: Influence of corpus luteum hormone on duration of pregnancy and inception of labor. Zentralbl. f. Gynak. 56:2346-2349, Sept. 24, 1932.

Miklos, L.: Experimental prolongation of pregnancy by means of Corpus Luteum Extract. Zentralbl. f. Gynak. 54:1755-1757, July 12, 1930.

Moore, J.E.: Management of Syphilis in General Practice. United States Public Health Service, 1938.

Nelson, W.O. and Pfiffner, J.J. and Haterius, H.P.: Prolongation of Pregnancy by extracts of corpus luteum. Am. J. Physiol. 91:690-695, Jan. 1930.

Parmelee, A.H.: Vol. I, p. 891 in Curtis' Obstetrics and Gynecology, 1933.

Reed, C.B. and Serbin, W.B.: Vol. II, page 22 in Curtis' Obstetrics and Gynecology, 1933.

Robson, J.M. and Paterson, S.A.: Progesterone in pre-eclamptic toxemia. Brit. Med. Jour. 1:311-314, Feb. 13, 1938.

Rupp, H.: Die Schwangerschaftsdauer beim Menschen. Ber. u. d. ges. Gynak. u. Geburtsh. 29:417-435.

Shea, S.: Luteal extract for maintenance of pregnancy. Brit. Med. Jour. 1:1053, June 17, 1933.

Stevens, H. G.: Wausau, Wisconsin. Personal Communication to the author.

Williams, J.W.: Standers Williams Obstetrics. D. Appleton-Century, New York, 1936.

Wisconsin State Board of Health: The Management of Syphilis, 1938.

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