CHAPTER VIII
SUMMARY & CONCLUSION
SUMMARY AND CONCLUSIONS

The present study was conducted on 50 patients in the Department of Orthopaedics, Paraplegia, Physical medicine and Rehabilitation, Pt. B.D. Sharma PGIMS, Rohtak. Study evaluated the patho-physiologic behavior, clinico-radiological imaging features and response to anti- tubercular treatment in these patients suffering from spinal tuberculosis.

Our time course study of clinico-radiologic profile of involvement and healing in TB of spine highlights the following findings:

1. Tuberculosis was found in 40% of the cases in the age group of 21-40 years.
2. Mean duration of symptoms was 8.3 months (range: 1-36 months) before the final diagnosis of spinal TB.
3. Majority of the patients were seen and treated by the health practitioners with non-steroidal anti-inflammatory drugs with a presumptive diagnosis of other mechanical problems of the back.
4. Backache was the commonest presenting symptom (100%). Constitutional symptoms (48%) and neurological deficits 22% were the other associated symptoms.
5. Deformity of the vertebral column was present in 50% cases at the visit.
6. ESR was raised in all the patients. In our study, it normalized at around 12 months and its decreasing trends correlated well with clinical improvement and signs of healing on MR scans.
7. Concurrent pulmonary TB was observed in 32% of the patients
8. Paradiscal involvement (94%) of the vertebral body was most common type of tubercular spondylitis.
9. There was increase in bone destruction and soft-tissue involvement during first six months of the chemotherapy in few of the cases both on plain radiography and MR examinations, though the patients showed clinical improvement.
10. Earliest sign of healing on plain radiography was decrease in fuzziness of end plate ultimately leading to either sclerosis of end plate or fusion of adjacent vertebrae. It took almost 3 month to 12 months for these signs to appear.

11. Tubercular deformity of the spine was more in dorsal spine and least in the lumbar spine.

12. Kyphotic angle achieved in thoracic spine at 6 months was not maintained at 24 months follow-up in the present series. Increase in kyphotic angle was statistically significant between initial and 6 month (p value 0.0037); and 6 and 24 months (p value 0.0001). In the lumbar spine only eight patients (40%) showed increase in kyphotic angle. This increase in kyphotic angle was not statistically significant between initial and 6 months and 24 months.

13. We could not find a correlation between initial VBL and final kyphotic angle (r=0.302; p >0.05).

14. Seventeen patients (89.4%) of thoracic and thoracolumbar junction area showed increase in deformity angle. The increase was extremely significant between initial and 6 months (p value 0.0006); 6 and 24 months (p value 0.0009). In the lumbar spine eleven patients (55%) showed increase in deformity angle. Increase in deformity angle was significant only between initial and 6 months.

15. The average lumbosacral joint angles observed were 12.3, 12.1, 10.8 and 10.8 degree at initial, 6, 12, and 24 months, respectively. It did not show any change after 12 months.

16. Early diagnosis of the spinal TB by MRI (cases number 8, 44 and 46) led to early start of chemotherapy, which resulted in least bone destruction and no neurological deficit.

17. Earliest feature of healing on MR examination was decrease in inflammatory soft-tissue masses and reduction in vertebral body marrow edema. Signal intensity changes on T1W-images on MRI scans paralleled the clinical improvement, although hypo intense signals of T1W images persisted for longer periods.
18. Contiguous involvement of 2 or more vertebrae was common (96%). Associated posterior element involvement was seen in 30% of the cases.

19. Extradural component (caseous/granulation tissue) (66%) was most common intracanalicular finding on MRI scans.

20. Chronic persistent compression led to cord signal intensity change or spinal cord changes in cases number 19, 20, 29 and 36.

21. Meningeal, nerve root, and intradural & intramedullary changes were least appreciated in the present study as contrast enhanced MRI scans were not done in all the cases.

22. Ninety-two percent cases had combination of marrow edema and paravertebral collections. Eighty-eight percent cases had a combination of marrow edema and subligamentous spread of disease. Eighty-two percent cases had combination of marrow edema, paravertebral collections and end plate erosion. Eighty percent cases had combination of marrow edema, paravertebral collections, end plate erosion and subligamentous spread. Fifty-two percent cases had a combination of subligamentous spread and epidural abscess. Sixty-six percent cases had a combination of subligamentous spread and extradural component (caseous/granulation tissue) suggestive of spread anterior and posterior to vertebral body. Sixty-four percent cases had combination of marrow edema, paravertebral collections, subligamentous spread, extradural component, end plate erosion and discitis.

23. Short-course chemotherapy (6 months) was not effective in completely curing the spine TB as evidenced by the clinical, laboratory, plain radiography, and MRI parameters evaluated in the present study in majority.

From the observations of the present study, we conclude that:

1. Tuberculosis is a disease of comparatively young and productive population. The large spread of symptom duration before diagnosis reflects the variable and chronic nature of this disease, and this may be a function of delay in self presentation.
2. Backache is the commonest presenting symptom. Presence of deformity of the vertebral column at presentation signifies delay in seeking treatment and chronicity of the disease.

3. ESR is of a prognostic value in monitoring the response to the treatment. Its decreasing trends correlates well with clinical improvement and signs of healing.

4. Paradiscal involvement of the vertebral body is most common type of tubercular spondylitis. Earliest sign of healing on plain radiography is decrease in fuzziness of end plate ultimately leading to either sclerosis of end plate or fusion of adjacent vertebrae. It may take almost 3 month to 12 months for these signs to appear.

5. Tubercular deformity of the spine is more in dorsal spine and least in the lumbar spine. It may be due to biomechanical regions as size of vertebral body is smaller, facet joints are more horizontally oriented, and there is normal kyphosis in the dorsal spine. Moreover, with healing of TB in the lumbar and lumbosacral spine normal lordosis might be regained. Kyphotic angle and deformity angle keeps on increasing even after 6 months of ATT, while lumbosacral joint angle shows a decreasing trend.

6. MRI is the radiological investigation of choice to diagnose the disease early, to see the response to the chemotherapy, and to decide the need for the surgery and approach to be used. Early the disease diagnosed by MRI, earlier the chemotherapy started, least is the chances of extensive bone destruction and neurological deficit. Earliest feature of healing on MR examination is decrease in inflammatory soft-tissue masses and reduction in vertebral body marrow edema. Signal intensity changes on T1W images on MRI scans parallels the clinical improvement, although hypo intense signals of T1W images might persist for longer periods. There may be increase in bone destruction and soft-tissue involvement during first six months of the chemotherapy both on plain radiography and MR examinations, though the patient may show clinical improvement.
7. Contiguous involvement of 2 or more vertebrae is common. Associated posterior element involvement is not uncommon. This might aggravate deformity of the vertebral column and also leads to spinal instability.

8. Extradural component (caseous/granulation tissue) may not lead to neurological deficit in all the cases. It may resolve with institution of chemotherapy and itself is not an indication for surgery. Chronic persistent compression can lead to cord signal intensity change or spinal cord changes. These changes although have a bad prognostic value for neurological recovery, but not all the patients with these changes have neurological deficit. Meningeal, nerve root, and intradural & intramedullary changes are well appreciated on contrast enhanced MRI.

9. Various classical features of the tuberculosis of the spine (e.g. marrow edema, paravertebral collections, subligamentous spread, extradural component, end plate erosion and discitis) in combination on MRI can be used with confidence to diagnose it. Response to chemotherapy can be assessed by observing the changes (increase/ decrease) in these features. Small paravertebral and epidural abscesses may be present at 12 month MR scans and may persist even up to 24 months.

10. Short-course chemotherapy (6 months) may not effective in completely curing the spine TB as evidenced by the clinical, laboratory, plain radiography, and MRI parameters evaluated in the present study. Patients may require an extended course of ATT. A chemotherapy protocol of 12 month seems to be most appropriate in curing spinal TB. In a patient who has a favorable outcome as depicted by clinical improvement and normalization of the markers of the inflammation; persistence of small amount of MRI abnormalities even after 12 months are inconsequential.

From the observations of our study, we propose protocols for MR spine examination for diagnosis, during the course of, and after antitubercular therapy as: A protocol of MR examination at presentation, 6, 12, and 24 months should be followed in the diagnosis, management and follow-up of spinal tuberculosis. MR examination at the initial visit in a suspected case of TB will help in early diagnosis and initiation of
chemotherapy; and hence preventing extensive bone damage and deformity usually seen in spinal TB cases presenting late. At 6 month it will help in identifying response to chemotherapy, early detection of non responders and multi-drug resistance cases. Both these MR examinations (initial and 6 months) can also define the indications for surgery and its type most appropriate for the individual patient. MR evaluation after completion of chemotherapy (usually 12 months) will further guide continuation of ATT, spinal instability, condition of the cord, and rehabilitation of the patient. At 24 months, MRI will rule out the possibility of recurrence and will also tell the latest status of spinal cord.