TUBERCULOSIS OF THE LOWER CERVICAL SPINE (C2 TO C7)

A REPORT ON 40 CASES

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Forty patients with tuberculosis of the lower cervical spine (second to seventh cervical vertebrae) have been reviewed. Pain and stiffness were important and dominant symptoms. Two types of disease were recognised. In children under 10 years old involvement was extensive and diffuse with the formation of large abscesses. In patients over 10 the disease was localised and produced less pus, but was associated with a much higher incidence of Pott’s paraplegia. The overall incidence of cord compression was 42.5 per cent (17 out of 40); 13 of the 16 patients with the “adult” type of disease had this complication. The commonest method of treatment was with antituberculous drugs, anterior excision of diseased bone and grafting. This regime rapidly relieved pain, compressive respiratory symptoms due to abscesses and Pott’s paraplegia. It also corrected kyphotic deformities from an average of 25.5 degrees to 5.4 degrees.

Tuberculosis of the cervical spine is uncommon. Its incidence, according to the few reports in the literature, varies from three per cent to five per cent (Dobson 1951; Martin 1970). Because of its low incidence, it has not been included in the extensive long-term trial by the Medical Research Council (Medical Research Council Working Party on Tuberculosis of the Spine 1973a, 1973b, 1974a, 1974b, 1976, 1978, 1982).

This paper presents our experience with 40 cases of tuberculosis of the lower cervical spine and attempts to highlight some of its features.

MATERIAL

Since 1956 over 1100 patients with tuberculosis of the spine have been seen in the Department of Orthopaedic Surgery of the University of Hong Kong. The cervical spine was affected in 46. We report 40 of these patients; the remaining six, who had tuberculosis of the atlantoaxial joint, have been reported previously (Fang, Leong and Fang 1983).

The clinical features of the disease were assessed in all 40 patients; the results of treatment were analysed in 30 patients who were followed up for a minimum of five years. The average length of follow-up was 8.8 years with a maximum of 18 years. Diagnosis had been confirmed by a positive culture or biopsy in all patients.

Ten patients were excluded from the series: four had insufficient follow-up (less than five years); three had inadequate radiographs; and another three had died, one from miliary tuberculosis and two from a combination of miliary tuberculosis and complications of Pott’s paraplegia.

The age of the patients at the time of presentation ranged from 2 years to 65 years: 24 were under 10 years old, 9 were between 11 and 50 years and 7 were over 50 years.

The commonest level involved was the sixth cervical vertebra. The average number of vertebral bodies involved per patient was 2.6.

Based on the radiographs and on our findings during operative exploration, there seemed to be two general types of the disease, that seen in children under 10 years old and that which occurred in those over 10 (the “adult” type). In children the disease was characterised by more diffuse and extensive involvement, the formation of large abscesses (Fig. 1), and a lower incidence of Pott’s paraplegia or tetraplegia. The “adult” type was more localised and produced less pus, but had a higher incidence of paraplegia (Fig. 2).

CLINICAL FEATURES

All 40 patients complained of pain in the neck of varying degree; it was the chief complaint in 36. Twenty-nine patients also complained of stiffness, which was associated with torticollis in 18. Fifteen had subjective progressive weakness of the limbs; five of these patients gradually lost bladder control.

Four young children had night cries, three of whom also had inspiratory stridor and attacks of cyanosis. Two patients also complained of discomfort in the throat when swallowing.

Eleven patients presented with a gibbus or kyphosis. Seven patients had associated lymphadenopathy, five of whom developed abscesses which ruptured and dis-
charged. None of the patients presented with a sinus communicating with the spine. Five patients had a second tuberculous lesion further down the spine.

The vast majority of patients had had symptoms for less than two months before presenting (average three months, range one to 18 months).

CORD COMPRESSION
Seventeen of the 40 patients had evidence of paraplegia or of tetraplegia on presentation, an incidence of 42.5 per cent. The onset of cord compression was gradual, usually occurring over a period of four to eight weeks after the onset of pain.

The cause of the cord compression, as determined at operation or necropsy, was tension from the abscesses in 13 patients and pressure from the internal kyphus in four.

The incidence of paraplegia after the age of 10 was high; only two of the 17 patients under five years, and two of the seven patients between five and 10 years were affected, while 13 of the 16 patients over 10 years had cord compression.

A breakdown of the pattern of neurological involvement showed that four patients were already bedridden on presentation, while 13 were still walking despite weakness of the lower limbs. All four bedridden patients had weakness of both upper limbs as well as of the lower limbs, while only one of the 13 “walking” patients had weakness in both upper limbs. The five patients with bilateral upper limb weakness also had sensory loss at and below the level of the cervical lesion, and urinary retention with overflow. The remaining 12 patients had lower limb weakness only and had no sensory loss or disturbances of the bladder or bowel.

TREATMENT
Treatment was analysed in 30 patients. They all received streptomycin for three to nine months. Twenty-three patients had para-aminosalicylic acid and isoniazid for 15 to 21 months, while seven patients had rifampicin and isoniazid for 12 to 15 months. Six patients proved to be resistant to these “first-line” drugs and were given additional courses of ethionamide or pyrazinamide or both for three to six months.

In addition to drug therapy all the patients had anterior spinal surgery. In 21 patients anterior excision of the diseased bone followed by grafting (the Hong Kong operation), as described by Hodgson and Stock in 1956, was the only procedure used. Twelve of these patients had cord compression before operation.

In two children (aged two years) with extensive disease, anterior spinal debridement without fusion was the only procedure to be carried out.

The remaining seven patients had anterior spinal surgery as secondary procedures. In three, laminectomy was initially done for cord compression; this caused subluxation of the diseased segment of the spine and worsening of the tetraplegia. Anterior spinal decompression and fusion was done after the subluxation had been reduced by skull traction. In four patients posterior spinal
fusion was done as a primary procedure. All four subsequently required anterior spinal fusion, two for progressive kyphosis and two for suspected persistence of the disease.

Postoperative immobilisation varied with the age of the patient, the extent and type of the disease, the associated complications and the procedure used. For the Hong Kong operation, immobilisation in a plaster bed for 12 weeks was used in the early cases. With the last eight patients, Minerva jackets were used for 6 to 12 weeks in patients with the children’s type of disease. In the “adult” type, the grafts were more stable and these patients wore a Plastazote or soft collar until there was radiographic evidence of union.

RESULTS

All patients who received anterior spinal surgery as a primary procedure were relieved of their neck pain within a few days of operation. The three patients with inspiratory stridor had complete relief immediately after operation. At nine months from operation all patients were enjoying good health and had no clinical or radiographic evidence of abscesses or disease. Two patients had resistant organisms as shown by culture and sensitivity tests of the tissues obtained at anterior exploration and were given second-line chemotherapy.

Of the 21 patients who were treated with chemotherapy and the Hong Kong operation, 16 had radiographic healing at six months and all had healed at 12 months. In five patients spontaneous interbody fusion was seen at one level above or below the fusion mass at final follow-up. Kyphosis was corrected from an average of 25.5 degrees before operation to 5.4 degrees at follow-up.

The 12 patients with cord compression had full neurological recovery after operation. In eight patients complete recovery occurred within two weeks, three recovered within three months and one needed four months to regain full function.

The two children who had anterior debridement without fusion developed spontaneous fusion over three and four vertebrae respectively.

The three patients who had anterior spinal decompression and fusion after laminectomy had adequate reduction of the subluxation, full recovery of cord function and fusion at six months. Two of these received second-line antituberculous drugs.

Of the four patients who had posterior spinal fusion as a primary procedure, in two the disease healed, but a progressive kyphosis developed (one from 10 to 28 degrees and the other from 31 to 45 degrees). Anterior spinal fusion was subsequently done which corrected the kyphosis to 7 degrees and 15 degrees respectively with no subsequent loss of correction. The infection was thought to have persisted in the other two and anterior spinal exploration and fusion was performed; second-line anti-
tuberculous drugs were also given. These patients had subsequent healing of the disease but, as in the other two patients, the convalescent period was prolonged.

DISCUSSION

Pain is a dominant feature in tuberculosis of the cervical spine, it being the chief complaint in 36 of the 40 cases. The pain is worse on movement and muscle spasm holds the neck tilted or twisted. This torticollis is cosmetically obvious and, together with the severe pain, forces the patient to seek early treatment.

The pattern of cervical tuberculosis in children differs significantly from that in adults. This is related to the relative immunity of adults to the disease in Hong Kong. The type of disease seen mainly in children under 10 years is characterised by more diffuse involvement and the formation of large abscesses. The abscesses may be so large that they push the trachea onto the sternal notch giving rise to upper respiratory obstruction (Fig. 1). Sinus formation, however, is not a prominent feature because the thick cervical prevertebral fascia contains the abscess.

In the “adult” type the disease is much more localised and produces less pus. Often it presents as a destructive lesion in a single vertebral body which may be difficult to differentiate from metastatic disease in the elderly. Kyphosis is usually present but is seldom severe because the articular processes are usually spared and provide sufficient support to the cervical spine.

Cord compression is common, particularly in adults. Seventeen of the 40 patients in our series had Pott’s paraplegia or tetraplegia on presentation, an incidence of 42.5 per cent. This is high, considering that the overall incidence of paraplegia in tuberculosis of the spine is between 15 and 30 per cent (Dobson 1951; Konstam and Blesovsky 1962; Martin 1970). The incidence is particularly high after the age of 10 years; only four of the 24 patients under 10 in our series had cord compression compared with 13 of the 16 patients over 10 years. Progressive narrowing of the spinal canal from degenerative disease, loss of flexibility of the spine and inelasticity of the prevertebral fascia are the main reasons for the higher incidence with increasing age.

The neurological involvement in our series was invariably of gradual onset with bilateral symmetrical involvement of the limbs. This is in contrast to metastatic disease in the elderly where the onset of paraplegia is often acute and the neurological involvement asymmetrical.

In Pott’s paraplegia the cord is compressed from its anterior aspect. Operative relief, if attempted, should therefore also be from the front. Laminectomy is not only ineffective in relieving cord compression but also removes the remaining supporting structures of the neck and causes subluxation and neurological deterioration. This
Figure 3—A three-year-old girl with disease mainly in C3 and C6; she presented with inspiratory stridor, night cries and attacks of cyanosis. Note the large abscess and diffuse involvement.

Figure 4—Fourteen years after the Hong Kong operation, spontaneous fusion is developing at C6 and C7. She has maintained a good range of neck movements.

Figure 5—At presentation. Figure 6—Postoperative radiograph; her pain and tetraplegia resolved within 10 days and she was back to normal activities in five months. Figure 7—Nine years after operation.
is well illustrated in three of our early cases where laminectomy made the tetraplegia worse.

Antituberculous chemotherapy is the mainstay of treatment and, as shown by the Medical Research Council in their prospective trial on thoracic and lumbar tuberculosis, the best surgical adjunct is excision of the diseased bone, replacing the gap with a bone graft (the Hong Kong operation). This combination was the commonest form of treatment used in our series and produced good results (Figs 3 to 7). The anterior operation was done via the simple Southwick-Robinson anterior approach which effectively and rapidly relieved pain and upper respiratory obstructive symptoms. It was also effective in the rapid resolution of cord compression. Of the 12 patients with cord compression who had the Hong Kong operation eight recovered completely within two weeks and three recovered within three months; the patient who presented late recovered within four months.

Posterior spinal fusion is not a useful adjunct to chemotherapy in the treatment of tuberculosis of the spine. This had been stressed by Griffiths in 1979, as well as by Seddon in 1938 and by McKee in 1937. It does not assist in the healing of disease nor does it prevent the development of kyphosis. This is well illustrated by our four cases who received posterior spinal fusion as primary treatment.

Ambulant chemotherapy, as advocated by Konstam and Blesovsky in 1962, is an established method of treating tuberculosis of the thoracic and lumbar spine (Medical Research Council 1973a, 1973b, 1974a, 1976, 1978), but its value has not been fully established in the cervical spine. Konstam and Blesovsky included nine cases of cervical tuberculosis in their report in 1962. Their method of treatment gave good results in the healing of the disease but none of their patients had cord compression, and the effectiveness of their regime in relieving pain or upper respiratory obstructive symptoms was not discussed.

REFERENCES


