PREGNANCY AND TUBERCULOSIS

A Study of End Results

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THE problem of the interrelationships between pregnancy and pulmonary tuberculosis is exceedingly complex, and notwithstanding the huge amount of work that has been done on the pathologic physiology of both conditions, we are still far from being able to answer many of the most fundamental questions. Why one woman takes a pregnancy or even repeated pregnancies "in her stride," so to speak, with but little apparent alteration in her bodily economy while her sister is brought to the very door of death by the same biologic process, is a question to which we can no more give a categorical answer today than we can to that of why one patient with a given tuberculous lesion in her lungs succeeds in healing the lesion without difficulty and enjoys perfect health for the remainder of her life, while another with the same type of lesion goes down hill and finally succumbs in spite of all therapeutic measures at present available. One is reminded of Osler's comparison of the evolution of tuberculosis in different individuals to the parable of the sower; the same comparison might almost be made with equal felicity to pregnancy. Given, then, two such variables, it is inevitable that they should react on one another in a variety of ways.

The history of the clinical attitude to the coexistence of the two conditions has undergone many modifications and changes, if not complete reversals. The Hippocratic view that pregnancy and parturition exerted a favorable influence on the course of phthisis was held until about the middle of the nineteenth century when the statistical studies of Louis and his contemporaries cast doubt on its veracity. The pendulum then swung to the opposite extreme, in spite of such excellent studies as those of Forssner, and it has been held until comparatively recent times that the influence of gestation on pulmonary tuberculosis was wholly bad and that every pregnancy in a tuberculous woman should be interrupted as soon as discovered. Just now we are in a more or less neutral phase with a tendency in most instances to sidestep the issue by saying that the cases should be individualized while advocating interruption in the majority. Certainly such extreme attitudes as that of DeLee, who holds that "until it can be incontestably proved that pregnancy actually improves the tuberculosis, this course (i.e., early interruption in every case of active tuberculosis) is most charitable," should be accorded but scant attention in the light of the experiences of such workers as Ornstein and Kovnat, Castlen, Schultze-Rhonhof and Hansen and many others. As a matter of fact, the question is in such a state of confusion at the present time that the burden of proof rests upon him who maintains that pregnancy does *not* exert a deleterious effect on pulmonary tuberculosis. One thus finds himself in the anomalous position of finding it necessary to prove that one condition does not have an adverse effect on another instead of advancing proof that it does.

Although an enormous literature has accumulated on the subject, very little real scientific data are available by which the interreactions between pregnancy and tuberculosis can be evaluated. This condition of affairs may be attributed to a number of factors of which the following may be mentioned: (1) the phthisiologist has but little interest in obstetrics and wishes to eliminate any condition that *may* interfere with his patient's recovery; (2) the obstetrician is seldom familiar with the natural history of pulmonary tuberculosis and is not in a position to follow the subsequent course of his patients for a sufficient time after delivery; (3) the practice of grouping under the head of "pregnancy" the three distinct, albeit closely related, functions of gestation, parturition, and the puerperium, each of which may exert an effect on the organism and hence on a pulmonary tuberculous lesion that is entirely distinct from the other two, has resulted in a confusion of data that are impossible to separate; and (4) as has been pointed out above, the reactions of individuals to tuberculosis and to pregnancy are so variable in themselves that an accurate prognosis for either condition is usually impossible at the initial examination.

The problem and the reasons for the inability to reach a decision on the influence of the two conditions on each other has been admirably set forth by Krause in an editorial which is recommended to all who are interested in the subject. "Merely a cursory examination of the customary treatise on the subject of tuberculosis and

pregnancy is sufficient to suggest, if not prove the solution,'' he says. ''Whether the individual inquiry approaches the problem biologically, statistically, clinically or, say, physiologically, it is at once apparent that, with few exceptions, the usual and average study proceeds from fallacious premises, gratuitous assumptions, and almost complete lack of definition and limitation of terms; and that from so unstable a foundation it limps through a morass of slip-shod data and the crudest handling of evidence to a palpably questionable conclusion. . . . Certainly it were anything but scientific to lay to *pregnancy*, in a woman who has tolerated her pregnancy extremely well, an activation or aggravation of her tuberculosis that followed an abnormal, exhausting or dangerous second stage of labor (as has frequently happened). . . . But, greater than any other fallacy in the customary approach to the problem of 'pregnancy and tuberculosis' is the almost universal premise and assumption that pregnancy acts as a 'constant' factor in whatever influence it may have on tuberculosis. That is to say, that all women tolerate pregnancy alike, which means nothing else than that the bodily economy of every woman reacts to pregnancy in the same way. Extensive reading would indicate that practically every author on the subject takes this most important datum for granted, notwithstanding its obvious falsity. Indeed, at the moment the writer cannot recall a study of 'tuberculosis and pregnancy' in which the author even casually suggested that pregnancy can act differently in different women or even differently in the same woman as one pregnancy follows another. . . . The most elementary practice soon teaches the observing physician that the bodily response of womankind to pregnancy is of almost 'infinite variety.' . . . And it would seem that any study or discussion concerning the influence of pregnancy on tuberculosis would have to take these facts into account. . . Even pseudoscience flies out the window when we are obliged to draw our conclusions from the data of ages lumped together, of non-discrimination between the variables of reproductive history of women undergoing observation and study, and so forth. . . . In summary, then, what are the known *facts?* They are, first, that pregnancy operates in widely divergent fashion on non-tuberculous women, that is, it may uplift and it may depress the individual economy; second, that pregnancy works to similar effect in tuberculous women, that is, it may rouse and it may quiet active tuberculosis. . . . Why, then, this pother and uncertainty? For any difference of opinion could be concerned only with what might be called quantitative effects, that is: Does pregnancy harm the tuberculous woman more frequently than it benefits her; and, if so, how much more? Before attempting to answer a problem, so insoluble on the basis of the data at hand, the writer begs permission to make a suggestion, as perhaps worthy of consideration in attempting a solution. He would put this in the form of a question, as follows: May it not be that pregnancy exerts a harmful effect on tuberculosis in those women who, without tuberculosis, would naturally tolerate pregnancy poorly, and a harmless or even beneficial effect on those tuberculous women who, without tuberculosis, would stand pregnancy well or even have their bodily economy improved by pregnancy?''

The present study was undertaken[1] to determine in what percentage of married women of childbearing age admitted to the Trudeau Sanatorium with active pulmonary tuberculosis the onset of the disease or its reactivation could be shown to bear a possible relation of a preceding pregnancy, and (2) to study the subsequent course of this group in comparison with a second group in similar age brackets manifesting pulmonary lesions of like extent. For this purpose the records of the Sanatorium from 1916 through 1935 (comprising approximately 5,000 admissions) were examined and the histories of the 457 married women between the ages of 20 and 35 (inclusive) set aside for study. In this group 6 cases were found to present incomplete data and were discarded, leaving a total of 451 cases for analysis.

The age group of 20 to 35 was chosen arbitrarily as covering the period of maximum childbearing. For the purposes of this study, pregnancies terminated either spontaneously or artificially in the first trimester (in most instances interruptions occurred in the first 8 to 10 weeks of gestation) were ignored as being unlikely to have an influence on either the onset or reactivation of the tuberculosis.

The 451 cases were divided into 6 categories as follows: (1) those who had had no viable pregnancies, (2) those who had had a full-term or viable pregnancy more than six months before the onset of the tuberculosis, (3) those who dated the onset of their tuberculosis from labor, (4) those who were pregnant when their tuberculosis was diagnosed but who continued to term, (5) those in whom a tuberculous process appeared within six months of the termination of a viable or full-term pregnancy, and (6) those who had become pregnant after the onset of tuberculosis. These groups, for the purposes of this study, may be combined under 3 large headings: (A) those who had had no viable pregnancies or a viable pregnancy more than six months before the onset of tuberculosis, who may be considered the controls, (B) those whose onset of tuberculosis bore some relation to a pregnancy, and (C) a small group who had been pregnant since tuberculosis had been diagnosed. The distribution of cases in each group, the extent of the disease on admission to the Sanatorium, and the mortality from tuberculosis in each group is shown in Table I.

TABLE I

	NO. OF CASES	PER CENT OF TOTAL	EXTENT OF DISEASE AND MORTALITY DUE TO TUBERCULOSIS IN EACH GROUP*					
			MIN.	DEAD %	M.A.	DEAD %	F.A.	DEAD %
No full-term or viable pregnancies	204	45.2	45	8.8	113	17.7	25	40.0
Full-term or viable pregnancy more than 6 months before onset of tuberculosis	159	35.2	29	10.3	97	17.5	19	57.9
Total controls	363	87.0	74	9.4	210	17.6	44	50.0
Full-term or viable pregnancy less than 6 months before onset of tuberculosis								
1. Onset tuberc. dated from pregnancy	22	4.8	3	0	18	16.6	0	0
2. Pregnant at onset of tuberculosis	16	3.5	5	0	9	33.3	2	100.0
3. No relation except time	16	3.5	0	0	9	11.1	5	40.0
Total	54	12.0	8	0	36	19.4	7	59.1
Pregnant since onset of tuberculosis	34	7.5	7	0	20	25.0	4	50.0

*Min., minimal; M.A., moderately advanced; F.A., far advanced.

The division of each group according to the extent of the pulmonary lesions on admission to the Sanatorium, using the classification of the National Tuberculosis Association, and the end results in each class are shown in Table II. Because of the small number of cases in certain of the subgroups, no attempt was made to express the mortality in percentages.

An analysis of the survival rates for five, ten, and fifteen years in each group is given in Table III. Here again percentages are omitted except in those groups

TABLE II

	MINIMAL				MODERATELY ADVANCED				FAR ADVANCED			
	ALIVE	DEAD OF TUBERCULOSIS	DEAD OF NONTUBERCULOSIS CAUSES	NO FOLLOW-UP	ALIVE	DEAD OF TUBERCULOSIS	DEAD OF NONTUBERCULOSIS CAUSES	NO FOLLOW-UP	ALIVE	DEAD OF TUBERCULOSIS	DEAD OF NONTUBERCULOUS CAUSES	NO FOLLOW-UP
No full-term or viable pregnancy	40	4	1	6	92	20	1	15	13	10	2	0
Pregnant more than 6 months before onset of tuberculosis	26	3	0	2	76	17	4	12	7	11	1	0
Onset of tuberculosis dated from full-term or viable pregnancy	3	0	0	0	15	3	0	0	0	0	0	1
Pregnant at onset of tuberculosis	5	0	0	0	6	3	0	0	0	2	0	0
No relation except a full-term or viable pregnancy within 6 months of onset of tuberculosis	0	0	0	1	7	1	1	1	3	2	0	0
Pregnant since onset of tuberculosis	7	0	0	2	15	5	0	1	2	2	0	0

TABLE III. SURVIVAL RATES

		5 YEARS			10 YEARS			15 YEARS		
		NO. CASES	SURVIVED	PER CENT	NO. CASES	SURVIVED	PER CENT	NO. CASES	SURVIVED	PER CENT
No full-term or viable pregnancies	Min.*	30	27	90.0	16	14	87.5	9	7	77.7
	M.A.	77	61	79.2	37	26	70.2	15	9	60.0
	F.A.	16	9	56.3	7	2	28.5	5	1	20.0
Pregnant more than 6 months before onset tuberculosis	Min.	18	17	94.4	8	6	75.0	8	5	62.5
	M.A.	74	63	85.1	47	35	74.5	21	9	42.4
	F.A.	15	7	46.6	9	2	22.2	5	0	0
Onset tuberculosis dated from full-term pregnancy or labor	Min.	2	2		1	1		0	0	
	M.A.	16	13	82.2	13	10	76.9	6	3	50.0
	F.A.	0	0		0	0		0	0	
Pregnant at onset of tuberculosis	Min.	4	4		2	2		1	1	
	M.A.	6	4		2	1		0	0	
	F.A.	2	0		2	0		1	0	
No relation noted except a pregnancy within 6 months of onset of tuberculosis	Min.	0	0		0	0		0	0	
	M.A.	5	4		5	4		5	4	
	F.A.	3	2		2	0		1	0	
Pregnant since onset of tuberculosis	Min.	5	5		2	2		2	2	
	M.A.	15	11	73.3	9	5	55.5	3	1	33.3
	F.A.	3	1		1	0		0	0	

*Min., minimal; M.A., moderately advanced; F.A., far advanced.

culosis in women of the childbearing age are reactivated or aggravated by gestation and its sequelae. Figures are not available by which this number can be compared with a similar group of *treated* cases; a limited personal experience, however, agrees with the findings of Alice Hill and others that reactivation or aggravation of properly treated cases occurs in a negligible proportion, especially when effective collapse therapy is instituted.

CONCLUSIONS

1. Of 451 married women between the ages of 20 and 35 inclusive who were admitted to the Trudeau Sanatorium between 1916 and 1935, approximately 12 per cent showed a possible relationship between the onset of their tuberculosis and a preceding viable pregnancy. In 3.5 per cent the symptoms first appeared during gestation and in 4.8 per cent the tuberculosis dated from parturition.

2. There is a slight tendency for the groups showing a relationship between the onset of the tuberculosis and pregnancy to exhibit more advanced types of lesions of admission to the Sanatorium. This does not, however, mean that the lesions manifested by this group tended to be more "acute" or show a higher incidence of exudative processes than those presented by the controls. While this finding may be interpreted as evidence of an unfavorable influence of pregnancy on a tuberculous process, it also suggests that with more careful examination of the lungs during the prenatal period many of these cases might have been diagnosed before symptoms appeared and proper *preventive* treatment instituted before the disease became activated.

3. There is no significant difference in the death rate from tuberculosis in the patients in whom the onset of the disease is related to a full-term or viable pregnancy as compared with that of a group of nulliparas of the same age group who show lesions of similar extent.

4. There is a relatively high incidence of hemoptoic onset of pulmonary tuberculosis in the group whose disease appears to bear a relationship to a gestation or parturition. While interesting in the light of the increased capillary permeability known to exist during pregnancy, the true significance of this observation is difficult to explain at the present time.

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