ORIGINAL ARTICLE

EARLY RECOVERY AND STABILISATION WITH INSTRUMENTATION IN ANTERIOR CERVICAL SPINE TUBERCULOSIS

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Background: Tuberculous infection causes destruction, caseation, and necrosis of cervical vertebrae or may present as an abscess. Complete recovery of neurological status is the rule after anterior surgical decompression and fusion, even in cases with complete paraplegia or tetraplegia. Neurological impairment and spinal deformity are the major concerns with spinal tuberculosis. Absolute non-operative treatment was offered in pre antibiotic era. Since last decade great advances in terms of operative options drastically changed the scenario in management of caries spine and indications for surgery have been extended for early resolution of disease, quicker rehabilitation and prevention of late complications. **Methods:** During the period from 2005 to 2012, 336 patients of spinal tuberculosis were admitted in Department of neurosurgery, Liaquat University Hospital, Jamshoro. Forty-four patients were considered for surgery. All 44 patients underwent decompression through anterior cervical approach followed by fusion with iliac bone graft and then stabilization with titanium locking plate. **Results:** There were 20 males and 24 females. Neck pain was the chief complaint and improved in all cases. Patients had varying grades of motor weakness in upper and lower limbs. All the patients had good neurological recovery after surgery. No postoperative surgical complication found in any patient. **Conclusion:** Anterior cervical decompression, fusion and instrumentation with titanium plate fixation in patients with tuberculous spondylitis gives excellent results without untoward effects.

Keywords: cervical spondylitis, Koch's spine, anterior instrumentation, cervical plating

INTRODUCTION

Tuberculosis of the spine is common in Indo-Pak region of Southeast Asia. Vertebral tuberculosis is the most common form of skeletal tuberculosis, and constitutes about 50% of all cases of skeletal tuberculosis in the reported series.[1] The incidence of cervical involvement is 2 to 3%.[2]

Neurological impairment and spinal deformity are the major concerns with spinal tuberculosis.[3] Absolute non-operative treatment was offered in pre antibiotic era. However, the response to conservative treatment was slow and its efficiency was doubtful.[4,5]

Over the last decade great advances were made in terms of operative options available such as stabilisation of spine, ability to use metallic implants in the presence of active tuberculosis infection. This has drastically changed the scenario in management of caries spine and indications for surgery have been extended for early resolution of disease, quicker rehabilitation and prevention of late complications.[6]

Surgical indications in spinal tuberculosis include the presence of a large para-spinal abscess, the presence of severe bone destruction and kyphotic deformity, neurological deficit due to spinal cord compression, and lack of response to conservative treatment.[7] Posterior fusion had been the standard surgical procedure for the limited correction and prevention of progression of deformity in many centres. However, posterior fusion does not appear to alter the natural course of the disease process, pseudo-arthrosis and bending of the fusion mass frequently leads to substantial increase of the kyphotic deformity.[8]

This study emphasises the results of anterior cervical approach with decompression and instrumentation with titanium plate fixation in spinal tuberculosis affecting cervical spine in terms of neurological recovery.

MATERIAL AND METHODS

During the period from 2005 to 2012, 336 patients of spinal tuberculosis were admitted in Department of neurosurgery, Liaquat University Hospital, Jamshoro. Cervical spine was affected in 57 patients. Three patients had atlantoaxial instability and they were managed conservatively. Two patients had involvement of posterior elements, and 2 patients left the hospital. Out of 50 cases of sub-axial cervical spine tuberculosis, 6 were considered for conservative therapy with anti-tubercular drugs as they were responding very well with chemotherapy. other 44 were considered for surgery. Indications for surgery in these patients were neurological deficit not responding to anti-tubercular drugs, large amount of prevertebral or peridural abscess and severe neck pain with destruction of vertebral body compressing spinal cord. All patients were evaluated with plain radiography and magnetic resonance imaging. After routine investigations, all 44 patients underwent decompression through anterior cervical approach followed by fusion with iliac bone graft and then stabilisation with titanium locking plate. Patients were positioned supine with a sandbag placed between the

scapulae. Cervical traction was applied during surgery. Transverse incision was made at required level except those who needed large room for fixation by plate where vertical incision used along medial aspect of sterno-cleidomastoid. Patients were assessed neurologically after surgery and then mobilised with rigid cervical collar. All patients were kept on anti-tubercular treatment for 18 months. All patients were in regular follow-up for one year. Lateral and antero-posterior radiographs were obtained 6 months following surgery.

RESULTS

Most of patients were in younger age group as shown in Table-1. There were 20 (45.45%) males and 24 (54.55%) females. Most common site was C5 (Table-2). Patients had varying grades of motor weakness in upper and lower limbs as shown in (Table-3). Neck pain was the chief complaint and improved in all cases (Table-4). Results were recorded on the basis of clinical and radiological basis. The erythrocyte sedimentation rate was elevated in all the cases.

All patients had good neurological recovery after surgery. No per-operative surgical complication was found in any patient. Wound infection was found in 2 patients which was resolved with culture sensitive antibiotics and daily dressing of wound. No patient developed any significant complications like hoarseness due to recurrent laryngeal nerve palsy, dysphagia, carotid, oesophageal or tracheal injury. Implant failure was found in one patient due to more than one segment fusion and weak adjacent bone due to severity of disease. In one patient only debridement was done and pus was removed as there were more than three segments were involved, and it was difficult to fuse and stabilise. Patient was placed in external brace for 6 months.

Table-1: Patients in different age groups

Age of Affected	Patients	Percentage
Less than 20 Years	5	11.40
21 Years to 30 years	22	50.0
31 Years to 40 Years	10	22.7
41 Years to 50 Years	5	11.40
51 Years to 60 Years	2	4.50

Table-2: Affected level of cervical spine

Level of Cervical Spine	Patients	Percentage
C4	4	9.1
C5	22	50.0
C6	16	36.36
C4-C5-C6	2	4.54

Table-3: Motor weakness of affected

Motor Power Grading	Upper Limb	Lower Limb
Grade 0	2	20
Grade 1	0	0
Grade 2	2	4
Grade 3	17	16
Grade 4	5	4
Grade 5	18	0

Table-4: presentations of affected (n=44)

	Patients	Percentage
Severe neck pain	38	86.36
Motor weakness	40	90.90
Large pre-vertebral abscess	6	13.63
Sensory disturbance	32	72.72
Sphincter disturbance	32	72.72

Figure-1: X-ray cervical spine, lateral view shows C5 collapse

Figure-2: MRI cervical spine shows C6 tuberculous osteomyelitis with peridural pus compressing cord

Figure-3: Postoperative x-ray c- spine showing C6 corpectomy, debridment of pus, fusion with iliac crest graft and titanium plate fixation in C5 & C7

Figure-4: X-ray cervical spine, lateral view shows failure of implant due to fixation of more than one segment

DISCUSSION

Tuberculosis affects young population and destroys the life by damaging cervical spinal region. In countries like Pakistan where the rural population is still below the standard facilities and where peoples are under financial burdens, tuberculosis of cervical spine is still misdiagnosed and people come late for proper treatment. Long-term medical treatment, pain and immobilisation not only give burden to family and government but adversely affect the psychology of patients.

Tuberculous infection causes destruction, caseation, and necrosis of cervical vertebrae or may present as an abscess. Complete recovery of neurological status is the rule after anterior surgical decompression and fusion, even in cases with complete paraplegia or tetraplegia.[9] Since the vertebral body lies anterior and is commonly affected in tuberculosis, decompression and stabilisation has to be done by approaching the spine anteriorly.[10] Anterior spinal instrumentation is needed to support the collapsed anterior weight-bearing column of the cervical spine. It has been confirmed clinically by studies showing that even in the presence of metallic foreign bodies, the disease responds well to anti-tuberculous chemotherapy. Instrumentation is not always being easy as adjacent bone is also weak and purchase of screws is also not solid. Reported series shows that placing the instrumentation in an area with active infection would be prone to complications like secondary infection.[11] We used titanium plates and didn't find infection in our patients of tuberculous spondylitis.

Literature revealed use of posterior instrumentation in some cases but it is associated with increased morbidity.[11] Since 2004 we are preferring anterior approach not only in cases of cervical tuberculosis but in cervical trauma, degenerative and neoplastic conditions with excellent results.[13,14]

The MRI is considered to be the most sensitive tool in detecting abnormalities in bone and soft tissue at an early stage. The use of gadolinium is promising in detecting the disease earlier, as it invariably results in bone enhancement.[15,16] In a study by Gupta *et al*, MRI showed gross abnormalities in 63% of patients with tuberculous spondylitis who had normal plain radiographic findings.[17] In our study, MRI provided the earliest evidence of spinal tuberculosis. Further management, though costly in rural areas of Pakistan, is mandatory for proper management of patient with spinal tuberculosis.

Non-operative treatment was offered in pre antibiotic era. An absolute non-operative approach to Pot's paraplegia is considered unjustifiable because valuable time may be lost, at the same time, universal surgical exploration also seems to be unnecessary in every patient.

Treatment of spinal tuberculosis remains controversial and should be individualised in each case and depend on the extent of the bony destruction, the presence of spinal deformity and instability, and the severity of neurological impairment.[3,18] Patients without significant bone destruction and neurological deficit are generally treated with anti-tuberculous medication and external bracing.[19] Surgical intervention should be indicated for drainage of large abscess, decompression of neural elements, correction of deformity and stabilisation of the affected spine. Surgery for subaxial cervical spine tuberculosis with anterior approach, radical debridement followed by fusion and stabilisation with titanium plate offers good clinical improvement and early mobilisation. Spontaneous fusion is not as common in tuberculous spondylitis, and progressive kyhotic deformity is frequent. This may lead to progressive neurological deterioration. Although medical therapy continues to be the cornerstone of treatment, surgical intervention is commonly performed to optimise functional outcome.

In our study, the main indications for surgery were neurological deficit not responding to anti-tuberculous treatment, large amount of pre-vertebral and peri-dural abscess and unstable spine. Faraj *et al*, reported full neurological recovery at two to six years follow-up with no recurrence of disease.[20] Application of autologous bone graft is a useful method to promote local bone healing and accelerate the attainment of spinal stability and therefore the prevention of late deformity.[18] Instrumentation is not a contraindication in the presence of infection if debridement is adequate and taken back to normal bleeding bone, but we found in our study that if adjacent bone shows signal changes and involvement, it is better not to take that bone for instrument placement as there are more chances of graft failure.

Hodgson *et al* used an anterior approach for decompression and autologous bone grafting and reported that 94% of patients made a complete recovery.

The bone fusion occurred earlier and decreased vertebral body loss with a lesser degree of kyphosis was expected postoperatively.[21] Hassan *et al*, reported 85% complete neurological recovery and improvement in kyphosis with lower cervical spine tuberculosis treated with anterior debridement, fusion and H-plate fixation.[22]

Moon stated that surgery should be reserved for those patients who have advanced tuberculosis with unacceptable complications such as paraplegia or deformity.[7,23] Patients in whom the graft length exceeds two disc spaces, it is unwise to rely solely on the graft to prevent vertebral collaps.[24] We found implant failure in our patient with more than two segment disease.

To avoid graft failure, Kemp *et al* applied halo-pelvic traction for 8 weeks after anterior debridement and bone grafting, followed by Minerva cast for 4 weeks. The average stay in hospital was 12 weeks.[25] In our series, the average hospital stay was 7 (5–15) days. Loembe *et al*, reported on nine adult patients with cervical tuberculosis with cord compression treated by anterior debridement and fusion, with neurological improvement in eight patients.[26]

Although literature shows use of cervical traction in patients before surgery, we did not use traction in any case before surgery except peroperatively. Our experience with anterior cervical decompression, fusion and instrumentation with titanium plate fixation in patients with tuberculous spondylitis is excellent without any mortality and morbidity.

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