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Tuberculosis of the Spine in Childhood

WI ADERELE*

Summary

Aderele WI. Tuberculosis of the Spine in Childhood. *Nigerian Journal of Paediatrics* **1982; 9: 6.** A study of tuberculosis of the spine in 52 Nigerian children, has revealed that the most commonly involved spinal segment is the thoraco-lumbar. Fifty-six per cent of the cases had neurological complications consisting mainly of spastic paraplegia/paresis. Management was successful in terms of bone healing in most of those who attended for follow-up, but the rate of recovery from associated paraplegia was faster in those managed with drug therapy and early debridement surgery than in cases treated with drugs alone. However, spinal deformities present at the commencement of therapy usually became more pronounced as the child grew, irrespective of the mode of treatment. It is suggested that the present methods of management need to be reviewed with a view to evolving other methods which would quicken the rate of healing and reduce or eliminate spinal deformity which in the thoracic area, predisposes to further respiratory infections and respiratory insufficiency.

Introduction

VARIOUS aspects of tuberculosis affecting Nigerian children have recently been reported.[1,2] While the pulmonary form of the disease is the commonest,[1] involvement of the spinal column is not uncommon. Konstam and Blesovsky[3] and Konstam[4] have reported their experiences with ambulatory management of spinal tuberculosis. One of the latest reports[5] about this condition dealt mainly with its radiological features in 69 cases, 22 of whom were aged below 11 years. The present communication details the clinical features and relevant investigations and prognosis in 52 children seen in the department of paediatrics, University College Hospital (UCH), Ibadan, with tuberculosis of the spinal column, over a period of $7\frac{1}{2}$ years.

University College Hospital, Ibadan
Department of Paediatrics
* Senior Lecturer

Materials and Methods

The cases were those seen and followed up by the author at the children's chest and tuberculosis clinic, UCH, Ibadan, during the years, 1972–1979. Diagnostic criteria were (*a*) radiological evidence of osteitis of the spinal vertebrae plus evidence of tuberculosis outside the spinal column,[1] or (*b*) histological confirmation of tuberculosis from biospy of granulation tissue obtained at laminectomy, or (*c*) both (*a*) and (*b*). Other relevant investigations included x-ray of the lungs, packed cell volume

(PCV), white cell count (WBC) and in appropriate cases, microscopy and culture of sputum and gastric washings, and lymph node biopsy.

After the initial diagnosis, each case was commenced on three standard antituberculous drugs comprising streptomycin, isoniazid and para-aminosalicylic acid. They were then followed up at the paediatric tuberculosis clinic. Those with severe spinal deformity, severe limitation of spinal movement or neurological deficit were referred to a special 'TB Spine' clinic where other forms of therapy such as spinal support with plaster of Paris and surgery were offerred in appropriate cases. Further follow-up surveillance and management were carried out at both the special clinic and the paediatric tuberculosis clinic. At each attendance at the latter clinic, the progress of the disease, including the mobility of the spine, was assessed. Other aspects assessed regularly during follow-up included weight and the response to therapy of any neurological deficit as well as other tuberculous lesions outside the spinal column.

Results

Age and sex distribution

The children were aged between 8 months and 10 years (Table I). Twenty (38%) of the 52 were below the age of 3 years and 33 (63%) below the age of 5 years. There were 35 males and 17 females, a M/F ratio of 2:1

Symptoms

The commonest presenting symptom (Table II) was a swelling at the back which was present in 51 (98%) cases. The duration of the swelling before presentation ranged from 4 days to 3 years (mean, 14 weeks). The swelling, which was usually slowly progressive, was apparently painful and tender in the early phase of the illness in 10 children. However, in 6 of the 10 cases, the pain and tenderness had subsided before the children presented at the clinic. Cough, which was present in 24 (46%) cases, was usually indicative of associated pulmonary tuberculosis. Other symptoms included the general features of tuberculosis, namely: fever, weight loss, anorexia and night sweats. Neurological symptoms, consisting of inability to stand or walk and unsteady gait, were present in 23 (44%) of the cases. Other symptoms were backache and neck pain in the older children and in one child, incontinence of faeces and urine.

TABLE I

Age Distribution in 52 cases of Tuberculosis of the Spine

Age(yrs.)	*No. of Cases*	*% of Total*
< 1	2	4
1	8	15
2	10	19
3	6	11
4	7	13
5	5	10
6	4	8
7	1	2
8	5	10
9	1	2
10	3	6
Total	52	100

TABLE II

Presenting Symptoms in 52 Cases of Tuberculosis of the Spine

Symptom	*No. of Cases*	*% of Total*
Swelling at the back	51	98
Cough	24	46
Inability to stand/walk	23	44
Fever	21	40
Loss of weight	14	27
Backache	9	17
Night sweats	7	13
Anorexia	4	8

Twelve (23%) cases had received BCG vaccination; BCG scars were present in all 12. There was a positive history of contact in 8 (15%) cases.

Signs

Forty-eight (92%) of the 52 children were wasted or marasmic. Forty (77%) children were febrile on presentation, with temperatures ranging from 37·5°C to 40°C. Phlyctenular keratoconjunctivitis was present in 3 (6%), while 5 (10%) and 4 (8%) had hepatomegaly and splenomegaly, respectively.

Spinal lesions: A gibbus was present in all cases. The diameter of the gibbus varied between 6cm and 15cm. It was tender in only 13 (25%) and was hard and non-fluctuant in all the children. There was ulceration over the gibbus in only one case who also had a sinus, and this was in the cervical region (Fig. 1). Kyphosis or kyphoscoliosis was marked in 12 (23%) cases.

Neurological signs: Fourteen (27%) cases had spastic paraplegia at presentation while 7 others had spastic paraparesis; a total of 21 (40%) with an upper motor neurone damage involving both lower limbs. There was flaccid paraparesis in 5 (10%) and flaccid paraplegia in 3 (6%). In one of the latter 3 cases, an initial flaccid paraplegia became a spastic one after decompression surgery. Twelve of 14 children whose chest X-rays revealed thoracic paravertebral shadows had spastic paraplegia or paraparesis. Only two children, both with lumbar involvement, had sensory loss in both feet.

Sites of spinal lesions: The commonest single vertebra involved in the present series was the 8th thoracic (13 cases), followed by the 7th thoracic (11 cases) and the 2nd lumbar vertebra (11 cases). In 30 (58%) of the 52 cases, only the thoracic vertebrae were affected; in 16 others, the lumbar, while both the thoracic and lumbar vertebrae were involved in 4 children. One child had involvement of the cervical vertebra alone, and in the remaining case, both the lumbar and sacral vertebrae were affected. A total of 121 vertebrae were involved in the tuberculous process, and out of this number, 81 (67%) were in the thoracic segment.

The number of vertebrae involved in individual cases is shown in Table III. In 34 (65%) cases, only one or two vertebrae were involved. However, in two cases with spastic paraplegia, 5 vertebrae (T4–T8 and T5–T9, respectively) were affected while in 2 others, 6 segments were involved.

Sites involved in those with neurological signs: The thoracic vertebrae were involved in all the 21 children with upper motor neurone lesion of the lower limbs. In addition, the first 3 lumbar vertebrae were also affected in one child. By contrast,

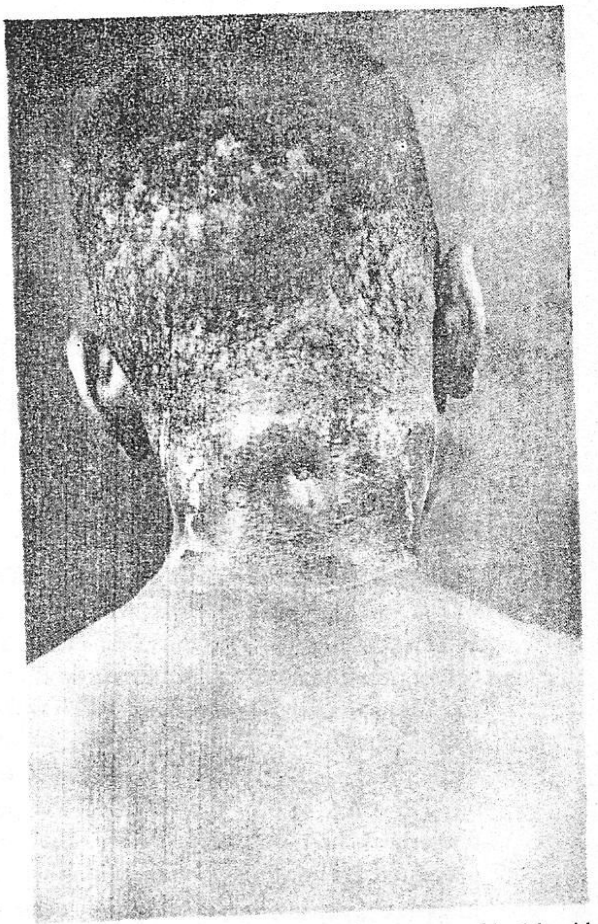

Fig. 1 Cervical gibbus with a sinus, in a 9-year old girl with spinal tuberculosis. X-ray revealed osteitis of C7.

in 7 of the 8 cases with flaccid paraplegia/paresis, only the lumbar vertebrae were involved. The eighth case was a 10-year old girl with involvement of D7–12, who presented initially with incontinence of faeces and urine and flaccid paraplegia which later became spastic, after decompression surgery. The remaining 23 children had no neurological deficit.

TABLE III

Number of Vertebrae involved in 52 Cases of Tuberculosis of the Spine

No. of Vertebrae	*No. of Cases*	*% of Total*
1	16	30.7
2	18	34.6
3	9	17.3
4	5	9.6
5	2	3.9
6	2	3.9
Total	52	100.0

Associated tuberculous lesions

Forty-eight (92%) of the 52 cases also had pulmonary tuberculosis, 13 (25%) had peripheral glandular tuberculosis, 6 (12%), abdominal tuberculosis while one each had tuberculosis involving the meninges, the ulna and the radius. None of the 52 cases had tuberculous involvement of the spine in isolation.

Investigations

Tuberculin skin test

Heaf/Mantoux test was positive in 39 (75%) of the 52 cases.

Haemogram

Haematocrit (PCV) values ranged from 25% to 40% (mean, 35%) in 50 cases. Nine (18%) of the 50 had values below 30%. The total WBC varied from 4,500 to 24,000/mm^3 (4.5 x 10^9/L–24.0 x 10^9/L), with variable differential counts. Haemoglobin electrophoretic pattern was done in 40 cases; it was AA in 23 (57.5%), AS in 15 (37.5%) and AC in the remaining 2 (5%).

Radiology

There was collapse of the vertebral body in 16 and a mixture of collapse and destruction of the vertebral body which subsequently became misshapened in the remaining 36 cases. The intervertebral disc spaces were narrowed or obliterated in all cases. Fourteen cases, including 12 with paraplegia, had visible thoracic paravertebral shadows (abscesses) on chest x-rays (Fig. 2). Other chest radiological findings included mediastinal adenopathy in 33 (63%) cases, consolidation/collapse/infiltration in 18, miliary shadowing in 2 and pleural effusion in one. In another case, the left lung had been destroyed by the tuberculous process.

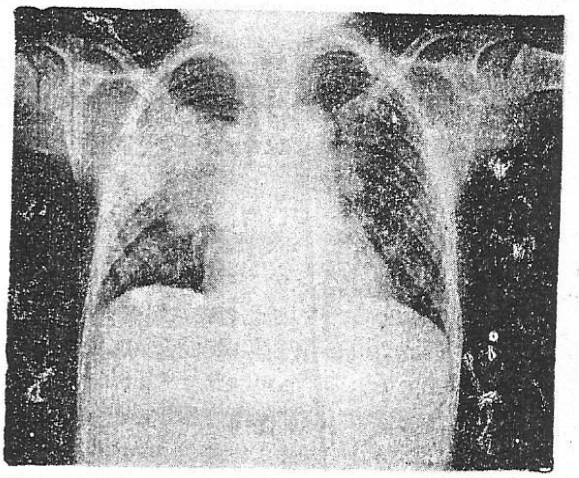

Fig. 2 X-ray of the chest showing a paravertebral shadow due to a paraspinal abscess. Note also, tuberculous consolidation in the right upper lobe.

Diagnosis

Bacteriological/histological confirmation of tuberculosis was possible in only 22 cases. In 7 cases who had surgery, biopsy specimens and drained pus yielded the histological diagnosis and positive cultures, respectively. Culture of gastric washings grew *M. tuberculosis* in 8 of 12 cases; sputum was similarly positive in 4 of 6 older children. In the remaining 3 cases, lymph node biopsies were confirmatory.

Management

Management was ambulatory throughout in 42 cases. Ten cases were admitted for variable periods on account of associated severe pulmonary tuberculosis, tuberculous meningitis, malnutrition or for surgery.

All the cases had the three standard antituberculous drugs. Twenty-six cases had plaster of Paris jackets for 2-18 months (mean, 7.9 months); Minerva jackets in 8 and hip spica with or without thigh extensions, in the remaining 18 cases. Five children with spastic paraplegia/paresis and 2 others with flaccid paraplegia had surgery within two weeks of presentation in 3 cases, and in the remaining 4 cases, after an apparent failure of 4-8 weeks' course of chemotherapy and immobilisation to improve the neurological signs. The operations consisted of costectomy and anterolateral decompression of the spinal canal. Spinal fusion was not carried out on any of the patients.

Outcome

None of the cases was known to have died. During follow-up however, 5 (9·5%) of the 52 defaulted from attending the clinics following diagnosis. Eleven (21%) others, including 3 with spastic paraparesis, did not attend after the first 6 months. The default rates after 12, 18 and 24 months were 31%, 52% and 71%, respectively. However, 11 (21%) cases attended for over 2 years, the longest attendance being for 4 years and 9 months. It was possible to assess progress in 36 cases who attended for at least, 12 months. This number was made up of 24 with neurological complications and 12 without. Cure of associated extraspinal tuberculosis as judged by the criteria enumerated by Aderele[1] and Johnson & Aderele,[6] was effected in all the latter 12 cases. Even though bone healing took place in the vertebral bodies in all the 12 children, as shown by serial spinal x-rays, no improvement was noticed in the physical deformity; if anything, kyphosis previously noted became more pronounced as the child grew (Fig. 3), irrespective of whether the child was treated conservatively or by decompression surgery. However, none of the 12 children

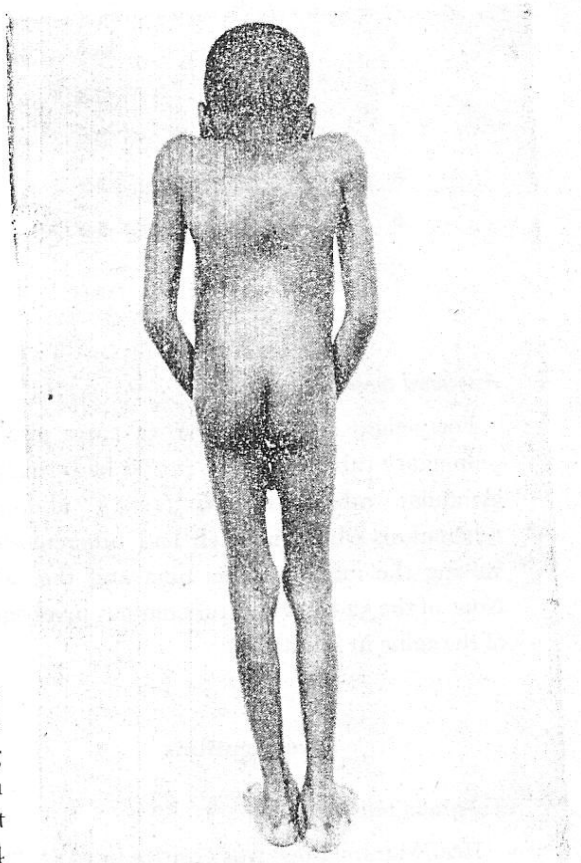

Fig. 3 Severe kyphosis involving the thoracic segment in a 6-year old boy. There was increased angulation as the boy grew older.

including 2 with paraspinal shadows on radiographs, developed neurological signs during treatment and follow-up.

Three of the 29 cases with neurological complications, did not return for follow-up following diagnosis. Two others defaulted 3-6 months after presentation. Of the remaining 24 cases, walking was possible between 4 and 14 months (mean, 7.4 months) in 16 of the 17 who did not undergo surgery, while the remaining case was slowly regaining the power in the limbs before defaulting, 8 months after being seen. In the 7 who had elective surgery, the mean period between surgery and walking was 3 months (range, 6 weeks -4 months). Recovery of neurological function in the limbs in those with paraparesis or paraplegia was usually gradual.

Discussion

Tuberculosis of the spine is the fourth commonest form of tuberculosis after pulmonary, glandular and abdominal types, seen in children attending the paediatric clinics at the UCH, Ibadan (unpublished data). However, it is our experience as well as that of others,[7] that among tuberculosis affecting bones and joints, the spinal column is the commonest site and has the worst prognosis.

Most of the clinical features in the present series did not differ appreciably from those in other series. Pain and back tenderness which were early features of the disease in some of our cases, are thought to be associated with spasm of the spinal muscles. The most frequent region involved in the present series, as in others,[5-7] was the thoracic segment, followed by the lumbar. Furthermore, it was from disease in the thoracic spine that paraplegia was most frequently seen.

Neurological involvement, whose incidence in Pott's disease varies from 18% to 41%,[8-10] is usually multifactorial. It includes compression, which may be caused by a paraspinal abscess invading the spinal cord; granulation tissue encroaching on the dura; sequestrated bone or intervertebral disc, and rarely, by dislocation of the vertebra.[10] In addition, damage may be caused by endarteritis resulting in occlusion of the spinal vessels supplying the spinal cord. The high prevalence of neurological damage (56%) in the present series is unexplained but may be due to late presentation. In this connection, it will be recalled that the mean duration of back swelling before presentation was 14 weeks and in some, there was evidence that the neurological involvement had become manifest for some time before presentation. Although involvement of the spinal bone is usually present in cases of tuberculous paraplegia, the condition may be associated with non-bony lesions such as tuberculous basal meningitis, extraosseous extradural tuberculosis[11] and primary localised spinal tuberculous radiculomyelitis.[12] Conversely, radiological changes of osteitis of the vertebral body in this environment, though most commonly caused by tuberculosis, can also be due to conditions such as trauma, pyogenic infection, *Histoplasma Duboisii* and neurofibromatosis.[5] In addition, we have seen sickle cell haemoglobinopathy causing osteitis of the vertebral body which, on radiology, was almost indistinguishable from the changes of tuberculous osteitis. In cases where there are difficulties in differentiating tuberculous osteitis from sickle cell osteitis however, stigmata of sickle cell disease will often be demonstrable in other areas.[13]

The management of spinal tuberculosis remains controversial. The controversy centers mainly on whether cases should be treated conservatively or by elective surgery, and if by the latter, at what stage and what type of operation. Traditionally, prolonged immobilisation on a plaster bed had been the method of treatment.[7 8] Later, Konstam and Blesovsky[3] and Konstam[4] showed that outpatient ambulatory non-surgical treatment consisting of antituberculous drug therapy and plaster jacket whose aim was relief of pain and prevention of gross deformity, could be successful. Later experience showed that plaster jackets did not significantly affect these favourable results.[2 4] However, it has been observed in the present and

other series,[4 8] that in cases treated conservatively, spinal deformity present at the initial visit, got progressively worse as the child grew older. In view of this, some workers have advocated early surgery which has been claimed to produce better results.[14 15] The controversy surrounding the methods of treatment led to large scale trials of the various methods, organised at different centres, by the Medical Research Council (MRC) of Britain. Reports of the MRC working parties on tuberculosis of the spine in Korea[16] and Rhodesia[17] did show that there was no difference at the end of 3 years, in terms of overall response to treatment, between those treated surgically and those managed conservatively. However, a similar trial in Hong Kong,[18] showed evidence that among those treated surgically, radical operation, which included anterior spinal fusion and bone grafting was associated with a better prognosis in terms of healing with bony fusion and less severe spinal deformity, than a simple debridement.

Whither Nigeria and similar countries? We believe that the present conservative policy of initial medical management with surgical intervention if no response is obtained after a trial of antituberculous drugs, is preferable for now, than radical surgery. This is because facilities, including adequate personnel for such ambitious surgery, are not available. Nevertheless, a constant review is necessary because, although healing of the lesions and recovery from the accompanying neurological complications took place with the conservative management in the present series, the rates were slower than in those treated by elective and early surgery. However, neither method had a beneficial effect on the spinal deformity. In order to improve further on the degree of deformity which is associated with increased liability to secondary respiratory insufficiency and infections, apart from its unsightly appearance, other ways of management need to be explored.

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References

1. Aderele WI. Pulmonary tuberculosis in childhood. An analysis of 263 cases seen at Ibadan, Nigeria. *Trop Geogr Med* 1979; **31**: 41–51.
2. Okeahialam TC. Childhood tuberculosis in Enugu. *Nig J Paediat* 1980; **7**: 1–6.
3. Konstam PG and Blesovsky A. Ambulant treatment of spinal tuberculosis. *Brit J Surg* 1962; **50**: 26–38.
4. Konstam PG. Spinal tuberculosis in Nigeria. *Ann Roy Coll Surg* 1963; **32**: 99–115.
5. Obisesan AA, Lagundoye SB and Lawson EA. Radiological features of tuberculosis of the spine in Ibadan, Nigeria. *Afr J Med Sci* 1977; **6**: 55–67.
6. Johnson AOK and Aderele WI. Abdominal tuberculosis in childhood. *J Trop Med Hyg* 1979; **82**: 47–52.
7. Murley AHG. Tuberculosis of bones and joints. *Brit J Hosp Med* 1971; **5**: 763–70.
8. Dobson J. Tuberculosis of the spine. *J Bone Joint Surg (Br)* 1951; **33**: 517–31.
9. Jones BS. Pott's paraplegia in the Nigerians. *J Bone Joint Surg (Br)* 1958; **40**: 16–25.
10. Editorial. Tuberculous paraplegia. *Brit Med J* 1979; **1**: 1442–3.
11. Ohaegbulan SC. Spinal extraosseous extradural tuberculoma. *Tubercle* 1977; **58**: 97–9.
12. Freilich D and Swash M. Diagnosis and management of tuberculous paraplegia with special reference to tuberculous radiculomyelitis. *J Neurol Neurosurg Psych* 1979; **42**: 12–18.
13. Lagundoye SB. Radiological features of sickle-cell anaemia and related haemoglobinopathies in Nigerians—Review article. *Afr J Med Sci* 1970; **1**: 315–42.
14. Goel MK. Treatment of Pott's paraplegia by operation. *J Bone Joint Surg (Br)* 1967; **49**: 674–81.
15. Martins NS. Tuberculosis of the spine. A study of the results of treatment during the last twenty-five years. *J Bone Joint Surg (Br)* 1970; **52**: 613–28.
16. Medical Research Council Working Party on Tuberculosis of the Spine. Fifth report. *J Bone Joint Surg (Br)* 1976; **58**: 399–411.
17. Medical Research Council Working Party on Tuberculosis of the spine. Third report. *J Trop Med Hyg* 1974; **77**: 72–92.
18. Medical Research Council Working Party on Tuberculosis of the Spine. Fourth report. *Brit J Surg* 1974; **61**: 853–66.

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