

PREGNANCY AND PULMONARY TUBERCULOSIS*

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THIS investigation of pregnancy and pulmonary tuberculosis reviews the cases treated conjointly at the Royal Victoria Montreal Maternity Hospital and the Royal Edward Laurentian Hospital (M.D.) from Jan. 1, 1935, until Aug. 1, 1946.

There is a natural division of the subject into three groups:

TABLE I

A. Pregnancy in inactive pulmonary tuberculosis	54 cases
B. Pregnancy in active pulmonary tuberculosis	33 cases
C. Therapeutic abortion in pregnancy and pulmonary tuberculosis	30 cases
Total	117 cases
Total corrected	110 cases

There were seven patients who have records in two of the above groups so that the review deals with 110 individuals.

The follow-up in thirty-three other cases of pregnancy with pulmonary tuberculosis was incomplete and these were discarded. Four cases of extra-pulmonary tuberculosis with an associated pregnancy were also excluded.

TABLE II

Total number of cases of pregnancy and pulmonary tuberculosis	143
Total number of deliveries from Jan. 1, 1935 to Aug. 1, 1946	23,192
Incidence of pulmonary tuberculosis among the pregnancies delivered	0.61%
The accepted incidence of pulmonary tuberculosis among women of childbearing age is approximately	1.5%

In the absence of routine radiographic examinations of the chests of the antenatal patients we can make no comment on our low incidence.

The stages of the pulmonary lesion are shown in Table III.

TABLE III

STAGES OF PULMONARY LESION	UNILATERAL	BILATERAL	
Minimal pulmonary tuberculosis (Stage I)	28	15	39%
Moderately advanced tuberculosis (Stage II)	7	37	40%
Far-advanced pulmonary tuberculosis (Stage III)	1	22	21%

Suffice it to say that the patients received as adequate treatment as possible when the pulmonary condition was recognized and they were supervised with added care at the antenatal clinic. The treatment followed the recognized modern methods and lack of hospital beds and, rarely, lack of cooperation of the patient were the restricting factors.

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The follow-up in the living cases averaged forty-eight months and one year was taken as the minimum period.

TABLE IV. END RESULTS OF ALL CASES

Died	18	16.3%
Active disease present	21	19.1%
Inactive disease	71	64.6%

Pregnancies with inactive pulmonary tuberculosis and those with active was taken as the minimum period.

TABLE V

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS				PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS			
Cases	54			Cases	33		
Parity:							
Primiparas	29	53.7%		Primiparas	20	60.6%	
Multiparas	25	46.3%		Multiparas	13	39.4%	
No. of babies born		76		No. of babies born			36

Antenatal complications were unimportant in each group.

Premature labor resulting in the birth of a baby of 2,500 Gm. or less occurred in six cases in the inactive group, 8.2 per cent, and in eight cases in the active group, 25 per cent. Five of these active cases were moderately advanced; three were far advanced and very ill. The incidence of premature labor in the hospital is 5.7 per cent. It is thus evident that these patients have a predisposition to premature labor.

TABLE VI. STAGE OF PULMONARY LESION

	UNILATERAL	BILATERAL		UNILATERAL	BILATERAL	
I.	18	12	55.5%	5	1	18.2%
II.	4	13	31.5%	1	14	45.4%
III.	1	6*	13 %	0	12	36.4%

*All postthoracoplastics.

The extent of the lesion was more advanced in the active group, 81.8 per cent being in the Stages II and III groups.

The method of delivery is tabulated in Table VII.

TABLE VII

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS				PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS			
TYPE OF DELIVERY, 76 BABIES				TYPE OF DELIVERY, 36 BABIES			
Spontaneous		52	68.4%	Spontaneous		24	66.6%
Forceps		14	18.4%	Forceps		8	22.2%
Low forceps		13		Low forceps		5	
Midforceps		1		Midforceps		3	
Breech extraction		0		Breech extraction		1	
Cesarean section		10	13.2%	Cesarean section		2	5.5%
Classical section				Classical with ligation of the tubes			
With sterilization		4					
No sterilization		3					
Low segment section							
With sterilization		1					
No sterilization		2					

Medical or surgical induction was used only if an obstetrical indication was present.

The first stage was allowed to proceed with adequate sedation.

The total forceps incidence is 23.1 per cent, while the forceps incidence for the hospital is 26 per cent.

The incidence of cesarean section was 10.7 per cent, but in only five cases was the indication solely the pulmonary condition. The incidence of section in the hospital is 5 per cent.

Third stage abnormalities are presented in Table VIII.

TABLE VIII

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS		PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS	
Postpartum hemorrhage	5 cases	Postpartum hemorrhage	4 cases
Incidence	6.5%	Incidence	12.1%
Incidence in general for all deliveries 0.77%			

In this series there was a definite predisposition to have an abnormal third stage.

TABLE IX

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS			PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS		
<i>Type of Anesthetic Given.—</i>			<i>Type of Anesthetic Given.—</i>		
Inhalation type	57	71.1%	Inhalation type	11	30.5%
Nitrous oxide and oxygen	22		Nitrous oxide and oxygen	3	
Nitrous oxide and oxygen with ether	23		Nitrous oxide and oxygen with ether	2	
Nitrous oxide and oxygen with local	2		Nitrous oxide and oxygen with cyclopropane	2	
Chloroform	10		Chloroform	4	
Noninhalation type	20	25.2%	Noninhalation type	19	52.8%
Local	14		Local	18	
Spinal	6		Spinal	1	
None given	2	2.5%	None given	5	14%
Not recorded	1	1.2%	Not recorded	1	2.1%

Inhalation anesthesia was used in a higher proportion of these cases than one would expect, but the trend in the active group was to give a local or spinal anesthetic.

The puerperium and morbidity rates are described in Table X.

TABLE X

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS			PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS		
<i>Puerperium.—</i>			<i>Puerperium.—</i>		
Morbidity	7	12.9%	Morbidity	17	51.5%
Intrauterine infection	6		Intrauterine infection	4	
Pyelitis	1		Intrauterine infection with pulmonary TB.	4	
			Pulmonary TB.	9	
<i>Incidental Data.—</i>			<i>Incidental Data.—</i>		
Blood transfusions given	5		Blood transfusions given	7	
Postpartum pneumothorax refills done	4		Postpartum pneumothorax refills done	7	

The incidence of morbidity in general was 19.2 per cent.

(The standard of morbidity for these cases was one rise to 100.6° F. excluding the first twenty-four hours.)

The figures are self-explanatory.

No pneumoperitoneum therapy was used in the cases under review.

No streptomycin was administered to any patient while under observation in the Royal Victoria Montreal Maternity Hospital.

TABLE XI

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS		PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS	
Babies born*	76	Babies born*	36
<i>Neonatal deaths</i>	3	<i>Neonatal deaths</i>	1
Erythroblastosis fetalis 1 6th day postpartum	1	Second of twins. Prema- turity with atelectasis and intracranial hemor- rhage 6th day post partum	1
Multiple congenital anom- alies 4th day post partum	1		
Multiple congenital anom- alies 15th day post partum	1		
<i>Later deaths reported</i>	2	<i>Later deaths reported</i>	2
Tuberculous meningitis 1 2 months post partum	1	Congenital heart disease 1 at 3 months	1
Tuberculous meningitis 1 6 months post partum	1	Tuberculous meningitis at 3 years	1

*The babies were all born alive in both groups.

TABLE XII

PREGNANCY IN INACTIVE PULMONARY TUBERCULOSIS		PREGNANCY IN ACTIVE PULMONARY TUBERCULOSIS	
<i>Weight of Babies.</i> —		<i>Weight of Babies.</i> —	
Premature 9 (1 only 985 Gm.)	2075 Gm.	Premature 11	1795 Gm.
Term 67	3013 Gm.	Term 25	3059 Gm.

Except for the neonatal deaths noted, the babies did well and the premature babies' progress was especially gratifying.

While most of these babies had patch tests and were kept under observation, nothing of significance was noted in the data obtained.

The subsequent course of the cases after delivery in the inactive pulmonary tuberculosis was as follows:

TABLE XIII. INACTIVE PULMONARY TUBERCULOSIS

Remained inactive	48 cases	86.4%
Became active	6 cases	13.6%

Two cases became active after rapidly repeated pregnancies, but are now inactive. Both had therapeutic abortions during their reactivation. Three are still active.

One woman died thirteen years after her first pregnancy and within two years of a therapeutic abortion for her third pregnancy.

In the active pulmonary tuberculosis the subsequent course is shown in Table XIV.

TABLE XIV. ACTIVE PULMONARY TUBERCULOSIS

Became inactive	8 cases	24.2%
Remained active	12 cases	36.4%
Died	13 cases	39.4%

Sixteen had been under treatment for chest lesion prior to pregnancy; all except one were moderately or far advanced. Of these, two cases became inactive; four cases remained active; and ten patients died. Fifteen cases were diagnosed shortly before and during the pregnancy and two were diag-

nosed in the immediate puerperium. Seven of these had minimal lesions and the remaining ten moderately or far advanced. Of these, six cases became inactive; eight cases remained active; and three patients died.

No patient died during the antenatal period, during labor, or in the first ten days post partum.

Discussion

In the inactive pulmonary tuberculosis group the patient has been under supervision and the disease is a known entity. The patient has been drilled in self-care and discipline which she maintains to a greater or less degree depending on home conditions, her intelligence, and the desire to cooperate.

Under continued supervision a single pregnancy will not affect the course of the disease adversely, but repeated pregnancies at close intervals with the related task of child rearing may result in activation of the disease.

With the active pulmonary tuberculosis group this is true to a less extent.

The phthiologists are of the opinion that pregnancy is but an incident in the course of the disease, but the statement may be qualified by the following observations:

1. If with rest and successful collapse therapy the disease is rendered inactive, the prognosis is good (especially if this be achieved prior to the onset of the pregnancy).

2. If the pulmonary condition is not well controlled with the above measures the prognosis is poor.

3. If the pulmonary condition be other than minimal and it is not diagnosed or treated during pregnancy, the prognosis is grave.

Early diagnosis is most important, but, as shown by other authors and by a small group in this series, patients with pulmonary tuberculosis do not appear early in their pregnancies for supervision. Routine radiographic examination of the chest in the antenatal clinic has proved its value but the ultimate would appear to be routine chest radiological examination of all women of childbearing age at regular intervals.

There is one point to add with respect to the management of the baby after delivery. The use of BCG vaccine to immunize the baby during the first months of life is a practical procedure. The Swedish workers consider that the child who becomes tuberculin positive after the administration of the vaccine acquires an immunity which enables him to resist infection provided he is not unduly exposed to tuberculosis.

Therapeutic Abortion in Pregnancy With Pulmonary Tuberculosis

This procedure, which was once the accepted treatment of pregnancy and tuberculosis, still has a restricted usefulness.

In cases treated in sanatoria under the optimum conditions of supervision and therapy the phthiologists have all but excluded it from their scheme of management. However, in most large gynecological units therapeutic abortions are being performed with pulmonary tuberculosis as the medical indication. The Margaret Hague Hospital is a notable exception.

The material consists of thirty patients who had therapeutic abortions because of associated pulmonary tuberculosis.

The incidence in relation to all deliveries is 1.25:1,000.

The incidence in relation to all cases of pulmonary tuberculosis in pregnancy is 27.2 per cent.

TABLE XV. COMPARISON OF THE INCIDENCE OF THERAPEUTIC ABORTIONS FOR PULMONARY TUBERCULOSIS TO ALL DELIVERIES IN FIVE LARGE HOSPITALS

Bellevue	1935-1940	6.5:1,000	1941-1946	6.1:1,000
Johns Hopkins	1896-1934	2.8:1,000		
Chicago Lying-in Hospital	1931-1939	1.2:1,000		
New York Lying-In Hospital	1932-1943	0.65:1,000		
Margaret Hague Hospital	1931-1939	0		
With 1.25:1,000 we strike a middle course.				

If the period is divided into two approximately equal periods it is shown that there is a slight increase in the incidence of the therapeutic abortions in recent years at the Royal Victoria Montreal Maternity Hospital:

1935-1940	1.07:1,000
1941 to August, 1946	1.4:1,000

This is due to the increased number of cases of pulmonary tuberculosis.

The decision to abort was made by the head of the department after consultation with the phthisiologist and the gynecologist in charge of the case. There are no hard or fast rules but the basic principle followed was that there be present a chance that the chest disease could be brought under control by treatment.

Sterilization was considered if there was a social-economic factor as well. The stage of the pulmonary lesions is shown in Table XVI.

TABLE XVI. STAGE OF PULMONARY LESION

STAGE	UNILATERAL	BILATERAL	
I	8	3	36.7% (3 inactive)
II	2	13	50.0% (3 inactive)
III	0	4	13.3% (1 inactive) (postthoracoplasty)

In the active cases the stage of the lesion was moderately advanced or far advanced in 50 per cent of the cases as compared to 80.8 per cent of the active full-term group.

The follow-up of the cases extended over a period of from one to ten years with the average being forty-seven months.

The end results obtained are shown in Tables XVII and XVIII.

TABLE XVII

INACTIVE PULMONARY TUBERCULOSIS, 7 CASES		ACTIVE PULMONARY TUBERCULOSIS, 23 CASES	
Died	0	Died	5 21.7%
Now active*	1 14.3%	Still active	6 26.1%
Still inactive	6 85.7%	Now inactive	12 52.2%
The death rate including both groups		5 cases	16.6%
The time interval that elapsed between operation and death:			
0-1 year		2 deaths	
1-2 years		0 deaths	
2-3 years		3 deaths	

*The patient whose case is now active had two full-term pregnancies one and five years after the therapeutic abortion.

The administrative time lapse while consultation and decision to operate were being considered was noted to be considerable.

TABLE XVIII

<i>Parity.</i> —		
Primiparas*	11	36.7%
Multiparas	19	63.3%
<i>Duration of Pregnancy.</i> —		
4 weeks	1	
6 weeks	4	
8 weeks	9	
10 weeks	10	
12 weeks	5	
14 weeks	2	

*One primipara was evacuated on two occasions.

TABLE XIX. TYPE OF OPERATION

Dilatation and evacuation		21
Dilatation and evacuation, two stage		5
With pack in cervix	3	
With bag induction	2	
Hysterotomy with sterilization		4
Subtotal hysterectomy		1

TABLE XX. TYPE OF ANESTHETIC GIVEN

Inhalation		12	31.6%
Nitrous oxide and oxygen	4		
Nitrous oxide and oxygen with ether	3		
Nitrous oxide and oxygen with cyclopropane	2		
Nitrous oxide and oxygen after Avertin	3		
Noninhalation*		26	68.4%

*At the present time intravenous or spinal anesthesia is used in almost 100 per cent of gynecological operations.

With the modern operative procedures no untoward shock, hemorrhage, or infection was encountered and the subsequent course of the patients did not indicate that the operation aggravated the pulmonary condition.

Pneumothorax refills were given postoperatively to three patients.

Thirteen children were born to these mothers subsequently, ten of whom were by then in an inactive phase, but two still had active disease present.

Comment

In this series there is a higher salvage rate than obtained by Bridgman and Norwood. This is possibly due to the improvement in operative and anesthetic technique.

With Active Disease.—The far-advanced cases do not deviate from their downward course and might better be left alone and tuberculosis therapy instituted as practical. This is at variance with some authorities.

The moderately advanced cases must be considered on an individual basis and in special ones therapeutic abortion may improve the prognosis. No dogmatic statement is permissible.

The minimal cases are similarly qualified.

With Inactive Disease.—The inactive cases do well, but they do equally well if allowed to proceed to term under supervision.

In recent years the social-economic factor with the strain of home duties has been given more careful consideration, but this by itself has not been the indication for operation in any case in this series.

Summary

One hundred seventeen cases of pregnancy and pulmonary tuberculosis in one hundred ten individuals were reviewed.

Of the fifty-four patients with inactive pulmonary tuberculosis, six, or 13.6 per cent, became active, but there is nothing to prove that they would not have become reactivated in any event.

Of the thirty-three patients with active pulmonary tuberculosis, 75.8 per cent were either dead or still had active disease present and 24.2 per cent were inactive.

Of the thirty patients who had therapeutic abortion, 40 per cent were dead or still active and 60 per cent were inactive. If only the active cases are considered, the figures are 47.8 per cent and 52.2 per cent.

These results when compared with the previous statement are surprising, but no conclusions are drawn at this time. The two groups were not identical as to stage of disease.

The forceps rate did not deviate greatly from the forceps rate for the hospital generally.

Premature labor occurred in 13.3 per cent of the cases as compared to the general figure of 5.7 per cent. The babies were all born alive and the incidence of neonatal deaths was not appreciably increased.

The third stage was abnormal in 9.5 per cent of the cases.

Conclusions

Pregnancy in inactive pulmonary tuberculosis will cause reactivation, of serious importance, in very few patients.

Pregnancy with active pulmonary tuberculosis will cause the patient's condition to grow worse in direct proportion to the stage of the lesion and the degree of control that can be achieved.

Therapeutic abortion still has a limited place in the treatment of pregnancy with pulmonary tuberculosis.

The management of the pregnant patient with pulmonary tuberculosis requires very close cooperation between the phthisiologist and the obstetrician and their efforts are restricted by the lack of accommodation for these patients.

The more widespread use of BCG vaccine to produce an immunity in the neonatal period may lead to a greater salvage rate of children born of mothers with pulmonary tuberculosis.

Our present routine practice is to send babies born of mothers with pulmonary tuberculosis directly from the case room for B.C.G. vaccination.

We wish to acknowledge the aid given to us by Dr. N. W. Philpott and Dr. Hugh Burke and the cooperation of our colleagues in the follow-up of certain of the cases.

Discussion

DR. BRIAN D. BEST, Winnipeg, Manitoba.—In the Province of Manitoba, the trend in teaching at present is to treat the tuberculosis and ignore the pregnancy in the vast majority of cases. Pregnancy, in our opinion, does not aggravate pulmonary tuberculosis. It either has no effect or is actually beneficial. We feel the salutary effects are the result

of the upward pressure on the diaphragm which acts somewhat like a double phrenicotomy, the improved general metabolism and increased weight, and the natural tendency of the woman, as her pregnancy advances, to reduce her activities automatically.

It is in the puerperium and during the first year or two following delivery that the greatest danger lies, as it is during this time that loss of sleep, strain, and anxiety associated with the care of the infant, etc., have their baneful effects. As it has been said, child-rearing is more harmful than childbearing so far as the tuberculous patient is concerned. It is established practice to obtain chest films as a routine in all prenatal patients.

DR. P. J. KEARNS, Montreal, Quebec.—Since 1928 in all cases of ectopic pregnancy at our clinic 5 cases have shown typical tubercles in the Fallopian tube. Furthermore, of all gynecological operations which we have done for so-called pelvic induration, we have found that 8 per cent showed tuberculosis. I believe that tuberculosis of the genital tract is quite possibly much more common than is generally believed.

DR. J. S. HENRY, Montreal, Quebec.—Fortunately for my patients I have seen very little tuberculosis of the genital tract. Recently I have been having x-ray chest films done on all my private patients. In the last 400 cases, eighteen have shown some evidence of tuberculosis. About half were definitely healed lesions which required no further attention. Four of the remaining nine showed probable activity of the tuberculous lesion and in two of these, following consultation with the chief of our department, therapeutic abortion was carried out. One aborted spontaneously and is still under the care of the phthisiologists. The fourth threatened to abort but did not do so and the lesion, whatever it was, is now arrested.

DR. G. J. STREAN, Montreal, Quebec.—What Dr. Simpson's survey shows is very true. I would like to emphasize that these patients must have no inhalation anesthesia and that some substitute for the intra-abdominal pressure of pregnancy must be made quickly after delivery.

DR. SIMPSON (Closing).—I may say that the labors of most of these patients were quite easy and spontaneous delivery was completed in most instances. In answer to Dr. Grant, we are making it a practice to have a phthisiologist in consultation before and after the delivery of our patients and we rely on his judgment as to when pneumothorax should be instituted. It depends on the individual case but as a general rule the sooner the better. Dr. Kearns' figures were very interesting and only emphasize that tuberculosis of the genital organs is much more common than is generally believed.