PREGNANCY AND TUBERCULOSIS*

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THE discussion as to whether pregnancy is beneficial or harmful in tuberculosis and whether or not the interruption of pregnancy in tuberculosis is warranted, has gone on for decades and still continues.

As no one man or institution has a sufficient number of cases to be convincing, it was thought possible that a questionnaire sent to tuberculosis sanatoriums and hospitals might assemble material of value for judging of the effect of pregnancy on tuberculosis from the clinical standpoint. Over 500 forms were sent out to all large and medium-sized sanatoriums listed in the directory of the National Tuberculosis Association, to large lying-in hospitals, and to leading obstetricians.

The questionnaire called for the listing of cases with classification on admission and discharge, statements as to tubercle bacilli in the sputum, cavities, fever, weight, duration of life after pregnancy, etc. Altogether 535 cases of tuberculosis with pregnancy were listed from 53 different sanatoriums and hospitals.

Of the 535 cases reported, 436 or 81 per cent came from sanatoriums or hospitals for tuberculosis and the remainder came from maternity or general hospitals with a lying-in service, where patients were followed after delivery through the out-patient service. Very few cases came through obstetricians, several of whom wrote that they rarely saw these cases or that they referred them to sanatoriums.

In many cases reported, data on all items were not given so that the same basic number could not be kept in all the tables and a considerable percentage of cases from lying-in and general hospitals could not be used at all in the tables, for this reason.

Many of the patients did not come under observation in the earlier months of pregnancy and many cases obviously could not be judged as well as though they had been under observation before, throughout and for a long time subsequent to pregnancy.

Of the 324 cases in which it was stated in what month of pregnancy the patient first came under observation, 6 patients were observed before, as well as during, pregnancy, 33 were first seen in the first month, 35 in the second, 49 in the third, 52 in the fourth, 32 in the fifth, 39 in the sixth, 27 in the seventh, 33 in the eighth, 15 in the ninth, and 23 in the tenth month of pregnancy.

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In 364 cases in which a statement as to toxemia of pregnancy was made, it was said to be present in 53 or 14.5 per cent and absent in 311 or 85.4 per cent.

Dubois said, "If a woman threatened with phthisis marries she may bear the first accouchement well; a second with difficulty; a third never." This remark has been so frequently quoted that I wish to cite the record of a patient not merely threatened with but actually suffering from advanced phthisis, who not only bore the third accouchement, but the fourth and even the fifth before succumbing.

Case No. 3389.—K. L., aged twenty. Single. Admitted January 31, 1917. Presumable duration before admission five months. Family history negative for tuberculosis. Examination showed dullness, bronchovesicular breathing, increased vocal resonance and many medium moist râles down to the fifth rib and the sixth vetebral spine. The left lung showed dullness, suppressed breathing and many medium moist râles down to the sixth rib on the left side. Tubercle bacilli were found in her sputum on February 2, March 28, and April 7, 1917.

Patient was readmitted as Case No. 8236 on July 24, 1926. The physical signs were much the same as on the first admission except that cavity signs were present at the right apex.

The x-ray showed in the right lung, mottling throughout, being especially dense from the second to the fifth ribs with honeycombing. Below the clavicle was a rarefied area 6½ by 4 cm. The left lung showed mottling throughout, being especially dense between the second and fifth ribs. Tubercle bacilli were found in the sputum in each of 6 examinations.

She gave a history of having had 5 children in six years preceding readmission. One died of bronchopneumonia, and one, a seven months' baby, lived only a short time after the mother's readmission. The other 3 children were alive and well. This patient died in the Sanatorium August 6, 1927.

If we compare the results obtained in the 385 patients shown in Table I who did not have therapeutic abortions, with the results obtained on all patients treated in sanatoriums, we find that in minimal cases the disease was apparently arrested, quiescent, or improved in 78 per cent as compared to 92 per cent at the Trudeau Sanatorium in the years 1922-24-26-27. In the moderately advanced cases the disease was apparently arrested, quiescent, or improved in 65 per cent as against 75 per cent at the Loomis Sanatorium during 1921-22. In the far advanced cases there were 28 per cent apparently arrested, quiescent or improved as against 44 per cent at the Loomis Sanatorium in 1921-22.

Accepting these figures as they stand, pregnancy prevented the improvement of 14 per cent of minimal cases, 10 per cent of the moderately advanced cases and 16 per cent of the far advanced cases, as compared to the figures from the other sanatoriums quoted. This would rate pregnancy as an unfavorable factor in a small minority of cases.

It is proper to say, however, that as 6 pregnant women in this series left the sanatorium after a short stay, for confinement, and as 14 others

TABLE I. CONDITION ON ADMISSION AND ON DISCHARGE. 410 CASES*

	MINIMAL						MODERATELY ADVANCED						FAR ADVANCED						
	APPARENTLY ARRESTED	QUIESCENT	IMPROVED	UNIMPROVED	DEAD	TOTALS	APPARENTLY ARRESTED	QUIESCENT	IMPROVED	UNIMPROVED	DEAD	TOTALS	APPARENTLY ARRESTED	QUIESCENT	IMPROVED	UNIMPROVED	DEAD	TOTALS	GRAND TOTAL
Full term																			
Number	15	5	19	8	1	48	11	21	65	38	11	146	3	10	33	62	34	142	336
Per cent	31	10	39	16	2	98	7	14	44	26	7	98	2	7	23	43	23	98	98
Spontaneous abortion																			
Number								1		1		2		1		2	2	5	7
Per cent								50		50		100		20		40	40	100	100
Therapeutic abortion																			
Number		1	1			2		1	3	2		6			11	3	3	17	25
Per cent		50	50			100		16	50	33		99			64	17	17	98	99
Premature labors																			
Number	1			1	1	3		1	2	1	4	8			4	12	15	31	42
Per cent	33			33	33	99		12	25	12	50	99			12	38	48	98	98
Totals	16	6	20	9	2	53	11	24	70	42	15	162	3	11	48	79	54	195	410
Per cent	30	11	37	16	3	99	6	14	43	25	9	99	1	5	24	40	27	99	

*In order that a contrast might be drawn between abortions before and after the fifth month, all pregnancies terminating in the sixth month are classed with the premature labors.

shortened their stay after delivery, probably to care for the new baby, in some of the cases pregnancy prevented improvement indirectly by limiting treatment rather than by direct influence on the course of the tuberculosis.

Finally, a small percentage of this series reported from lying-in hospitals probably did not get sanatorium treatment at all. Taking these facts into consideration it appears that these pregnant women obtained results fairly comparable to those obtained in nonpregnant patients.

Although no attempt will be made to review the voluminous literature, yet it is of interest to note at this point that Prof. Forsner of Stockholm in his report of 341 tuberculous pregnant women, found that 86 per cent of first stage cases, 75 per cent of second stage cases, and 38 per cent of third stage cases, were either improved or stationary during one year's observation subsequent to confinement.

Norris and Landis found that 69 of 85 cases of tuberculosis, or 81.1 per cent were unchanged by pregnancy, two patients became worse and six died.

Norris and Murphy found that 92 of 166 or 55 per cent of tuberculous patients were unchanged by pregnancy.

Miss Alice M. Hill states that "A comparison of the condition of the 160 women whose pregnancies accompanied or immediately preceded their tuberculosis with that of their close controls at one year and at two years after diagnosis (and in the case of the pregnant women, after conception or confinement) leads to the conclusion that pregnancy had no appreciable bearing upon the progress of the tuberculous disease."

SPUTUM

The condition on discharge of 269 pregnant women with positive sputum and of 113 pregnant women with negative sputum was as follows:

TABLE II

SPUTUM	APPAR. ARRESTED	QUIES.	IMPR.	UNIMPR.	DEAD	TOTAL
Positive	10	28	89	62	80	269
Negative	20	10	48	28	7	113
Totals	30	38	137	90	87	382

The good results in the negative sputum cases (mortality 6.2) as compared to the bad results in the positive sputum cases (mortality 29.7) conform to the general experience with nonpregnant patients.

CAVITIES

Cavities during pregnancy were reported in 77 or 24.8 per cent of the 310 full-term cases. Of the 77 cavities found in full-term cases, 63 were found during pregnancy and 14 after delivery. Cavities were found in 3 or 27.2 per cent of 11 spontaneous abortions, in 12 or 27.5 per cent of 38 therapeutic abortions, and in 15 or 30 per cent of 50 premature labors.

X-RAY FINDINGS

For fear of making the questionnaire appear too discouragingly laborious, x-ray findings were not asked for, but comparative findings during pregnancy and after delivery were furnished in 34 cases.

Of 26 full-term cases the x-ray evidence in 15 showed improvement, in 3 extension, and in 8 no change. Of 3 spontaneous abortions, all showed improvement, of 3 therapeutic abortions 2 showed improvement and one no change, and of 2 premature labors one showed improvement and one no change.

The questionnaire asked for a statement of the duration of life after pregnancy and reports of 230 cases appear in Table III. In asking reports from so many institutions, it was not thought practicable to ask for a definite time after discharge when the condition of the patients should be ascertained, but many of the patients were reported living and well from two to nine years after pregnancy.

TABLE III. SUBSEQUENT HISTORIES

	CASES	LIVING		DEAD		DURATION OF LIFE IN MONTHS OF THOSE WHO DIED
		NO.	PER CENT	NO.	PER CENT	
Full term	195	95	48.7	100	51.2	22.3
Spontaneous abortions	5	2	40.0	3	60.0	16.7
Therapeutic abortions	6	2	33.3	4	66.6	7.7
Premature labors	24	2	8.3	22	91.6	7.7
	230	101	43.9	129	56.0	

When it is realized that 42 per cent of the full-term cases, 71 per cent of the spontaneous abortions, 68 per cent of the therapeutic abortions, and 73 per cent of the premature labors, were far advanced cases, it is easy to understand the high mortality rates.

DEATHS

Among 328 women, 8 or 2.1 per cent died during pregnancy. All were far advanced cases. One patient died in premature labor at the sixth month, child stillborn. One patient having tuberculous meningitis died at the sixth month, the child in good condition was delivered by postmortem cesarean section. One died in labor at full term, undelivered. One died in labor at full term, child stillborn. The remaining 4 patients died undelivered. Sixteen others, or 4.8 per cent died within a week after delivery and in 6 of these cases the babies were reported to be in good condition. All of these were classified as far advanced cases when they first came under observation. A considerable percentage of all far advanced cases will die within a few months whether pregnant or not, and this death rate does not appear excessive.

Of 76,059 children born in Rhode Island in the five years, 1919-1923, 2676 or 3.5 per cent were stillborn. This slight increase in the per-

centage of stillborn children of tuberculous mothers may be accounted for by the mothers who died in late pregnancy and labor.

The 324 children above tabulated include those resulting from all pregnancies going to full term as well as all spontaneous abortions and premature labors in which the condition of the child at birth was known. In all spontaneous abortions at the fifth month or earlier the children were counted as dead by us unless there was a record to the contrary. If the 4 children who died unborn are added, we have 328 children of which 266 or 81 per cent were normal and vigorous at birth.

TABLE IV. CONDITION OF CHILDREN AT BIRTH

	BABIES	PER CENT
"Normal" or "Good"	266	82.0
Stillborn	22	6.7
Premature vigorous	13	4.0
Died within three days	10	3.0
Subnormal vigor	7	2.1
Other abnormalities	4	1.2
Twins	2	0.6
Total	324	99.6

The condition of these children of tuberculous mothers, at birth does not appear to have been materially different from that of children of normal mothers, and lends no support to the statements of some writers that such children are of subnormal vigor and die soon.

Physicians were asked to note in each case whether there was an increase or decrease of tuberculosis activity either during pregnancy or after delivery.

TABLE V. TUBERCULOSIS ACTIVITY

	NO. CASES	DURING PREGNANCY				AFTER DELIVERY				ACTIVITY NOT INCR. DURING PREG. OR AFTER DELIV.	
		INCREASE		DECREASE		INCREASE		DECREASE			
		NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Full term	275	80	29.0	66	24.0	102	37.0	45	16.3	152	55.0
Spontaneous abortion	11	4	36.3	0	0.0	4	36.3	2	18.1	7	63.0
Therapeutic abortion	31	10	32.2	1	3.2	13	41.9	6	19.3	13	41.9
Premature labor	48	37	77.0	2	41.6	41	85.4	4	8.3	5	10.4
Totals	365	131	36.0	69	18.6	160	43.8	57	15.6	177	48.4

Tuberculous patients are liable to have extensions of the infection to new areas and other things being equal, those women who carry a child to full term for ten months should have more extension to new areas and more reactivation of old lesions, than women in whom, because of abortions, the duration of the pregnancies are reduced to periods of from two to five months.

If we combine the 11 spontaneous abortions with the 31 therapeutic abortions, we have 42 pregnancies which were terminated by the fifth month or earlier, at a time when we might hope for a favorable influence. Of these 42 cases, in 14 or 33.3 per cent there was an increase in the activity of the tuberculosis noted during pregnancy, as compared with an increase in 29 per cent of pregnancies which went to full term. After the interruption of these 42 pregnancies, tuberculosis activity was present in 17 or 40.4 per cent as compared to 37 per cent in which increased tuberculosis activity was noted after delivery in full-term cases. A decrease in tuberculosis activity after interruption of pregnancy was noted in 8 cases or 19 per cent as compared to 16.3 per cent of cases in which a decrease of tuberculosis activity was noted in full-term cases.

The results in 410 and 365 pregnant women shown in Tables I and V, respectively, lend little support to the view that emptying the gravid uterus in either the minimal or the far advanced cases has value as a remedy for pulmonary tuberculosis. Most of the favorable cases in this series tending toward arrest seem to have gone on to arrest in spite of the pregnancy and the majority of the actively progressive cases appear to have progressed with the empty as surely as with the gravid uterus.

It is difficult to see how terminating a pregnancy in far advanced cases with fever and cavities, can offer much hope when we know that in women who are not and never have been pregnant, most of these cases progress to death in a few months, or a year or two at the most.

If then we follow the implications of these statistics that most of the minimal cases do not need interference and that most of the far advanced and unfavorable types of moderately advanced cases continue hopeless after abortion, we may consider therapeutic abortion as a remedy for a small minority of cases, febrile, with only a limited spread of the lesions to x-ray, and still curable if the reactivations or recent extensions could be checked. The questionnaire did not bring reports of such cases in sufficient number to be helpful in deciding this problem.

Many observers have reported good results from therapeutic abortions. It is also true that a considerable minority of observers report worse results after abortion.

Of 35 therapeutic abortions in this series, the number of patients running a temperature over 99.5° F. before the abortion was 12, the number after the abortion was 20. The number running a temperature over 100° F. before the abortion was 4 and the number afterward was 10.

Before abortion can be accepted as a remedy for these active febrile cases of tuberculosis with lesions not incurable in amount, it must be

shown in several hundred cases by different observers that the end-results after abortion are better than in similar cases allowed to go to full term.

This questionnaire did not ask for data as to the influence of pregnancy in causing the development of tuberculosis. As tuberculosis develops at all ages, it is natural that pregnancy should be blamed by the patients for a good part of the tuberculosis which develops in women of childbearing age. Probably most of the cases are merely coincidental. Even if we knew the incidence of tuberculosis among pregnant women as compared to nonpregnant women of the same ages, we could not decide the matter as to the influence of pregnancy in causing the development of tuberculosis because such statistics would not differentiate between the risks of bearing and the risks of rearing children. Many women while carrying one child are exhausting themselves caring for another in the home.

If we could have a series of women who bear the children but do not care for them, to compare with another series of women who care for children but do not bear them, we might accurately evaluate these dangers, and some of the women might get a very welcome relief from their double burden.

The following case is one in which there is some reason to believe that pregnancy was a causative factor in the development of clinical tuberculosis.

Patient aged eighteen, a girl of Italian parentage with no family history of tuberculosis and apparently in perfect health when married, began to vomit fifteen days after marriage and vomited nearly every meal until the baby was born, June 30, 1928. On marriage she weighed 146 pounds and after delivery 100 pounds. About April 1, 1928, she began to cough and expectorate and when I saw her seven months later she had far advanced disease with a cavity in each lung. It does not seem unreasonable to believe that a therapeutic abortion in this case might have saved a breakdown. Such cases are rare.

This questionnaire did not ask for reports of cases of pregnancy in latent tuberculosis or in arrested cases after their discharge from the sanatorium. Going over our cases treated at the State Sanatorium for twenty-three years, it was found that of 56 patients whose sputum was positive and who have had children since the onset of their disease, 18 or 31 per cent were living, while of all our tuberculous patients cared for during the same period, including both men and women, and nearly a third of whom were the more favorable negative sputum cases, only 26.4 per cent were living.

Of 53 patients whose sputum was negative and who are known to have had children, either during or since sanatorium treatment, 40 or 75.4 per cent were living. Most of these patients had their children a considerable period after their discharge. These statistics seemed surprisingly favorable but it is not claimed that they mean that preg-

nancy was beneficial. It is more likely that most of the patients with progressive lesions avoided conception and that those who became pregnant did so because they had been doing well a considerable time.

The danger of pregnancy activating latent tuberculosis has been greatly exaggerated.

In patients whose sputum has never been positive and who have had no active symptoms within three years, the risk of pregnancy is comparatively slight.

All sanatoriums ought to care for tuberculous women during pregnancy, unless this important duty is performed for the locality by some other institution. Patients should be cared for in sanatoriums during labor rather than have the patients return home for confinement. Once at home with a new baby, a large percentage of women do not return for treatment.

If lying-in hospitals situated within a few hours journey of sanatoriums will care for tuberculous women during the lying-in period, and if the women are able to go and return to the sanatorium before and after confinement, this arrangement is very satisfactory.

What is obviously needed to settle many problems relating to pregnancy and tuberculosis, is a few thousand cases with complete records as to history, physical and x-ray examinations, and end-results. The Sanatorium Association ought to act on Miss Hill's excellent suggestion, by appointing a committee to prepare blanks to be filled out by sanatoriums for all pregnant women. Judging by the scores of friendly responses to my questionnaire, for all of which I wish to make grateful acknowledgment, valuable data could be accumulated in a few years.

COMMENT

The questionnaire did not ask whether the mothers cared for their babies. Probably few did so, as most sanatoriums would not keep the babies. It is not uncommon to know of a woman in apparent health being worn out by the care of a baby, especially a sick baby.

If a woman with active tuberculosis and possibly febrile, must give up sanatorium treatment, or rest treatment in the home, in order to care for a baby all day and perhaps be kept awake at night, the baby is obviously a great danger to the mother.

It is not the baby in the uterus but the baby in the home which seriously endangers the life of a woman with active tuberculosis. The death of the baby either before or after delivery, obviously removes this danger.

SUMMARY

The results of the questionnaire pertaining to 410 pregnant tuberculous women are summarized as follows:

1. Toxemia of pregnancy was present in 14.5 per cent.

2. Seventy-nine per cent of the minimal cases, 65 per cent of the moderately advanced cases, and 28 per cent of the far advanced cases improved during pregnancy.

3. The relative frequence of improvement in the positive and negative sputum cases corresponded closely with that of nonpregnant patients.

4. X-ray evidence of clearing in the lung was noted in 15 of 26 full-term cases in which data were available.

5. Subsequent history reports at variable periods after confinement showed that 48 per cent of full-term patients, 40 per cent of patients who had spontaneous abortions, 33 per cent of patients who had therapeutic abortions, and 8 per cent of patients who had premature labors, were living.

6. Of 358 pregnant patients, 8 died undelivered and 3 died in labor, all these deaths occurring in far advanced cases.

7. Of 324 children, 82 per cent were "normal" or in "good condition" at birth and 6.7 per cent were stillborn.

8. The number showing marked tuberculosis activity after delivery in 42 pregnancies terminated not later than the fifth month, was 17 or 40.4 per cent, against 37 per cent of 275 full-term cases.

9. The number showing marked decreased tuberculosis activity after delivery in 42 pregnancies terminated not later than the fifth month, was 8 or 19 per cent against 45 or 16 per cent of 275 full-term cases.

10. Of 56 ex-patients of the R. I. State Sanatorium with positive sputum who are known to have had children during or since sanatorium residence, 31 per cent were living, while of all tuberculous ex-patients, only 26 per cent were living.

11. Of 53 negative sputum cases known to have had children during or since sanatorium treatment, 40 or 75 per cent are living.

CONCLUSIONS

A woman with active tuberculosis should avoid pregnancy in order that she may be spared the extra work and worry of a baby, and that the baby may be spared the risk of infection.

The problems of tuberculosis and pregnancy need further clinical research, but the data obtained from this series of 410 pregnant tuberculous women suggest that pregnancy in itself has a harmful influence, if at all, in only a small percentage of cases and that abortion being unnecessary in most favorable and futile in most unfavorable cases, is rarely beneficial to tuberculous women.

About 81 per cent of the tuberculous women who became pregnant and who were not subjected to therapeutic abortion, bore normal children. A policy which would sacrifice all these children on the apparently slight and still unproved chance of saving the mothers, is not easy to justify.