SYNOVECTOMY AND CURETTAGE IN THE TREATMENT OF TUBERCULOSIS OF JOINTS

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Girdlestone (1940) wrote that "during his time in the wards of a London hospital, first as a student and then as a house surgeon, Pott's disease and hip disease had meant deformity, septic complications and the slow miserable process of lardaceous disease. In contrast to this, the work of Sir Robert Jones in open-air hospitals in Shropshire and Heswall seemed miraculous. The children with hips, spines and knees looked perfectly well." These words illustrate a principle which is as true to-day as when they were written. They paint a picture of "old, unhappy, far-off things and battles long ago." With the advantages that antibiotics offer to the modern surgeon it is important that the old teaching should not be forgotten. The results described in this paper would not have been possible except in an open-air country hospital where constitutional treatment is carried out carefully.

The value of constitutional treatment alone, though great, was limited. Prolonged splintage was necessary which, in the child, stunted physical development; miliary tuberculosis and meningitis or septic complications might develop. Even after healing of the disease, a major operation might be required to stabilise the joint and function was lost. There was a substantial late mortality from associated tuberculous lesions. For example, Harris and Coulthard (1942) followed up 296 patients treated for skeletal tuberculosis for periods varying from one to ten years and found that eighty-five had died. Approximately half of these deaths were from miliary dissemination or sepsis, and most others from associated tuberculous lesions. The main problems therefore, before the introduction of antibiotics, were to reduce the mortality from sepsis, miliary tuberculosis and associated lesions, and to save joint function. The introduction of antibiotics might have been expected to reduce the incidence of sepsis and miliary tuberculosis, and this, in fact, is what has happened at Black Notley, in spite of the adoption of open operations into tuberculous joints which are to be described. The effect of antibiotics on associated lesions has yet to be assessed but its effect appears to be less certain than on the other complications. Nevertheless the adoption of operations on tuberculous tissues, by which a possible antigenic effect may be produced from the drainage of tuberculous material into body tissues, may be of value in reducing the mortality arising from associated lesions. Even before the introduction of antibiotics, results had been published of a series of patients with associated lesions who had been treated by operations into tuberculous tissues (Wilkinson 1946). These results were compared with those of a similar series of patients with associated lesions upon whom no operation had been performed into tuberculous tissue. The late mortality in patients operated upon, with more severe disease which in those days made operation more justifiable, was 7 per cent. In the group of patients in whom no operation was performed the late mortality was 16 per cent.

The main object of operations on tuberculous bones or joints is to heal the local lesion. The purpose of this paper is to describe how far such operations have been successful, when combined with constitutional treatment and antibiotic therapy, in preserving joint function and reducing the time required for treatment. Preliminary remarks on the pathology of skeletal tuberculosis are necessary. The tuberculous infection, bacillaemic in origin, falls most heavily on parts of the joint where there are reticulo-endothelial cells capable of entrapping the bacilli: these reticulo-endothelial cells are found at the ends of long bones and in synovial membrane (Fraser 1935, Mercer 1943, Boyd 1942, Soeur 1949). There is

also free vascular communication between the synovial membrane, capsule and epiphyses (Davies 1946). Thus, usually, there is concomitant infection of synovial membrane and the ends of the long bones -- an observation emphasised by Allison and Ghormley (1931) and by

FIG. 1

Radiograph of a child with tuberculosis of the left hip. Strict constitutional treatment was enforced but it was not supplemented by streptomycin or operation. Subsequent radiographs (Figs. 2 and 3) show the progressive development of ischaemic necrosis in the femoral neck with destruction of the joint.

FIG. 2

Same case as Figure 1, two months later.

FIG. 3

Same case as Figure 1, eight months later.

Mortens (1948). At the periphery of the joint, where the synovial membrane is reflected from the cartilage, is the "circulus vasculosus" of Hunter, of which the arteries are end-arteries in the sense that they do not form anastomoses. Local endarteritis is one of the main

features of the pathology of tuberculosis. This may be seen clearly in microscopical sections of tissues from tuberculous joints. To quote Boyd (1929): "A tuberculous obliterating endarteritis followed later by a periarteritis is a very constant feature." It follows, therefore, that ischaemic necrosis is a common and early feature of the pathology of skeletal tuberculosis. Once this has occurred antibiotic drugs can only reach the affected part with difficulty unless the way is opened by curettage of necrotic foci (Figs. 1 to 3).

Not only may ischaemic necrosis occur in bone but the synovial tissues and capsule become engorged and congested. The effect of streptomycin on the histology of synovial tissue is being studied and will be the subject of another paper: the macroscopic changes observed depend on how soon after the start of antibiotic therapy operations have been performed. In patients operated upon after periods up to ninety days the synovial membrane was actively inflamed and microscopy showed tubercles: in those operated upon after ninety days the majority showed tuberculosis microscopically but the changes were more difficult to identify. In patients operated upon late there was thickening of the membrane, which was often adherent to the margins of the articular cartilage, but the inflammatory reaction was much less. In no case was normal synovial membrane found. Key (1925) showed that synovial membrane rapidly regenerates after removal: therefore partial synovectomy, accompanied by antibiotic treatment, affords an opportunity for fresh and healthy synovial tissue to be developed, along with fresh blood vessels which will bring the antibiotic into the diseased area.

The results of partial synovectomy, partial capsulectomy and curettage of necrotic foci in bone appear to be satisfactory; after such operations the tuberculous process appears to be arrested and recalcification occurs; partial synovectomy and capsulectomy alone seem to be beneficial in those patients in whom no major necrotic areas are seen. The results of such operations on the hip, the spine and the knee will be considered briefly. A summary of each patient is appended at the end of the paper and a few illustrative examples are mentioned more fully in the text.

TUBERCULOSIS OF THE SPINE

A follow-up of approximately four years of 131 patients who had been treated at Black Notley for tuberculosis of the spine showed that there was unstable ankylosis in 46·7 per cent of the children and 34·5 per cent of the adults, and that this had occurred oftenest when the disease was in the mid and lower thoracic regions (Wilkinson 1949). Unstable ankylosis is a fruitful source of deformity, reactivation of disease and paraplegia. Girdlestone (1940) found that paraplegia occurred in about 10 per cent of all patients suffering from spinal tuberculosis, and Butler (1935) stated that the thoracic spine was the site affected in 157 out of 186 patients whose records he had examined. The relatively poor prognosis for disease in the mid and lower thoracic spine may be due to the persistence of perispinal abscess or granuloma. Swett, Bennett and Street (1940) advocated evacuation of persistent paravertebral abscess as part of the treatment of tuberculosis of the spine; they reached this conclusion from a study of 350 patients with spinal tuberculosis and found that sound healing seldom occurred in the presence of an abscess. This observation, they maintained, was true whether or not a posterior spinal fusion had been performed. Cleveland and Bosworth (1942) described the incidence and effects of ischaemic necrosis in tuberculosis of the spine, and this has also been referred to by Capener (personal communication).

Twenty-three patients have been discharged after operation for spinal tuberculosis by means of evacuation of the abscess and curettage of granulomatous material. The operation entails costo-transversectomy of one, or preferably two, ribs and transverse processes: it is necessary to remove the transverse processes and rib heads cleanly to ensure a view of the lateral aspects of the vertebral bodies. Two chief groups of patients were selected for operation: those whose disease had recurred after previous constitutional treatment, or for whom operation was performed to accelerate and improve the results of initial treatment; and those

with unstable ankylosis and developing deformity, in whom curettage of the lesion was followed by the insertion of bone chips into the resulting defect.

Results. *Reactivated disease*—Eight patients, readmitted after previous treatment, were

FIG. 4

FIG. 5

FIG. 6

FIG. 7

Case 2. Figure 4—Lateral view early in treatment. Figure 5 shows the condition eight months later, before operation. Note extensive destruction of T.10-11 and partial destruction of T.9 and T.12. Figure 6—Eight months after operation: there has been no further destruction of vertebral bodies. Figure 7—Two years and seven months after operation: there has been collapse with commencing bony ankylosis without further vertebral destruction. A posterior graft has been inserted to augment stability.

operated upon. The average duration of treatment was 7.5 months. One, a patient treated when supplies of streptomycin were inadequate, required readmission again later for four months. The remainder were satisfactory. *Active disease in children*—Five children were

operated upon. The average duration of treatment was twenty-six months. Four have gained sound ankylosis: in one the disease has relapsed. *Active disease in adults*—Eight patients were operated upon. The average duration of treatment was eleven and a half months. All patients have gained a sound ankylosis—some have bony ankylosis—and none has relapsed. *Progressive deformity*—Two children have been treated by an attempt at producing strong anterior fusion by means of bone chips inserted into the curetted area of a spine which was quiescent but which was becoming deformed. One appears now to have a sound ankylosis: the other developed further deformity.

CASE REPORTS

Case 2--Girl aged four. Admitted with tuberculosis of the ninth to twelfth thoracic vertebrae with paravertebral abscess. Despite full constitutional treatment the disease progressed; after ten months there was total destruction of the tenth and eleventh vertebral bodies and partial destruction of the ninth and twelfth. Costo-transversectomy was undertaken and pus under considerable tension was released. Since only small quantities of streptomycin were available,

FIG. 8

FIG. 9

Case 3. Figure 8—Condition two months after admission. There is incomplete destruction of T.11 and 12 and a threat to T.10 and L.1. Operation was performed two months later. Figure 9—Thirteen months after operation: no vertebral destruction has occurred since operation and there is recalcification of the affected vertebrae.

she was given an operation cover of 200 milligrams daily for six weeks. After operation no further vertebral destruction occurred. She was discharged after twenty-one months' treatment but was readmitted a year later with a small abscess under the scar. A full course of streptomycin was then given and a posterior spinal fusion was performed to augment stability (Figs. 4 to 7).

Case 3—Boy aged six. Admitted with tuberculosis of the eleventh and twelfth thoracic vertebral bodies with paravertebral abscess: miliary tuberculosis of the lungs was also present. After four months, in spite of a full course of streptomycin, the eleventh and twelfth thoracic bodies were almost completely destroyed and the adjacent vertebrae threatened. Costo-transversectomy was undertaken; pus was evacuated and the lesion curetted. No further vertebral destruction took place and the remains of the affected vertebral bodies recalcified. After a period of convalescence posterior spinal fusion was performed to augment stability (Figs. 8 and 9).

Case 7—Man aged twenty-eight. Tuberculosis of the thoracic vertebrae 5–10. He was given a two-months course of streptomycin (one gramme daily). Drainage of abscess and curettage of lesion was then carried out. The patient was discharged fourteen months after admission and progress has been uneventful (Figs. 10 and 11).

FIG. 10

Case 7 Condition soon after admission with tuberculosis of T.5-10 with perispinal abscess. Operative drainage of abscess was undertaken seven months after admission.

FIG. 11

Case 7 Six months after operation there is bony ankylosis of T.9-10 and healed disease of T.7-8. The lesion of T.5-6, not seen in this film, had also healed.

FIG. 12

Case 28 Early radiograph showing ischaemic necrosis in the left femoral neck.

FIG. 13

FIG. 14

Case 28. Figure 13—Three months later. Incomplete destruction of the femoral head occurred despite streptomycin therapy. Partial synovectomy and curettage of the ischaemic area were undertaken one week later. Figure 14—Seven months after operation. The child was walking and had returned home.

FIG. 15

Case 28—Showing the range of flexion six months after operation.

TUBERCULOSIS OF THE HIP

Twenty-three children and four adults have been treated by partial synovectomy with or without curettage of necrotic foci. In the adults the cartilage of the femoral head was found to have been destroyed by the disease, possibly because operation was performed too late. The children alone will therefore be considered. The survival of cartilage in tuberculosis of the hip in children is often remarkable, and accords with Phemister's observation (1924) that cartilage survives better in tuberculous than in pyogenic pus. Of the twenty-three children operated upon, treatment was successful in nineteen, in that the disease rapidly became quiescent after operation and a good range of movement was restored; in two it was incompletely successful in that the disease became rapidly quiescent, but function was not restored; in two it failed in that the disease did not become rapidly quiescent and function was not restored. The average duration of treatment in the favourable cases has been ten months, a duration which can probably be reduced in the light of the experience gained. Splints have not been worn by patients discharged. No patient discharged has suffered a relapse.

CASE REPORTS

Case 28—Girl aged eight. Admitted with acute disease of the left hip which was fixed in flexion and adduction; marked spasm and oedema. Radiographs showed joint changes with an area of ischaemic necrosis in the femoral neck. Streptomycin (0.5 gramme daily) was given but destruction of the femoral head progressed. Partial synovectomy with curettage of the ischaemic area in the neck was performed four and a half months after admission. After operation the bone began to recalcify and no further destruction occurred. The child was walking nine months after admission and was discharged with 90 degrees range of flexion of the hip. Microscopy confirmed tuberculosis (Figs. 12 to 15).

Case 25—Girl aged six. Active tuberculous synovitis on admission, but 90 degrees flexion movement was present. Partial synovectomy was performed a month after admission: a cavity in the acetabular roof was not curetted. Microscopy of the synovial membrane confirmed tuberculosis. Traction was discarded after five weeks but resumed later for another month owing to return of muscle spasm. Streptomycin (0.25 gramme daily) was administered for ninety days after admission. She was discharged after ten months' treatment with a wide range of movement: the acetabular cavity was healed (Figs. 16 to 18).

Case 45—Girl aged three. Admitted with gross spasm, oedema and abscess formation of the left hip. Intramuscular streptomycin (0.5 gramme daily) was started but the condition continued to deteriorate. Partial synovectomy was performed one month after admission at a stage when the patient was very ill. The capsule was found to be infiltrated with tuberculous granulation tissue and had perforated: there were three abscesses in relation to the outside of the capsule: the cartilage was intact. Microscopy confirmed tuberculosis. After operation both the child's general condition and local condition of the hip improved. Twelve months after operation the child is still under treatment: there is a 110-degrees range of flexion movement without spasm, and radiographs show that the joint remains intact. Treatment is now being given for a slight degree of subluxation which has complicated the recovery.

Case 26.—Girl aged one year ten months. Admitted with active tuberculosis of the hip: only

15 degrees of flexion movement present. Radiographs showed erosion and excavation of the upper surface of the femoral neck. Treatment by streptomycin had been given before admission. Four months after admission partial synovectomy and curettage of the excavated area in the femoral neck were carried out. Microscopy confirmed tuberculosis. She was discharged after eleven months with a full range of movement.

Case 37—Girl aged six. Admitted with active tuberculous disease of the right hip. Spasm and oedema present with flexion and adduction deformity. Streptomycin (0.5 gramme daily) started on admission. A small area of ischaemic necrosis was seen in the femoral head. Despite treatment there was progressive destruction of the femoral head. Five months after admission partial

FIG. 16

FIG. 17

Case 25. Figure 16—Condition of hip on admission. Partial synovectomy was performed one month later. Figure 17—One year after operation. The patient had been discharged home walking four months before this radiograph was taken.

FIG. 18

Case 25 Showing range of flexion eight months after operation.

synovectomy was carried out, after which no further destruction occurred and recalcification proceeded. Nevertheless joint function was not restored and the child was discharged after a displacement osteotomy had been performed. Microscopy confirmed tuberculosis (Figs. 19 to 22).

TUBERCULOSIS OF THE KNEE

In tuberculosis of the knee destruction of cartilage usually occurs late: even before the introduction of antibiotics recovery with useful movement was sometimes possible in childhood. Mortens (1948) found that, of sixty-two children treated for tuberculosis of the knee, twenty-

FIG. 19

FIG. 20

Case 37. Figure 19 Early radiograph showing a small ischaemic area in the femoral head. Figure 20—Three and a half months later. There has been progressive destruction of the femoral head despite streptomycin therapy. Partial synovectomy was carried out soon after this radiograph was taken.

FIG. 21

FIG. 22

Case 37 Six months after operation. No further bone destruction has occurred but the joint was lost. Figure 22 Three months later, after displacement osteotomy.

seven had a useful range of movement ten years afterwards. In adult life recovery with a useful range of movement was rare. The introduction of antibiotics was therefore a signal for an attempt to obtain better functional results by means of a combination of antibiotic treatment and partial synovectomy. The experience gained so far in the treatment of sixteen patients with proven tuberculosis of the knee by these methods has been encouraging.

Results. *Children (fourteen years and under)*—Seven patients were treated. Tubercle bacilli were recovered from the joint in six. Six have overcome the disease and retained a useful range of movement, the flexion range being almost full in three. One child, four years after operation on the knee, has had to be readmitted recently with a fresh lesion in the spine, though there is 120 degrees range of flexion of the knee. It should be noted that she was treated at a time when inadequate amounts of streptomycin were available. Another child failed to recover movement and has required readmission. *Adolescents and adults*—Nine patients were treated. In seven, tubercle bacilli were recovered from the knee or the diagnosis was confirmed by microscopy; two had multiple associated lesions; and one had a cold abscess before admission. Seven patients regained movement through 90 degrees or more: one has a range of approximately 50 degrees; and one, whose disease had advanced to the stage of considerable cartilage destruction, has had to have an excision of the joint surfaces; at reoperation no evidence of active disease was seen, but unstable and painful ankylosis was present.

CASE REPORTS

Case 49—Girl aged seven. Admitted with active synovitis, swelling, spasm and 15 degrees fixed flexion deformity. A course of intramuscular streptomycin (0.25 gramme daily) was given, and full constitutional treatment was begun. Four months after admission partial synovectomy was undertaken. The synovial membrane was swollen and red, and pannus was present on the margins of the articular cartilage, though clinically the joint appeared much improved. Active tuberculosis with early reparative changes was reported on microscopical examination. Splints were discarded six weeks after operation and she was discharged walking after eight months' treatment. On re-examination she has almost a full range of movement.

Case 51—Girl aged eighteen. Admitted with synovitis of the left knee of seven months duration. There was a tuberculous focus in the apex of the left lung, and a tuberculous cold abscess of the chest wall. Tubercle bacilli were recovered from the knee by a guinea-pig inoculation of joint fluid. Intramuscular streptomycin (1.0 gramme daily) was started on admission and partial synovectomy was performed ten weeks later. The synovial membrane was thickened and had become partly adherent to the articular margins of the medial condyle. Microscopically, the synovial membrane was thickened, hypertrophic, fibrous and vascular, but it showed no specific changes. Splints were discarded three weeks after the operation. She was discharged after six months' treatment, when all lesions were quiescent. The range of movement was 90 degrees; it has increased slightly recently. She has since married and had a baby. The knee remains quiescent.

Case 47—Girl aged nineteen. Admitted with chronic synovitis of the knee and bilateral pulmonary tuberculosis, for which bilateral artificial pneumothoraces had been induced. Her knee had previously been treated for a year in plaster at a sanatorium, and two years before her admission to Black Notley she had been given a course of streptomycin and P.A.S. On admission there was marked synovial thickening; the range of flexion was 90 degrees. Streptomycin (1.0 gramme daily) was given and a month after admission partial synovectomy was undertaken. The synovial membrane was thickened and red and the margins of the articular cartilage were eroded. Microscopically, there were numerous giant-cell systems. She was allowed to walk seven weeks after operation and returned home four months later. At that time there was still increased local warmth over the knee and flexion through 80 degrees was present. On follow-up the knee is quiescent and there is a 90-degrees range of movement.

TABULATED RESULTS IN THE COMBINED SERIES

The results in sixty-two patients treated for tuberculosis of the spine, hip or knee by synovectomy or by curettage of necrotic foci are shown in Table I. All patients were operated upon during the years 1949-52. The designation "successful result" implies in the hip or the knee, restoration of good function with preservation of the joint; and, in the spine, a stable ankylosis, without post-operative vertebral destruction.

TABLE I

Site of disease	Number of patients	Successful	Result		Average duration of treatment
			Incompletely successful	Failure	
Spine					
Reactivated disease	8	7		1	7.5 months
Early active disease:					
Children	5	4		1	26 months
Adults	8	8			11.6 months
For progressive deformity	2	1		1	6 months
Hip	23	19	2	2	11.3 months
Knee	16	14		2	9.9 months

SUMMARY

1. Experience in the treatment of tuberculous disease of the spine, hip and knee by combined constitutional, antibiotic and operative measures is described.
2. In patients with tuberculosis of the spine, especially in the thoracic region and when perispinal abscess formation is a prominent feature, the treatment helps to ensure stable ankylosis in the type of case in which it otherwise might not occur.
3. In children with tuberculosis of the hip and in adults and children with tuberculosis of the knee it is usually possible to save the joint and to restore function, provided the joint has not been destroyed before treatment is begun.

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APPENDIX

SUMMARISED RECORDS OF THE SIXTY-TWO CASES FORMING THE BASIS OF THE PAPER

All patients had typical clinical and radiological evidence of tuberculosis

TUBERCULOSIS OF THE SPINE

Case No.	Sex	Age yrs.	Site of lesion	Amount of streptomycin (grammes)	Nature of operation	Duration of treatment	State of healing on last examination or follow-up	Remarks
1	F	3	T.10-11	3	Evacuation of paravertebral abscess	26 months	Unstable fibrous ankylosis	Relapse and readmission
2	F	4	T.10-11	8.4	Evacuation of paravertebral abscess	23 months	Stable fibrous ankylosis	Readmitted for posterior fusion and further course of streptomycin
3	M	6	T.11-12	135	Evacuation of paravertebral abscess	21 months	Stable fibrous ankylosis	No further vertebral destruction. Posterior spinal fusion later
4	M	28	T.10-12	20	Evacuation abscess and curettage	9 months	Bony ankylosis	Sinus after discharge from hospital healed with further streptomycin
5	M	45	T.7-8-9	6	Curettage of lesion	6 months	Stable fibrous ankylosis	Readmitted 2 years later for 4 months' treatment by streptomycin
6	M	25	T.10-11	11	Curettage of lesion and bone chips	5 months	Partial bony ankylosis	
7	M	28	T.10-11	56	Curettage of lesion	14 months	Partial bony ankylosis	
8	M	24	T.8-10	100	Evacuation of abscess and curettage	10 months	Bony ankylosis	
9	F	39	1-2-4	13	Curettage of lesion and bone chips	8 months	Bony ankylosis	Operation for painful fibrous ankylosis: marked improvement
10	F	49	1-2-4	86	Curettage of lesion and bone chips	16 months	Improved ankylosis	Chronic painful ankylosis markedly improved
11	F	19	T.6-8	64	Curettage of lesion and bone chips	16 months	Improved ankylosis	Operation performed to prevent deformity
12	F	24	T.8-9	90	Curettage of lesion	10 months	Bony ankylosis	
13	F	39	T.8-10	103	Curettage of lesion	7 months	Strong fibrous ankylosis	Painful spine relieved
14	F	10	L.4-5	50	Curettage of lesion and abscess	6 months	Disease healed	
15	F	37	T.8-12	61	Curettage of lesion	11 months	Improved healing	Chronic disease in spine for 11 years before operation
16	M	2	L.1-3	25	Curettage of lesion	3 years	Fibrous ankylosis	
17	F	32	T.9-10	100	Curettage and bone chips	Not discharged	Possible early bony ankylosis	Discharge from hospital pending after 8 months' treatment
18	F	12	T.7-9	6	Curettage and bone chips	5 months	Bony ankylosis	Operation was for fibrous ankylosis and increasing deformity
19	M	30	T.10-11	100	Curettage and bone chips	12 months	Possible early bony ankylosis	Additional (lower lumbar) lesion treated conservatively
20	F	10	T.12 L.1-3	Uncertain	Curettage and bone chips	6 months	Fibrous ankylosis	Failure: deformity increased in spite of operation
21	F	28	T.8-9	90	Curettage of lesion	8 months	Bony ankylosis	Previously treated for disease of T.10-11 which had healed
22	F	13	T.10-12	62	Curettage of lesion	2 years	Bony ankylosis	
23	F	30	T.8-9	90	Curettage of lesion and chips	10 months	Early bony ankylosis	

APPENDIX—*continued*
TUBERCULOSIS OF THE HIP

Case No.	Sex	Age yrs.	Total dose of streptomycin (grammes)	Nature of operation	Range of movement		Duration of treatment	Additional evidence of tuberculosis	Remarks
					Before operation	Last examination or follow-up			
24	M	7	36	Partial synovectomy	80° flexion	Full	9 months	Microscopy positive	
25	F	6	22.5	Partial synovectomy	90° flexion	Full	9 months	Microscopy positive	
26	F	1½	30	Synovectomy and curettage of focus	120° flexion	Full	9 months	Microscopy positive	
27	F	6	22.5	Partial synovectomy	45°	90° flexion	16 months	Cold abscess incised before admission	
28	F	8	22.5	Synovectomy and curettage	Nil	90° flexion	11 months	Microscopy positive	
29	F	5	63	Partial synovectomy	Nil	70° flexion	8 months	Microscopy positive	
30	F	4	25	Curettage of cavity	Nil	35° flexion	18 months	Progressive disease	No synovectomy: patient relapsed: disease progressed
31	M	7	45	Synovectomy and curettage	Nil	Nil	22 months	Microscopy positive	Progressive disease: failure
32	F	3	25	Partial synovectomy	30° flexion	90° flexion	19 months	Microscopy positive	
33	M	7	—	Curettage of cavity	90°	Full	4 months	T.B. in pus	Acetabular disease with iliac abscess: acetabulum curetted
34	M	4	22.5	Curettage of cavity	Almost full	Full	11 months	Mantoux 1 in 10,000 = + + +	
35	F	7	39	Partial synovectomy	70° flexion	Full	6 months	Mother and father with phthisis	
36	F	5	50	Partial synovectomy	Nil	90°	14 months	Resolving primary lung disease on admission	
37	F	6	22.5	Synovectomy and curettage	45°	20°	9 months	Microscopical confirmation	Partial success: displacement osteotomy performed
38	M	4	22.5	Synovectomy and curettage	Full	Full	9 months	Mother with phthisis	
39	F	14	45	Synovectomy and curettage	90° flexion	120° flexion	8 months	T.B. in hip abscess	
40	F	7	45	Synovectomy and curettage	90°	Full range	9 months	Microscopy confirmed	
41	F	3	50	Partial synovectomy	90° flexion	Full range	11 months	Mother with phthisis	
42	F	3	22.5	Curettage of cavity	60° flexion	100° flexion	5 months	T.B. in urine	
43	M	6	45	Synovectomy and curettage	25° flexion	Full flexion	10 months	Microscopy confirmed	

APPENDIX—continued
 TUBERCULOSIS OF THE HIP—continued

Case No.	Sex	Age yrs.	Total dose of streptomycin (grammes)	Nature of operation	Range of movement		Duration of treatment	Additional evidence of tuberculosis	Remarks
					Before operation	Last examination or follow-up			
44	F	5	75	Partial synovectomy	Nil	Almost full flexion	9 months	Microscopical confirmation	
45	F	3	32.5	Partial synovectomy	Nil	110° flexion	Discharge pending	Microscopical confirmation	Very active disease quiescent after 5 months' treatment
46	F	7	22.5	Partial synovectomy	10	100°	19 months	Microscopical confirmation	Partial success: displacement osteotomy performed
TUBERCULOSIS OF THE KNEE									
47	F	19	90+ P.A.S.	Partial synovectomy	80	90°	4 months	Bilateral pulmonary tuberculosis	
48	M	45	90+ P.A.S.	Partial synovectomy	45°	45°	18 months	Multiple tuberculous lesions	
49	F	7	22.5	Partial synovectomy	120°	Full	8 months	Microscopical confirmation	
50	M	5	22.5	Synovectomy and curettage	Full	Full	8 months	T.B. in abscess	
51	F	18	90+ P.A.S.	Partial synovectomy	Full	120° flexion	6 months	T.B. in joint fluid	
52	M	20	90	Partial synovectomy	130° flexion	100° flexion	16 months	Multiple tuberculous lesions	
53	M	13	45	Partial synovectomy	70° flexion	90° flexion	8 months	Microscopy confirmed	
54	M	3	22.5	Partial synovectomy	45° flexion	5° flexion	15 months	Microscopy confirmed	Readmitted later for persistent sluggish disease
55	M	19	90	Partial synovectomy	70° flexion	90° flexion	6 months	Microscopy confirmed	
56	M	21	100+5 intra-articular	Partial synovectomy	90° flexion	90° flexion	6 months	T.B. in synovial fluid	
57	F	11	81+6 intra-articular	Partial synovectomy	15° flexion	100° flexion	11 months	T.B. in synovial fluid	
58	F	14	90+8 intra-articular	Partial synovectomy	45° flexion	120° flexion	11 months	Microscopy confirmed	Readmitted after 2 years with spinal lesion
59	M	16	74	Partial synovectomy		90°	9 months	Cold abscess present before admission	
60	F	18	69	Partial synovectomy	Full flexion	100°	9 months	Microscopy confirmed	Knee quiescent after 6 months. Flexion
61	F	36	97	Partial synovectomy	Nil	A few degrees	15 months	Pulmonary tuberculosis	Gross disease: painful ankylosis: excision
62	M	3	22.5	Partial synovectomy	5°	90°	9 months		