PREGNANCY AND SKELETAL TUBERCULOSIS*

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When a maternity unit for tuberculous women was opened at Black Notley in 1937, there were some fears for the outcome, pregnancy being held in current medical opinion as harmful to tuberculous women. But the problem remained that many were in fact becoming pregnant, and provision for their confinement was made difficult by the reluctance of many nursing homes and hospitals to admit patients who might be infectious.

More than 300 women with tuberculosis have now had their confinements in the Black Notley unit. The results in those suffering from pulmonary tuberculosis were published in 1946 by Cohen, who found that when supervision and treatment were adequate there was no evidence that pregnancy, labour and the puerperium had any harmful effect on the course of the disease. In 1947 Stewart and Simmonds came to substantially the same conclusions after a searching investigation under the auspices of the Middlesex County Council.

The literature on pregnancy and skeletal tuberculosis is very scanty; the few references that I have been able to find will be quoted.

Myers (1891) reported a series of fourteen patients who had been cured of Pott's disease and among whom there were altogether twenty-four confinements with no ill effects. He also reported seven patients confined when there was active tuberculosis of the spine: six suffered adversely, but none of the seven patients was reported to have had any special treatment for their active spinal lesions.

Norris (1931) stated that tuberculosis of bone was little influenced by pregnancy; he had seen a number of patients, including some with lesions of the hip and spine, but in none was the disease aggravated. He also quoted Pinard (1912) who reported that he had never seen a case of bone tuberculosis aggravated by pregnancy.

Seddon and Strange (1940), writing on tuberculosis of the sacro-iliac joints, recorded an investigation of ten women with sacro-iliac tuberculosis who later became pregnant. They concluded that if the lesion appeared well-healed, there was little risk of reactivation of the disease.

The views of Stanger (1949) have recently been reported briefly. He collected eighteen cases that he considered relevant to an inquiry into the effects of pregnancy on skeletal tuberculosis. Though some of these patients had suffered reactivation, Stanger thought that little permanent harm had followed.

CASE REPORTS

Full reports on the later histories of 132 women with various kinds of skeletal tuberculosis have been available. Of these, ten died, sixty-seven married either before or after the onset of disease, and fifty-five remained single. Thirty-two of the married women had forty-five children, an average of 1.4. Most of these women had been treated for their tuberculous infection at Black Notley. A few women are also included who were previously treated at other hospitals and were later admitted to the maternity unit for confinement, but the majority had their babies at home. Some details of these thirty-two patients will be given according to the situation of the skeletal lesion.

* This article is based on a paper read at a meeting of the British Orthopaedic Association in Bristol in October 1949.

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PATIENTS WITH SPINAL TUBERCULOSIS: 14 CASES

Case 1. J. D.—had tuberculosis of the upper dorsal spine in childhood, and was discharged from Black Notley with the disease quiescent in 1934. She married in 1943 and had a normal confinement in 1944 without ill effect.

Case 2. Q. N.—was discharged from Black Notley at the age of fifteen years after treatment for tuberculosis of the fourth and fifth lumbar vertebrae. She married at seventeen years and has had five children. Her general condition is good and radiographs show a well-healed lesion. She writes: “Having children has been the making of me. . . . I have the quickest and easiest confinements any woman could have.”

Case 3. C. T.—was discharged at the age of eleven years after treatment for tuberculosis of the fourth and fifth lumbar vertebrae. She was married at twenty years and has had two normal confinements. Her husband writes: “My wife wishes me to tell you that after eight years of married life with two children, one seven and the other nearly two, she enjoys the very best of health.”

Case 4. K. N.—was discharged at the age of eighteen years after treatment for tuberculosis of the twelfth dorsal and first lumbar vertebrae. She married in 1944 at twenty years. A daughter was born in the unit a year later with no ill effect.

Case 5. O. T.—a middle-aged woman, was admitted with an extensive but well-calciﬁed lesion of the spine, present since childhood. A paravertebral sinus of recent origin healed after a few months' constitutional treatment. Eight years previously she had had a normal confinement without ill effect.

Case 6. F. N.—was discharged in 1947 at the age of twenty-six years after treatment for tuberculosis of the twelfth dorsal and first lumbar vertebrae. Two years later she was admitted to the unit for confinement, which was uneventful. Radiographs of the spine at that time showed bony fusion.

Case 7. S. D.—had had an artificial abortion when tuberculosis of the spine was first diagnosed, before she was admitted for tuberculosis of the tenth and eleventh dorsal vertebrae. A year after her discharge in 1947 she returned to the unit for a normal confinement, from which there was no ill effect. At that time radiographs showed bony ankylosis of the affected vertebrae.

Case 8. H. O.—had been treated for tuberculosis of the fourth and fifth lumbar vertebrae in childhood. In 1945, at the age of twenty-nine years, she was admitted to Black Notley for a confinement. Caesarian section for pelvic contracture was performed and her progress was uneventful.

Case 9. I. T.—was treated for tuberculosis of the second and third lumbar vertebrae, and was discharged at the age of twenty-nine years. She had a successful confinement in 1939 and states that she is in perfect health.

Case 10. D. D.—aborted spontaneously shortly after admission to Black Notley in 1941 for treatment for tuberculosis of the eleventh and twelfth dorsal vertebrae. Her subsequent progress was slow and she developed paraplegia of late onset which was cured after a lateral decompression operation in 1946. She had an uneventful confinement in the maternity unit in 1949, and is in good health with no recurrence of the disease.

Case 11. F. M.—had two children before contracting pleurisy and pneumonia in 1938; a cold abscess of the chest wall developed. About this time an artificial abortion was performed at the sixth month. Nineteen months afterwards she was admitted to Black Notley for the treatment of multiple tuberculous lesions, and after several courses of treatment her disease improved. She became pregnant again in 1946 and had a further artificial abortion; at the same time sterilisation was performed. She died the following year.

Case 12. W. E.—had two children and was healthy until the onset of tuberculosis of the lower dorsal spine for which she was treated at Black Notley during 1942 and 1943. She returned for a confinement in the maternity unit in 1949. There was no ill effect.

Case 13. L. E.—was healthy until the onset of tuberculosis of the spine in 1942. She was treated in Black Notley for tuberculosis of the dorso-lumbar spine with sinuses from September 1947 to October 1948. In 1949 she had a confinement in a hospital near her home; follow-up examination in 1950 shows well-healed disease.

Case 14. B. C.—was aged twenty-six years when she was admitted to Black Notley in 1945 suffering from tuberculosis of the twelfth dorsal and first lumbar vertebrae. She was discharged in 1946, but subsequently developed a pulmonary tuberculous lesion for which further treatment was required. In 1949 she had a normal confinement. The disease in her spine and in her lungs was at that time quiescent and she has remained well since.

A few comments are necessary on the patients with spinal tuberculosis and pregnancy. No reactivation of disease, increase of deformity or difficulty in labour occurred as a result
of parturition. The patient H. O. (Case 8) had a Caesarian section, not because of the tuberculous disease, but because of pelvic contraction. Some perplexity was felt about the patient D. D. (Case 10), admitted with active tuberculosis of the spine and pregnancy, until she aborted spontaneously. Experience would now lead me to reassure such a patient, to treat the spinal tuberculosis, and to obtain as much quiescence of the spine as possible, before delivery either normally or by Caesarian section. The patients S. D. (Case 7) and F. M. (Case 11) had artificial abortions. The spinal disease appeared to be unaffected in the patient S. D., but the patient F. M. developed multiple tuberculous lesions in the ankle and spine and ultimately died.

![Image](image_url)

**Fig. 1**
Case 16 (J. O.) — The radiograph shows the descending foetal head and the manner in which it could squeeze out a residual intrapelvic abscess into the thigh. This would not necessarily be evidence of fresh disease (see Case 19).

**Fig. 2**
Case 17 (M. K.) — This patient had old tuberculosis of both hips with fibrous ankylosis and only a few degrees of movement. Adduction deformity of the right hip was corrected by a low osteotomy. She has since had one normal confinement.

**Patients with Tuberculosis of the Hip: 5 Cases**

**Case 15. L. H.** — was treated for tuberculosis of the hip at Black Notley and was discharged at the age of fourteen years. Subsequently a strong fibrous ankylosis developed. She married, and had a child in 1946; the labour was normal and there was no ill effect.

**Case 16. F. O.** — had tuberculosis of the left hip in childhood. She married and had one child. Two years after her first confinement she was admitted for the correction of a flexion and adduction deformity. She had another child in 1948. Both deliveries were by Caesarian section. There was no evidence of reactivation after either confinement (Fig. 1).

**Case 17. M. K.** — had bilateral disease in childhood. At the age of eighteen only a few degrees of movement were present in each hip, and an adduction deformity of the right hip was corrected by osteotomy. She later married and in 1947 had a normal labour with no ill effect (Fig. 2).

**Case 18. W. G.** — was treated in childhood for tuberculosis of the hip, ending with ankylosis. She married in 1946 and had a confinement in 1947. She writes that she had thirty stairs to climb from kitchen to sitting-room all through her pregnancy, but had a normal confinement, a healthy child and no ill effects.

**Case 19. F. T.** — was treated for tuberculosis of the left hip during childhood. She married and had a confinement in 1948, during which she developed a cold abscess in the thigh. Unsound ankylosis was present with flexion and adduction deformity.
It can be deduced that a patient with a fixed hip, or even two fixed hips, may have a normal labour. The patient J. O. (Case 16), who had two Caesarian sections, was thought to have a contracted pelvis, and these operations were done for obstetric reasons. The patient M. K. (Case 17) with bilateral ankylosis of the hips (Fig. 2) had a normal confinement. In a personal communication, Mr Alan Brews has told me that abduction of the hips is not required for a normal delivery, as the child is delivered forwards.

The patient F. T. (Case 19), who developed an abscess of the thigh during pregnancy, had long-standing fibro-caseous disease of the hip with unsound ankylosis in flexion and abduction. The character of the pus when aspirated suggested old sero-caseous material which may have been expressed from the pelvis by the foetal head. She was admitted to Black Notley following a normal confinement, and after four months' constitutional treatment an osteotomy and graft were performed. Figure 1 (a radiograph of another patient) shows how the foetal head may express a residual intrapelvic abscess into the thigh.

**PATIENTS WITH TUBERCULOSIS OF THE KNEE: 7 CASES**

**Case 20. K. D.**—was treated in childhood at Black Notley for tuberculosis of the left knee and ankle. Bony fusion developed in both these joints. She had good function and earned her living on the stage. She married in 1945, and a child was born in 1947 with no ill effects.

**Case 21. J. F.**—was treated at Black Notley at the age of twenty-six for tuberculosis of the knee and of the lungs, the sputum being positive. Excision of the knee was performed and she was discharged in 1939. She had one child in 1943 and another in 1947, and has kept well.

**Case 22. O. F.**—was treated at the age of twenty-four years for tuberculosis of the knee and of the lungs, the sputum being positive. Excision of the knee was performed after constitutional treatment and she was discharged in 1938. She married in 1945, had a child in 1947 and is keeping well.

**Case 23. Q. X.**—was treated at the age of nineteen years at Black Notley for tuberculosis of the knee, excision being performed. She was discharged in 1937 and married in 1946. A baby was born in 1947 and she is keeping well.

**Case 24. F. S.**—was treated conservatively in childhood at Black Notley for tuberculosis of the knee. Later she married and had two children. After the second confinement she felt some strain on her knee but the symptoms did not persist. She was readmitted to Black Notley two years afterwards with a painful fibrous ankylosis for which excision was performed. She has later had two more children. She writes: "I have four children altogether, the eldest being six years old. I do all my own housework, laundry, shopping etc., but my legs never tire or ache. I am now in the best of health and very happy indeed."

**Case 25. H. Q.**—was admitted to Black Notley in 1944 at the age of twenty-seven years with active tuberculosis of the right knee; she was then eight months pregnant. Her knee was put in a plaster splint well cut away on the inner side of the thigh, and she was confined normally. Two months after confinement excision of the knee was performed. She was discharged with the disease quiescent and was well when last seen.

**Case 26. F. S.**—was treated at the age of twenty-two years at Black Notley for tuberculosis of the knee and pulmonary tuberculosis. The sputum was positive. Excision of the knee was performed after constitutional treatment, and she was discharged with the disease quiescent. She married, and in 1945 had a baby in the unit without ill effect. She was seen a year later when there was sound healing of the disease in the lungs and the knee. Her general health was then excellent. In 1949 she died after a rapid illness, the nature of which has not been determined.

A feature of this group of patients with pregnancy and tuberculosis of the knee is the frequent association of pulmonary tuberculosis with tuberculosis of the knee in young women. The combined lesion yields to treatment, especially after excision of the knee, and no ill effect attributable to pregnancy has been observed.

**PATIENTS WITH TUBERCULOSIS OF THE SACROILIAC JOINT: 2 CASES**

**Case 27. I. H.**—was treated at the age of twenty-four years at Black Notley for disease of the left sacro-iliac joint. She was discharged in 1938, married in 1940 and has had two babies since, both delivered by Caesarian section. There has been no ill effect.
Case 28. W. M.—was treated at the age of eighteen years at Black Notley for tuberculosis of the right sacro-iliac joint. Large subgluteal abscesses were present and many pints of pus were aspirated. She was discharged in 1946 and married the same year. She was admitted to the maternity unit in 1948, being then six months pregnant. There was a small tuberculous abscess in the thigh which had appeared recently; for this reason a Caesarian section was performed, but the baby died of pulmonary atelectasis. The patient again became pregnant and the abscess in the thigh reappeared. In 1949 she had a normal confinement in a hospital near her home and is well. The abscess in her thigh was probably due to the expression of a residual abscess from the pelvis by the foetal head. A radiograph taken after the second pregnancy in 1949 showed healing more sound than on discharge after treatment in 1946.

No comment is required on these two patients who had pregnancy and sacro-iliac tuberculosis.

Patients with tuberculosis of the shoulder, foot or wrist: 4 cases

Case 29. F. T.—had been treated for tuberculosis of the astragalus involving also the ankle and subastragaloid joints. The foot had healed well after constitutional and operative treatment. She had one confinement in 1948 without ill effect.

Case 30. O. F.—was treated at the age of twenty-two years at Black Notley for tuberculosis of the tarsus and pulmonary tuberculosis. After constitutional treatment the tarsal lesion was curetted and grafted. Firm healing occurred. She was discharged in January 1946 and readmitted in October 1946 for confinement. There was no ill effect. The foot and the lung have remained well healed.

Case 31. O. T.—was treated in 1942 for tuberculosis of the first left metatarso-phalangeal joint; there was also bilateral apiical pulmonary tuberculosis. Sequestrectomy of the joint was performed and subsequently both the joint and the lung disease healed. She had a confinement in 1948 and remains well.

Case 32. N. T.—was treated conservatively for tuberculosis of the right wrist at twenty-six years. Since then she has had three children. She writes that despite a stiff wrist she manages her housework quite well and is in good health.

No comment is required on these patients.

Conclusions

The case histories of these Black Notley patients show that no serious harmful effects have been caused by pregnancies going to full term. Most of the patients had normal confinements; Caesarian sections were few and were usually done for obstetric reasons, not for fear of reactivation of the disease. This experience bears out a remark made to me by Marcel Galland. When asked if Caesarian sections were required for women who became pregnant after treatment at Berck for skeletal tuberculosis, he replied: "Jamais! Tont passe!"

Two patients in the series had artificial abortions, and one aborted spontaneously. Two of these three patients did not do as well as other patients whose pregnancies went to full term.

Quite another question is whether the onset of skeletal tuberculosis soon after pregnancy may be attributed to the pregnancy. In a group of women of child-bearing age, it would be difficult to distinguish between post hoc and propter hoc in considering this question. One patient of this series, H. Q. (Case 25), was admitted eight months pregnant with active tuberculosis of the knee; but pain in the joint had started fifteen months before admission, and the onset of disease no doubt preceded the pregnancy. Some of the patients admitted to Black Notley were mothers of young children but there is no note of any pregnancy having preceded the onset of tuberculosis by a short interval. The follow-up reports of the married patients compare favourably with those of the unmarried.

Further, it may be argued that pregnancy increases resistance to tuberculosis. Such a belief was current from the time of Hippocrates until the middle of the nineteenth century, and clinical evidence can be quoted in favour of such a view. In America, Lyman (1943) followed up 1,818 women who had been treated for tuberculosis in a sanatorium; many had married despite medical advice to the contrary. Lyman found that the late results of treatment were four times as good in the married patients as in the single women. Lyman says, "When
we consider that the married group established this record in spite of the fact that 192 out of 315 gave histories of pregnancies (averaging 2.25 children each), it is clear that some factor not yet accounted for has exerted a profound influence in their cases."

I have speculated elsewhere as to what this factor may be (Wilkinson 1949). But it seems clear that increased sterol circulation in the body is associated with increased reticulo-endothelial activity (Fraser 1935). Thus reticulo-endothelial proliferation has been observed in the lesions of lupus following the administration of calciferol (Dowling, Gauvain and Macrae 1948). An increase of blood cholesterol is found during pregnancy. The sex hormones are sterols and might be expected to be raised in the marital state; it is perhaps significant that marital contacts form a group relatively immune to tuberculosis.

There would appear to be good grounds for reassuring the married woman who has suffered from skeletal tuberculosis regarding the prospect of normal pregnancy. Many letters received from patients in a follow-up of this sort are poignant documents. There is no doubt that the majority of these women desire children as ardently as normal women, and that a safe confinement following skeletal tuberculosis is an excellent form of rehabilitation.

REFERENCES

BREWS, R. A.: Personal communication.
GALLAND, MARCEL: Personal communication.

DISCUSSION BY F. G. ST CLAIR STRANGE

(Contributed after the original reading of the Paper)

Mr F. G. St Clair Strange said that he was in agreement with Mr Wilkinson's views, and would like to reinforce one of the groups of case reports with some from his own experience.

The sacro-iliac was the joint which, above all others, one would expect to become reactivated in pregnancy and labour, owing to the great vascular changes and mechanical stresses which affect it. In his series of ninety-nine cases there were fifty-six women. In four cases pregnancy had precipitated the onset, or at least had immediately preceded it. Fifteen women had died under treatment or within three years of discharge, and four had not been traced. In two others, the follow-up was incomplete. Of the remaining thirty-five, fifteen were single, three were over child-bearing age and a further two had gynaecological operations which
prevented pregnancy. This series therefore concerned fifteen married women with quiescent sacro-iliac tuberculosis.

Of the fifteen women who were married, of child-bearing age and able to have children, twelve had had twenty-seven pregnancies, and one was pregnant for the sixth time. There were no Caesarian sections and no case of recurrence of activity in the sacro-iliac joint. There was one miscarriage, one stillbirth at eight months from antepartum haemorrhage and one death, from broncho-pneumonia of uncertain etiology three months after a second pregnancy. In one case only was pregnancy followed by the development of tuberculosis in a remote joint.

One of his patients had written in 1939 saying that she did not think it wise for her to have any pregnancies, and the speaker had felt remiss in having failed to advise her otherwise. But later, in 1946, she developed a tuberculous wrist. If she had been told that pregnancy carried little risk, she might have waited till the war was over before starting a family: the coincidental development of a tuberculous wrist would then have been blamed on the pregnancy.

To summarise, one might say that pregnancy appeared to carry no material risk of reactivation of a tuberculous sacro-iliac joint that was clinically and radiographically quiescent, and no interference with normal labour need be expected.