Theme Symposium

OPERATIVE TREATMENT OF TUBERCULOSIS OF DORSAL AND LUMBAR SPINE

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INTRODUCTION

SPINAL tubercular infection is the most common and dangerous form of skeletal tuberculosis . It constitutes 1/3 to 1/2 of all bone and joint tuberculosis. It is a result of hematogenous dissemination from primary focus in the lungs, lymph nodes, etc. [1]. Thoracic and lumbar spine are commonly affected area. 10-40% of patients with thoracic spine tuberculosis may get neurological deficit. Urgent measures are needed to halt progression of destruction and deformity and especially to prevent and overcome paraplegia. Proper selection of drug therapy and operative modalities, however, is needed to optimize functional outcome for each individual case of Pott's disease [2].

CHANGING CONCEPTS IN TREATMENT

Absolute nonoperative treatment was offered in pre antibiotic era. Dabsen (1951) reported 48% of paraplegia improved neurologically. Seddon, Griffith and Roaf (1955) reported 55% neurological recovery rate with the advent of modern chemotherapy [3]. However, the response to conservative treatment was slow and its efficiency was doubtful. 73% neural recovery has been reported in ambulatory chemotherapy in Korea and Rhodesia.

Another group of surgeons advocate surgical extirpation in all cases of tuberculous paraplegia with the advantage of good quality and speedy neural recovery. The improved drug penetration was achieved since surgical decompression removes fibrous barrier to drugs and the diagnosis is established beyond doubt. Hodgson (1960) advocated radical debridement and removal of whole vertebra/vertebrae [4].

Both methodologies of management were extreme. An absolute non-operative approach to Pott's paraplegia is considered unjustifiable because valuable time may be lost while irreparable may progress to complete loss of motor function (Tuli, 1969) [5]. At the same time, universal surgical extirpation also seems to be unnecessary in every patient.

In 1970s, middle path regime was followed by surgeons in India [6]. They considered a fair trial of conservative therapy for a few weeks (3-4 weeks) before advocating surgery. Surgical decompression was limited to the following situations:

1. Neurological complications which do not start showing signs of progressive recovery to a satisfactory level after a fair trial of conservative therapy.
2. Patients with spinal caries in whom neurological complications develop during the conservative treatment.
3. Patients with neurological complications which become worse while they are undergoing therapy with antituberculous drugs and bed rest.
4. Patients who have a recurrence of neurological complications.
5. Patients with prevertebral cervical abscesses, neurological signs and difficulty in deglutition and respiration.
6. Advanced cases of neurological involvement such as marked sensory and sphincter disturbances, flaccid paralysis or severe flexor spasms.

However, over last decade great advances were made in terms of operative options available such as minimally invasive spine surgery, stabilization of spine, ability to use metallic implants in the presence of active tuberculosis infection. Also, safer anaesthesia and better ICU care is now available. 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.

DIAGNOSIS

Standard protocols exist for diagnosing caries spine. Yet it may be difficult to make definitive diagnosis on clinico-radiological grounds alone, unless lesion is typically paradiscal and / or is associated abscess formation. A definite diagnosis is given only by

histological examination of the affected tissue [7].

MRI has turned out to be a boon in making a diagnosis, picking up skip lesions, understanding the details of bony and soft tissue involvement, extent of extradural compression, presence or absence of meningeal involvement, cord changes etc. [1]. On the other hand, MRI picks up changes much earlier than roentgenographic changes and sometimes earlier than typical changes of paradiscal involvement, destruction and abscess formation have developed. In such circumstances, it is mandatory to do a biopsy before starting ATT. CT guided biopsy is extremely helpful. CT guided biopsy is relatively simple if there is large destruction with collection of pus, granulation tissue or caseous material. But all practicing spine surgeons know, that for obvious reasons, radiologists are reluctant to do transpedicular CT guided biopsy if there is only bony involvement as it can be difficult and at times hazardous.

Thus, there are circumstances, thankfully, unusually so, when clinico-radiologically and with all available blood tests, it is not possible to confirm the diagnosis of caries spine and CT guided biopsy may not be practical. In these circumstances, Thoroacscopic / Laproscopic biopsy may be done in thoracic and lumbar spine respectively. This can be done with least morbidity and patient can be discharged in 48 hours.

DEBRIDEMENT / DECOMPRESSION

It is well known that large majority of patients with caries spine can be managed conservatively with ATT and bracing.

Pendulum of operative treatment has swung from one extreme to another with advocates of surgery in all cases to no surgery at all.

In 1970's and 80's middle path regime caught the imagination of surgeons in India [6]. However, in this day and age, it would be difficult to justify non-operative treatment in the presence of significant neurological deficit with demonstrable extradural compression.

Admittedly some patients may show reversal of neurological deficit on non-operative treatment but delay in the rest of the cases cannot be justified. Argument that patient's with long standing neurological deficit have also shown recovery after decompression is also not sufficient to deliberately delay decompression in demonstrable extradural compression associated with severe neurological deficit [8].

It has also been mentioned that one can distinguish on MRI whether compression is due to pus in which case surgery can be delayed or is it due to thick caseous material and sequestrae in which case one should go ahead with early decompression. However, experience has shown that most of time, per-operatively one encounters more destruction of vertebrae and necrotic material than what was appreciated on MRI etc. It would therefore be prudent to go ahead and decompress sooner than later in caries spine with significant neurological deficit [9].

Next comes the question of Anterior Decompression vs Anterolateral Decompression. Supporters of anterolateral decompression would suggest that as good exposure and decompression is possible by this approach as by anterior transthoracic approach. However, there is no doubt that anterior approach is more direct, wide decompression and removal of all necrotic material is possible. Large graft can be placed in compression (*Figs*.1-3). If required, cage and anterior instrumentation can be done, which will not be possible by anterolateral approach.

With the availability of modern age anaesthesia, ICU care, anterior approach is now much less formidable than couple of decades ago.

Endoscopic Anterior Decompression (Thoracoscopic / Laproscopic-Retroperitoneal) have added another exciting dimension to approaching the spine anteriorly. Thorough debridement, decompression and even instrumentation is possible endoscopically with much less morbidity and early rehabilitation can be done (*Fig*. 4).

STABILIZATION FOR TUBERCULOSIS OF DORSAL AND LUMBAR SPINE

Another problem which was not addressed properly in 1970's and 80's was the question of severe pain associated with instability associated with large destruction. There is extensive support in the literature that stabilization with various types of metallic implants including cages, pedicle screws and plates etc can be done in the presence of active tuberculosis following debridement. Anterior as well as posterior instrumentation is possible depending on the situation (*Figs*. 5-7) [10].

In growing children, caries spine can lead to severe deformity in next few years [11]. It is therefore necessary to recognize those cases which have potential to advance to increasing deformity and treat them surgically with anterior and posterior fusion [12-13]. Such situations can be recognized by instability seen on roentgenogram i.e., spine at risk signs.

INDICATIONS FOR SURGERY

Over the time, indications for surgery in tuberculosis of dorsal and lumbar spine have been extended.

We recommend surgery in following circumstances when dealing with tuberculosis of dorsal and lumbar spine:

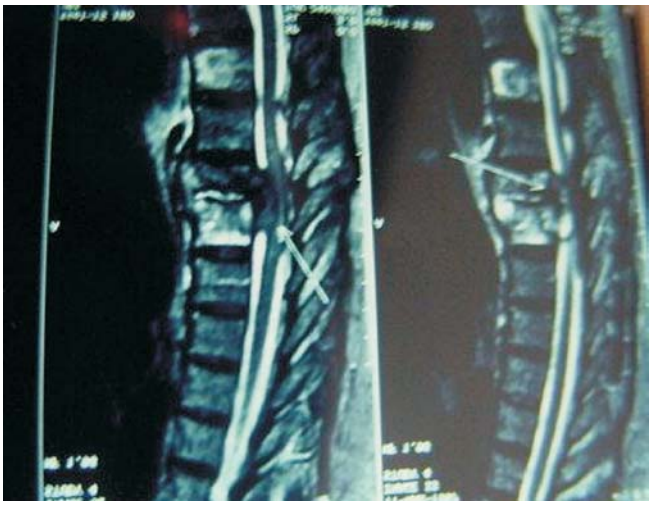


Fig. 1. Tuberculosis dorsal spine.

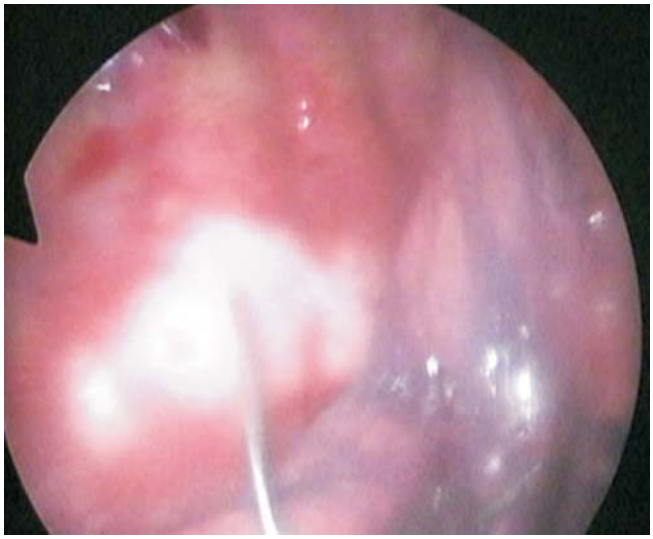


Fig. 4. Thoracoscopic drainage of tubercular abcess.

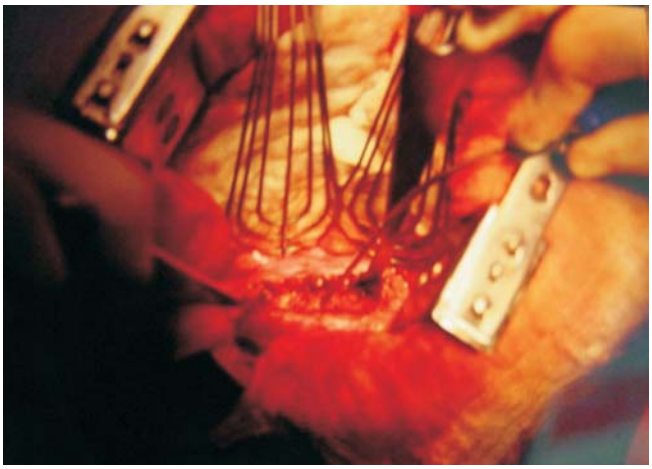


Fig. 2. Anterior decompression + bone grafting.

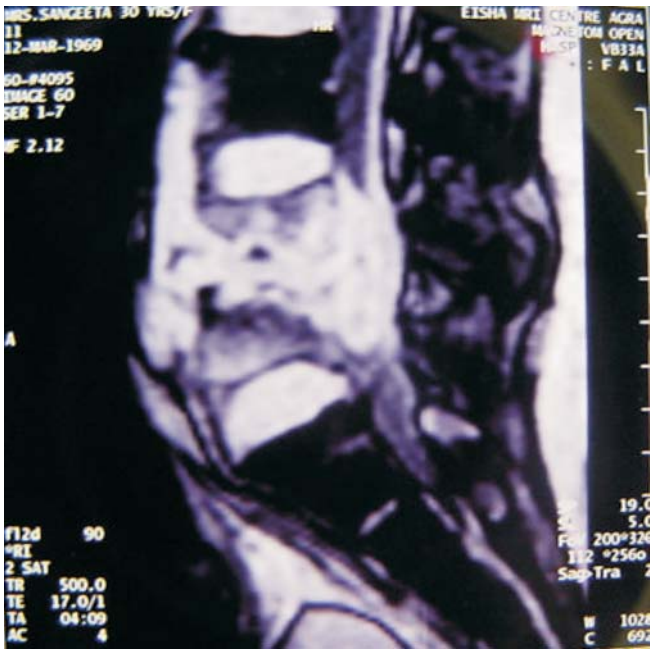


Fig. 5. Caries lumbar spine.

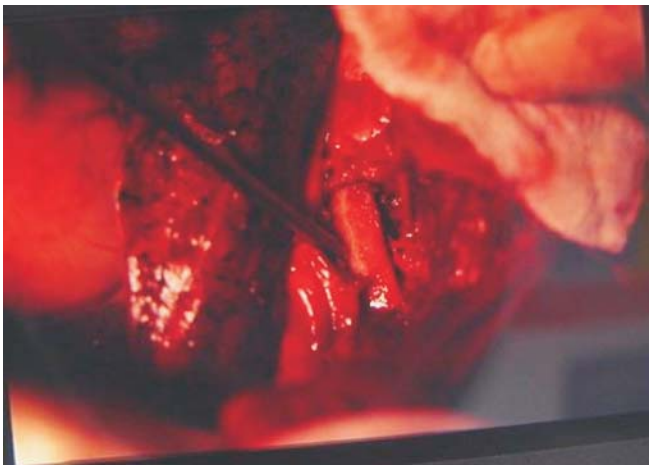
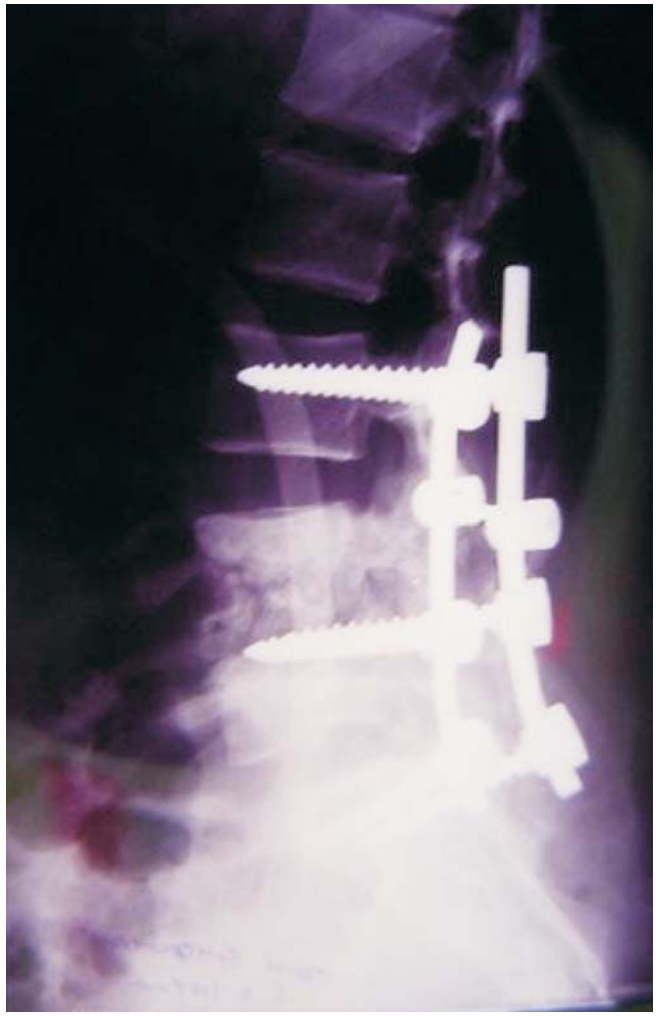


Fig. 3. Anterior decompression + bone grafting.

1. Caries spine without neurological deficit
   - Large abscess.
   - Large destruction not responding to ATT - Pain ++.
   - Spine at risk in children.
2. Caries spine with neurological deficit
   - All indications recommended in middle path regime
   - Significant neurological deficit with demonstrable significant extradural compression.



Figs. 6 & 7. Anterior decompression + bone grafting and posterior instrumented stabilization.

DISCUSSION

With the clinical awareness of the condition and its complications and with the advent of modern imaging techniques, one can diagnose tuberculosis spine easily in the predestructive stage. Early effective treatment can avert or minimize the potentially devastating effects of Pott's paraplegia.

MRI has been found to be extremely useful in diagnosing the difficult and rare sites of disease. It detects the marrow changes, extra and intradural disease and the radiological response to treatment [1,14].

The use of ATT has improved the results of conservative treatment and has allowed the radical operation to be undertaken in safety. Operative treatment allows to assert the diagnosis, to treat a compression, to evacuate pus, to treat or at least avoid worsening of a deformation and to reduce treatment duration [15].

In selected cases, early operative treatment with instrumentation, when indicated, minimizes neurological deterioration and spinal deformity. It allows early ambulation [9]. Surgery can even result in reversal of long standing paraplegia [16].

Results of single stage decompression, anterior interbody fusion and posterior instrumentation for tuberculous kyphosis of DL spine are encouraging. It is a very demanding surgery and should be performed after taking into account the risks and benefits involved. This surgery perhaps prevents progression of neurological deficit and recurrence of late onset paraplegia [17,18].

Progressive kyphotic deformity, in spite of conservative treatment, is considered as unstable. Anterior as well as posterior fusion with instrumentation is necessary in such unstable spines [19]. Anterior instrumentation should be restricted to cases with sufficient bone stock [20].

CONCLUSION

There is no denying the fact that conservative treatment will continue to be successful in majority of cases but when indicated, especially in patients with neurological deficit, good decompression and fusion should be done promptly.

One must remember that neurological deficit due to tuberculosis of spine is reversible in majority of cases especially if decompression is done promptly. Good fusion and stabilization can prevent pain and late deformity.

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