

Rationale for Operative Treatment of Caries Spine: A Study of Twenty Cases

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Caries spine is the most common problem presenting in the Orthopaedic outpatient department . Many of the patients have symptoms and signs of neurological involvement by the time they seek specialized medical help. Most of the clinicians begin with a multi drug chemotherapeutic regimen. The response is unpredictable especially in our region where tuberculosis is rampant and known to be showing resistance to drugs. Many cases deserve an aggressive approach involving open debridement and drainage. Some cases need bone grafting. This prospective study focuses on the recovery of twenty such cases in which chemotherapeutic treatment was used as adjuvant to operative management. The results were very promising and most of the patients showed adequate recovery from partial or complete paraplegia after review at two and a half years postoperatively.

Key Words: Caries spine, surgery

Tuberculosis remains among the most dreaded infective diseases to afflict mankind even in this era of ever expanding array of drugs and rapidly improving surgical techniques^{1,5}. It causes three million deaths each year and ninety million new cases have been diagnosed in last ten years⁶. Half of these cases present with vertebral involvement, dorsal spine being the most favored site^{6,8}. Skeletal involvement, is 5–7% in HIV negative population and 60% of those affected from among the HIV positive have skeletal tuberculosis⁷. The mainstay of the modern surgery remains the observation that caries spine affects the anterior elements of the spine more than the posterior parts^{1,3,6}. All the operative procedures thus developed till now have concentrated upon the erosive/caseous destruction of the vertebral body anteriorly. The introduction of CT & MRI has revealed that the posterior elements are involved more frequency than was realized earlier^{5,6}. This has given rise to the use of posterior instrumentation in cases where the surgeon is reluctant to rely solely on the anterior debridement and strut grafting only^{5,6}. An increasing kyphosis and late onset paraplegia is an ever present danger in these cases^{5,6}. The contributions of Hogdson and Stock were very major on impact when they described the radical excision of tuberculous focus in the spine through anterior approach adding bone graft^{1,3,5,6,7}. The periodic recommendations of Medical Research Council did not find much to condemn conservative treatment however the combination of surgery and chemotherapy has come to be the standard treatment by now^{3,4,5,7}. Ambulatory treatment rendered during the MRC trials has shown that 85% patients had favorable results at the end of the study⁹. On retrospective review of the cases included in the earlier MRC studies showed that only 10% cases had sound bony fusion whereas 16% did not show any radiological evidence of bony fusion after three years⁵. Progressing kyphosis especially in the children of this study group remains an ever-present danger.

Over the past few decades the procedures that have stood the test of time are cold abscess drainage, laminectomy, anterolateral debridement, costotransver-sectomy and anterior spinal fusion by modified Hong Kong procedure. Recent reports by Govender and Prabhoo using a composite strut graft comprising of frozen femoral allograft filled with chipped rib autograft have opened new avenues⁸.

Materials and methods

Twenty cases of tuberculosis spine with neurological involvement were included in the study. All patients underwent same set of investigations including bone scan, CT and myelography. A record was made of the sensory and motor deficit in the patients. The paraplegia was graded according to the criteria (Table 1)¹².

Table 1. Evaluation criteria used for paraplegia

| Grades | Ambulatory status |
|--------|--|
| I | Exaggerated reflexes but able to walk unaided. |
| II | Marked altered gait needing external support. |
| III | Bed ridden |
| IV | Total paraplegia |

Five patients needed myelography and CT. Myelography was done in cases where the paraplegia was of long duration. Bone scan (Tc99) was done in 16 patients and was found positive in all. Chemotherapy was started empirically after clinical evaluation, finding an increased ESR, radiological evidence of caries spine and a positive result on Mantoux's test/Bone Scan. A four-drug regimen was used according to the body weight of the patient. Streptomycin was used in children instead of ethambutol. Base line liver function tests were done in all cases and they were repeated during follow up. All material removed at the time of surgery was subjected to Histopathological analysis. Patients were operated according to the following indications.

- Spinal Tuberculosis with neurological involvement.

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- Patients failing to respond to chemotherapy for two months of treatment.

Fit patients were operated using anterior debridement and fusion. Others were operated by doing a costotransversectomy. When the pus was released under pressure the decompression was considered to be adequate but a formal Capncrs procedure was done when the pus did not come out under pressure. All patients received the chemotherapy for nine months and the drugs were withdrawn only after there were signs of radiological healing and a decreased ESR was documented. External splintage was given where needed. All patients were followed up for the next two and a half years through the out patients department.

Results:

Of 20 patients selected initially only 20 patients fulfilled the criteria and were included in the study, most were young adults with male to female ratio 1.8:1 (Table 2).

Table 2. Age at presentation

| Age Group | No. of patients |
|-------------|-----------------|
| 0-10 years | 00 |
| 11-20 years | 01 |
| 21-30 years | 04 |
| 31-40 years | 04 |
| 41-50 years | 04 |
| 51 & above | 07 |

There was a predominance of female patients as a whole. Thirteen out of twenty 13(65%) were females with a male to female ration at 1:1.8. Backache was the predominant symptom with paraplegia in 19(95%), 8(40%) patients had urinary incontinence.

Table 3.

| Clinical features | No. of Pts. | %age |
|--------------------|-------------|------|
| Backache | 20 | 100 |
| Tenderness | 20 | 100 |
| Paraplegia | 19 | 95 |
| Pallor | 16 | 80 |
| Weight loss | 15 | 75 |
| Fever | 09 | 45 |
| Urine incontinence | 08 | 40 |
| Kyphosis | 07 | 35 |
| Stool incontinence | 02 | 10 |
| Psoas abscess | 01 | 05 |

Most (12) patients presented with less than one month history of paraplegia.

Table 4. Duration of paraplegia

| Duration of paraplegia | No. of patients |
|------------------------|-----------------|
| 0-1 month | 12 |
| 1-3 months | 05 |
| 3-6 months | 02 |
| 6 months & above | 01 |

Only one patient was found to have radiological evidence of pulmonary tuberculosis. Sixty five percent patients were found to be from poor socioeconomic class, 25% were from middle class and 10% were from upper

socioeconomic group. Half the patients showed 10-15mm diameter response to the Mantoux's test with mean diameter being 14mm. Sixteen patients underwent Tc99 bone scans and all were positive. Only five patients underwent myelography and all showed a block at the suspected level. CT scan was done in four patients, which showed the level, extent of bone destruction and pus surrounding the area of infection. In 9 patients were operated through the anterior approach and an anterior fusion was attempted. (Table 5).

Table 5. Recovery of neurological symptoms after surgery.

| Duration of paraplegia before surgery | Postoperative first sign of neurological recovery | Mean time for recovery of bladder control | Mean time for completion of motor recovery |
|---------------------------------------|---|---|--|
| 0-1 month | Within 1 st week | 10 days | 3 months |
| 1-3 months | 2 weeks | 1.5 months | 5 months |
| 3-6 months | 5 weeks | 9 weeks | 5-6 weeks |

One of these patients developed acute dilatation of stomach on the first postoperative day. He recovered well with conservative treatment. An open pneumothorax developed in one patient and later empyema thoracic (pseudomonas) that necessitated retention of a large bore chest tube and antibiotics.

Discussion:

Al though only twenty patients were included at the end point assessment but strict adherence to the recommended criteria for selection of the operative procedure was observed. Modified Hong - Kong procedure was used for 9 patients. Tricortical sturt graft was used in all along with a plaster of Paris jacket or a Thoracotomy was done in case the dorsal spine was affected, thoracoabdominal approach was used if the lumbodorsal junction area seemed involved and lumbosacral disease needed a retroperitoneal operative approach for exposure. Mehta & Bhojraj have shown complete neurological recovery in their patients did not regain normal tone of the muscles and remained spastic. Although the role of anterior surgery alone has recently been challenged by many due to the possibility of an increasing spinal deformity but the likelihood of remodeling at a later stage cannot be over ruled^{6,10}.

Costotransversectomy and anterolateral decompression was done in patients having disease limited to the dorsal spine, involvement of the posterior or posterolateral part of the body, soft tissue shadow of the abscesses seen in the plane radiograph, failure to respond to the conservative therapy, progressive neurological defect without imaging evidence. Our rationale for this limited surgery was to lower morbidity lower chest complications easily learnt surgical procedure and with the limitation for its more universal use being used in a mechanically stable spine. Mehta & Bhojraj have also obtained full neurological recovery of the patients in the group where just a drainage procedure was done. The long-term results of such limited approach have been well

documented in the literature in the past^{1,4,6,10}. The spinal deformity is not likely to progress further on long term basis as compared to the anterior fusion in these cases as well however a review at a later stage will be an interesting proposition⁶. We had a very low incidence of complications as shown earlier, probably reported incidence of acute dilatation of stomach in the recent literature 5–10% that is fairly close to the one experienced by us 1/8 patient. Only one patient developed pneumothorax and needed ventilatory assistance for three days. Our series shows a 1/8 incidence compared to 10% reported elsewhere. One patient in each group developed wound infection that was resolved with local measures like stitch removal and drainage.

Table 7. Comparison of anterior and posterior approaches.

| | Group A Ant. Decompression | N Group B Posterior approach |
|---------------------|----------------------------|------------------------------|
| Mean hospital stay | 23 days | 11 days |
| Rehabilitation time | 63 days | 39 days |
| Mean operating time | 3-4 hours | 1.5 hours |
| Mean blood loss | 1.5 litres | 500cc |

Butt RM et al have reported upon their series of cases when they treated 60 patients of caries spine; operating 55(91.5%) where they took biopsy, did a decompressive laminectomy, drained the tuberculous abscess excised the granulomatous material¹¹. On review at six months interval 40(66%) had no/mild neurological deficit and 20(34%) had significant deficit. They have used external splint without resorting to internal fixation of any form.

A close review of the data obtained at the end of the current series shows that the operative management hastens recovery of caries spine. The recovery is quicker, ambulation is achieved within three months, neurological recovery is earlier and recovery is progressive. Our results favor the limited posterior approach more because of lesser surgical skill requirements (Table 6). There is generally no need for supplemental use of an external orthosis. The procedure is well tolerated by most of the patients but cannot be recommended for all cases of caries spine. This has been well documented in the past by various authors as well^{1,2,4,5,6,10}. There is an established role for anterior decompression in cases where a less limited procedure is not likely to succeed and a more radical debridement is required. The extent of the vertebral bodies involved, neurological status of the patient, kyphotic deformity of the spine and age / growth potential of the patient determine whether the spine needs a more aggressive approach or not. There is a definitive place for the posterior sub laminar stabilization of the spine followed by anterior debridement and strut grafting where the deformity needs to be corrected more urgently but we feel such cases are likely to be very few and can only be treated at dedicated centers of spinal surgery^{6,11}. The anterior approach not only provides surface of the cord if required to remove the retro-pulsed bony fragments or granulations. Though attended by more

complications yet the ability to halt/correct a spinal deformity so common in caries spine is unique to anterior decompression and strut bone grafting i.e. Modified Hong Kong procedure. The graft used anteriorly is likely to succeed more if the posterior instruments tilt the biomechanical environment more in favor of the healing process^{6,10,11}.

Conclusion:

Ours is a very modest effort to analyze the fruits of surgical management of caries spine rampant in our population. The cohort is small but the follow-up is long enough to point out that surgical management has certain advantages over conservative management alone using chemotherapy. There is better neurological recovery, lesser morbidity, improved rehabilitation and the cost may be lesser if calculated in a larger series using scientific accounting practices. A certain amount of learning is required for the anterior decompression and strut grafting as compared to costotransversectomy. A better postoperative care is required in anterior decompression of the dorsal spine where the patient may even require mechanical ventilatory support temporarily. The surgical management of limited posterior approaches is less demanding and can be achieved with less difficulty at all secondary referral centers.

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