PULMONARY TUBERCULOSIS AND PREGNANCY

BY

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Before the last two decades it was widely believed that pregnancy had a uniformly unfavourable effect on the course of pulmonary tuberculosis. This view has been contradicted in recent years by many authors, notably Cohen (1946), who gives an extensive review of the literature, and Stewart and Simmonds (1947). Brooks (1940) remarks that "scarcely any accurate scientific data exist by which the hypothetical effect of pregnancy on pulmonary tuberculosis may be evaluated." This is probably less true to-day than it was ten years ago; and certainly such evidence as has been accumulated supports the view that pregnancy in general has no dramatic effect on the course of the disease.

Present Investigation

An inquiry has been conducted into the experience of a selected group of women with pulmonary tuberculosis with regard to the incidence of pregnancies. The course of the disease was followed in those women who became pregnant; they were divided into two groups—those allowed to proceed to term and those whose pregnancies were terminated surgically.

Material.—The case histories of all sputum-positive tuberculous women of child-bearing age (17 to 45 years) who were admitted to the Brompton Hospital during 1945 and 1946 were investigated. Of the total of 508 women listed the case notes of 22 were not available and a further 24 have been lost sight of. The remaining 462 were followed up to December, 1950, and those who were found to have had pregnancies were selected for further study.

Mortality.—By the end of 1950, after an average period of observation of five years, 108 patients (23.4%) were dead. This low figure may be accounted for largely by the tendency to select for admission cases suitable for treatment.

Pregnancies.—There were 87 pregnancies in 65 patients. Of these pregnancies 24 were terminated and 63 proceeded to term. Two completed pregnancies occurred in each of seven patients and one only in each of 46. Two patients had one pregnancy completed and one terminated, and one had one completed and two terminated. Sixteen patients had one therapeutic abortion only and two had two abortions.

Fertility.—"Fertility" is used here to describe the occurrence of live births. The number of live births per 1,000 observation years in each five-year age group of this series

TABLE I.—Live Births per 1,000 Observation Years in This Series. Compared with the General Population (Five-year Age Groups)

Age Group (Years)	Patients	Observation Years†	Live Births	Live Births per 1,000 Obs. Years	
				This Series	General Population
5-19	56*	280	1	3.6	19.3
20-24	152	760	25	32.9	146.0
25-29	150	750	27	36.0	169.7
30-34	87	435	6	13.8	117.6
35-39	15	75	4	53.3	65.6
40-44	2	10	0	0	19.4
Total..	462		63		

* Only patients aged 17-19 were included.

† Number of patients multiplied by five. The average period of observation for each age group was approximately five years, as all cases were admitted during 1945 and 1946 and observed until December, 1950. This approximation probably has only a very slight effect on the results.

of patients has been compared with the equivalent number taken from the Registrar-General's returns for the general population (Table I). In this way an indication of the fertility of women with pulmonary tuberculosis has been obtained. As might be expected, they have a very low birth rate compared with women of the same age groups in the general population: in the largest age groups it was approximately one-quarter of that for the general population. As only 24 pregnancies out of a total of 87 were artificially terminated, it is clear that the pregnancy rate also is very low. This comparison is based on the assumption that the proportion of married women to single is the same in this group as in the same age groups in the general population, whereas in this group the proportion may well have been lower. (The exact proportion is not known, as the date of marriage was not always available.) Further possible reasons for the low fertility rate are prolonged stay in hospital and contraceptive advice.

Tuberculosis First Diagnosed Shortly After a Pregnancy—The history of tuberculosis becoming manifest within a few weeks of delivery is sometimes held to be evidence that pregnancy activates the disease. In the present series (48 cases—that is, those whose case notes were investigated including those lost sight of) the diagnosis is recorded as having been made within three months of delivery in 11 only; these 13 pregnancies, of course, fall outside the period of observation and are not included in the main series. It is seen from Table II that the incidence of this particular

TABLE II.—Percentage of Patients Diagnosed Within Three Months of Delivery, Compared with Percentage of Women in the General Population Expected to be Within Three Months of Delivery at any Given Time

Age Group (Years)	Total No. of Patients	No. Diagnosed Less than Three Months after Delivery	Percentage Diagnosed Less than Three Months after Delivery	Percentage of Women in General Population who Expect to be Within Three Months of Delivery
15-19	56*	1	1.8	0.5
20-24	152	5	3.3	3.9
25-29	150	3	2.0	4.3
30-34	87	3	3.4	3.2
Total..	445	12		

* Only patients aged 17-19 are included.

Age groups 35-39 and 40-44 years each contained fewer than 50 patients and are therefore not included. One patient in the 35-39 age group was diagnosed less than three months after delivery.

history in the present series is not greater than would be accounted for by chance. The percentage of women in each age group of the general population who can be expected to be within three months of delivery of a child at any given time has been calculated from data given in the Registrar-General's returns. It was found that these figures do not differ significantly from the percentage of patients in each age group of the present series who were diagnosed within three months of delivery.

Analysis of Completed Pregnancies

In assessing the effect of pregnancy on pulmonary tuberculosis the nine pregnancies which occurred in 1950 have been omitted from the analysis. The remaining 54 pregnancies occurred in 47 patients, seven of whom had two pregnancies each. These 47 patients have been divided into two groups—"Active," with evidence of activity at the time of diagnosis of pregnancy (13 patients); and "non-active," without evidence of activity at the time of diagnosis of pregnancy (3 patients). The results of the follow-up of each of these two groups have been compared with those of the similar group whose pregnancies were terminated surgically. The results summarized in Tables III and IV, show that they are strikingly similar.

Active.—In these 13 patients the evidences of activity were persistent cavitation in seven, radiological spread occurring

TABLE III.—*Active Group. Comparison Between 15 Completed Pregnancies in 13 Patients and 6 Terminated Pregnancies in Six Patients, Showing Periods of Observation, and Number who Later Deteriorated, Improved, or were Unchanged*

	Completed Pregnancies					Terminated Pregnancies				
	Period of Observation after Delivery				Total	Period of Observation after Termination				Total
	1-2 yrs.	2-3 yrs.	3-4 yrs.	4-5 yrs.		1-2 yrs.	2-3 yrs.	3-4 yrs.	4-5 yrs.	
Total No. of pregnancies ..	5	4	5	1	15 (13 patients)	3	2	0	1	6
No. followed by deterioration ..	4	1	2	1	8 (7 ")	3	1	0	1	5
No. unchanged ..	1	2	2	0	5 (4 ")	0	1	0	0	1
No. followed by improvement ..	0	1	1	0	2 (2 ")	0	0	0	0	0

Of the two patients having two completed pregnancies, one showed no change 26 months after her first, and 13 months after her second; the other was following a very gradually downhill course 41 months after her first pregnancy and 28 months after her second.

TABLE IV.—*Non-active Group. Comparison Between 39 Completed Pregnancies in 34 Patients, with 14 Terminated Pregnancies in 12 Patients, Showing Periods of Observation, and Number who Later Deteriorated, Improved, or were Unchanged*

	Completed Pregnancies					Terminated Pregnancies				
	Period of Observation after Delivery				Total	Period of Observation after Termination				Total
	1-2 yrs.	2-3 yrs.	3-4 yrs.	4-5 yrs.		1-2 yrs.	2-3 yrs.	3-4 yrs.	4-5 yrs.	
Total No. of pregnancies ..	19	10	5	5	39 (34 patients)	4	5	3	2	14 (12 patients)
No. followed by deterioration ..	3	1	1	2	7 (7 ")	2	1	0	0	3 (3 ")
No. unchanged ..	13	7	4	2	26 (21 ")	1	3	2	2	8 (6 ")
No. followed by improvement ..	3	2	0	1	6 (6 ")	1	1	1	0	3 (3 ")

less than three months before pregnancy in four, and pleural effusion (tubercle-positive) in two. Seven patients deteriorated, four have shown no change, and two have shown radiological improvement (Table III). Of the seven who deteriorated, two did so during pregnancy, two less than three months after delivery, one eight months, one nine months, and one four years after delivery. Two of these died—one after 19 months and one after three years. Of the seven patients who, despite treatment, showed persistent cavitation during pregnancy, six deteriorated subsequently.

Non-active.—This group of 34 patients includes all those without cavitation in whom no radiological spread had been observed in the three months before conception. The term non-active is therefore clearly not equivalent to quiescent as ordinarily defined. Five of these patients each had two pregnancies. In seven patients pregnancy was followed by deterioration, 21 have shown no change, and six have shown radiological improvement. Of the seven who deteriorated, one did so during pregnancy, one six weeks after delivery, two nine months after, one a year after, one two and a half years after, and one three and a half years after. Four of these seven had two pregnancies, the deterioration in each case occurring after the second. The fifth patient, who had two pregnancies, remained unchanged during the 15 months for which she was observed after her second child.

Patients in Whom Pregnancy was Terminated

Three patients had a completed pregnancy as well as therapeutic abortion. Of these, one had a termination three years after a completed pregnancy, although her chest condition was apparently stable; two had pregnancies terminated shortly after tuberculosis was diagnosed, but, after intervals of two and three years, respectively, had a completed pregnancy without any adverse effect on the tuberculosis.

Apart from these, 20 pregnancies were terminated in 18 women, two of whom had two terminations. These 18 patients were divided into active and non-active groups, using the same criteria as for the completed pregnancies. Six were active cases, of whom five had persistent cavitation and one had a spread of infiltration less than three months before termination. Of these, five subsequently deteriorated—two immediately, one after one year, one after 18 months, and one after four years; and one remained unchanged. Of the five patients with persistent cavitation, four subsequently deteriorated. Twelve were non-active—in three the abortion was followed by deterioration after two months, 15 months, and 30 months; in six by no

change; and in three by improvement. Both the patients having two terminations came into this group, and have subsequently remained well.

Discussion

As the definition of activity and quiescence is at best a very arbitrary matter, it was decided to call "active" only those cases with definite evidence of activity at the time of diagnosis of pregnancy. All cases were sputum-positive, and therefore active, on admission; it follows that a proportion of the non-active patients were not yet quiescent, according to the usual definition, when pregnancy was diagnosed. By defining activity and non-activity in this way a bias has been introduced, the effect of which is to magnify to some extent the possible effects of pregnancy on the course of the disease.

The series is too small for any definite conclusion to be drawn with regard to the question of whether a particular patient with pulmonary tuberculosis should or should not have a pregnancy terminated; but the proportions subsequently deteriorated, unchanged, or improved in each group—that is, allowed to continue and terminated—are strikingly similar. If the two groups are comparable in other respects, as they appear to be, then from the evidence presented in this series there is no indication for therapeutic abortion, as the outcome seems to be similar whether the pregnancy is terminated or not.

There is likewise no evidence that pregnancy, whether terminated or allowed to continue, had any definite effect on the course of the disease in this series of patients. The overall survival rate of sputum-positive cases of pulmonary tuberculosis five years after diagnosis is given by Tattersall (1947) as 32% and by Berg (1941) as 33%. Berg gives a slightly lower survival rate for women of the child-bearing age groups. The very serious prognosis of sputum-positive tuberculosis, in spite of modern methods of treatment, should be kept in mind when considering the course of the disease in women who have also had pregnancies. Stewart and Simmonds (1947) found no significant difference between their pregnant and non-pregnant—that is, control—groups of tuberculous patients with regard to the course of the disease over a follow-up period of 12 to 15 months.

Summary

A group of 462 women with pulmonary tuberculosis, who were observed for an average period of five years,

have been studied, with particular regard to the incidence of pregnancy and its effect on the tuberculosis.

There were 54 completed pregnancies in 47 patients, who were followed up for at least one year after delivery; 20 pregnancies in a further 18 patients were artificially terminated.

The patients with completed and interrupted pregnancies were each divided into two groups—those with active and those with non-active disease. In each of these groups the results in patients with completed and those with interrupted pregnancies did not differ appreciably at the end of the follow-up period.

Of patients with persistently patent cavities in spite of treatment, seven completed their pregnancies, and of these, six later deteriorated. Of five whose pregnancies were terminated four later deteriorated.

As expected, the birth rate among these patients was very low, being of the order of one-quarter of that for women of the same age groups in the general population.

The initial diagnosis of tuberculosis less than three months after an antecedent pregnancy was not made with greater frequency than could be ascribed to chance.

The findings support the view that pregnancy has no very dramatic effect on the course of pulmonary tuberculosis.

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Irish medical students now approaching the end of their training are hoping that British hospitals will be able to offer them jobs next year, otherwise they may be delayed for some time before they are able to set up in practice on their own. New Irish legislation, expected to come into force next January 1, will require all newly qualified doctors leaving medical school to work in a hospital for a year before their names are entered on the *Irish Medical Register*. This is part of the arrangement with Britain about the new intern year. But between 260 and 270 students are expected to qualify in Dublin next year, and there will be only 200 jobs available for them in Irish hospitals. They understand there will be about 100 jobs available for them in British hospitals. If these jobs do not materialize, however, there is likely to be a waiting-list of medical students who have completed their training but have not qualified for practice. There is an inducement to them to work in Britain. In Irish hospitals the young doctors will be paid £150 for their year's work, plus their keep. In Britain the pay is £375, from which £100 is deducted for keep. Irish hospitals are wondering where they are to get the money to pay these salaries. "The increase in cost cannot be less than £50,000 a year," says Dr. R. A. Stoney, president of the Irish Medical Registration Council, in a paper published in the current *Irish Journal of Medical Science*. "So far there has been no authoritative statement as to where this money is to come from."

VALUE OF PNEUMOENCEPHALOGRAPHY IN DIAGNOSIS OF FITS

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The occurrence of fits in a young and otherwise healthy adult who has no abnormality on clinical examination is fairly frequent in neurological practice among the armed Forces. Once there is convincing clinical evidence that they are genuine epileptic attacks, the further problem arises whether they are idiopathic (constitutional) or symptomatic of some organic lesion of the brain, such as a neoplasm, cicatrix, angiomatous malformation, or the like. Help in deciding this is given by the family and personal history. Useful evidence may also be obtained from examination of the cerebrospinal fluid (C.S.F.), x-ray films of the skull, and electroencephalograms. None of these procedures causes much clinical upset, and, provided facilities are available, they are not time-consuming. They may, however, give equivocal results; if they are negative the clinical setting of the epilepsy may still leave the suspicion of a possible progressive intracranial lesion as a causative factor. In that case it is usual to consider the advisability of doing pneumoencephalograms to see whether there is displacement or distortion of the ventricular system or whether there are abnormalities in the disposition of cortical air. This procedure does temporarily upset patients, and it carries a slight but definite risk. It is pertinent, therefore, to ask how much useful diagnostic information is likely to accrue in the clinical setting mentioned above.

The possibility of a cerebral neoplasm presenting as epilepsy in a young adult cannot be ignored. Thus, Penfield and Erickson (1941) tabulated the presumptive causes of epilepsy appearing at different ages, and for the age group 20 to 35 years they put first trauma and then neoplasm. (It is worth noting that neurosyphilis, still often invoked in many standard textbooks, is not considered important, an opinion with which most neurologists practising in this country would agree.) Discussing this table, they wrote: "In young manhood and in middle age the onset of epilepsy without obvious traumatic cause should always suggest an expanding lesion as the most likely cause." They also declared: "In general, all patients whose seizures have come on late in life should come in for study and usually pneumography." Notkin (1931), studying chronic epileptics with mental deterioration, found that only 8 out of 17 cases had normal pneumoencephalograms. Dickerson (1941), on the other hand, found only 7 abnormal encephalograms in 313 studies on epileptics, but he did not state the type of case he was studying. Merritt and Brenner (1944) reported three patients who had pneumoencephalograms done 7, 20, and 30 months respectively after their first fit. All the encephalograms were normal, and no patient had any abnormal physical