Surgical Outcome of Anterior Decompression, Grafting and Fixation in Caries of Dorsolumbar Spine

Ijaz Hussain Wadd, Ainullah Khan, Abdullah Haroon and Anjum Habib Vohra

ABSTRACT
Objective: To evaluate the surgical outcome of anterior decompression, grafting and fixation in tuberculosis of the dorsal and lumbar spine with compression over the neural tissue and neural deficit.

Study Design: A case series.

Place and Duration of Study: Department of Neurosurgery Unit-I, Lahore General Hospital, Lahore, from January 2008 to March 2012.

Methodology: Patients with caries spine having compression over the thecal sac with neurological deficit and kyphosis were included in the study. Patients below 17 years and above 56 years of age; those with bed sores and unfit for anesthesia were excluded from the study. Complete blood picture with ESR, X-rays of chest and of the relevant spinal level, and MRI were done. All patients were treated with corpectomy, debridement, drainage of abscess and grafting followed by fixation with poly-axial screws and rods. All patients were assessed by ASIA Impairment Scale before and after surgery and with Bridwell grading after surgery.

Results: Among 79 patients, 47 were males and 32 females. The mean age was 35.97 ± 8.8 years. The commonest level involved was the dorsolumbar junction (n=42, 53.16%). Lower limb power improved to ambulatory level in 60% of patients with complete paraplegia; recovery was excellent in patients with partial weakness; only 2 patients (2.53%) deteriorated to a lower grade. There was no postoperative mortality. One patient had long ICU stay due to lung injury.

Conclusion: Corpectomy followed by grafting and fixation is safe and effective procedure for dorsolumbar spinal caries. Even those patients presenting with complete paraplegia showed improvement in motor power to ambulatory level and those who had partial deficit showed excellent improvement.

Key Words: Caries spine, Anterior spinal decompression, ASIA Impairment Scale, Bridwell grading, Motor deficit.
affected vertebrae and the lack of sphincter control all correlate with the chance of recovery from paraplegia.8

The objective of this study was to evaluate the surgical outcome of anterior decompression, grafting and fixation in tuberculosis of the dorsal and lumbar spine with compression over the neural tissue and neural deficit.

**METHODOLOGY**

This study was carried out in the Department of Neurosurgery Unit I, Lahore General Hospital, Lahore, from January 2008 to March 2012. Patients of either gender who had caries spine with compression over spinal cord and causing neurologic deficit (ASIA Table C) and/or kyphosis were included. Seven patients who were not fit for anaesthesia and those who had bed sores and patients below 17 years and above 56 years of age were excluded. This study was approved by the ethical committee of the hospital and informed consent was taken from all of the patients included in this study. The clinical condition of patients were graded according to the Impairment Scale defined by American Spinal Injury Association (ASIA), ranging from A through E for spinal cord injuries as shown in (Table I). Backache, limbs weakness and spinal deformity were present in all patients. CBC (complete blood count) with ESR, C-reactive protein, X-ray spine of the involved level and of chest and MRI of the spine (plain and contrast) were done and level and extent of pathology was identified. MRI findings were assessed carefully for involvement of end plates and vertebral body and compression over the neural tissues.

**Table I: ASIA Impairment grading for neurological assessment of spinal injury.**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Complete (no sensory or motor function).</td>
</tr>
<tr>
<td>B</td>
<td>Incomplete (sensory function present, but no motor function below the neurological level).</td>
</tr>
<tr>
<td>C</td>
<td>Incomplete (motor function intact but useless, below the neurological level, and have a muscle power grade of &lt; 3) with intact sensation.</td>
</tr>
<tr>
<td>D</td>
<td>Incomplete (motor function intact and useful, below the neurological level, and have a muscle power grade of 3).</td>
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<tr>
<td>E</td>
<td>Normal.</td>
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**Table II: Anterior fusion grades.**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>Grade I</td>
<td>Fused with remodelling and trabeculae.</td>
</tr>
<tr>
<td>Grade II</td>
<td>Graft intact, not fully remodelled or incorporated, though no lucencies.</td>
</tr>
<tr>
<td>Grade III</td>
<td>Graft intact but definite lucency at the top or bottom of the graft.</td>
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<tr>
<td>Grade IV</td>
<td>Definitely not fused with resorption of the graft and with collapse.</td>
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**Table III: Comparison of ASIA impairment scale before and after surgery.**

<table>
<thead>
<tr>
<th></th>
<th>Pre-surgery score</th>
<th>Postsurgery score</th>
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<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>D</td>
<td>26</td>
<td>13</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>57</td>
</tr>
</tbody>
</table>

Wilcoxon signed rank test; p < 0.001

Postoperative improvement in clinical condition was also assessed according to ASIA Impairment Scale. Radiological analysis was done according to percentage of deformity correction by measuring Cobb's angle, and the evidence of fusion was assessed according to Bridwell Criteria shown in (Table II).

In all patients corpectomy, debridement of necrotic and granulation tissue and drainage of pus were done through retroperitoneal approach for lumbar and by lateral thoracotomy (intrapleural) for dorsal and dorsolumbar junction followed by iliac crest grafting in all patients and fixation with poly-axial screws and rods. Postoperative check X-rays were done on second postoperative day, and CT scan of the relevant spine with 3D reconstruction was done on the tenth day when patients were relatively pain free.

Follow-up was done at 3 and 6 months after surgery and then at the end of first and second years of surgery. All patients underwent scheduled physiotherapy including postural turning every 2 - 4 hours, skin care, bowel and bladder care both pre-operatively and postoperatively. Bedding were changed frequently particularly for those patients suffering from urinary incontinence. Postoperative ATT was continued along with good analgesia.

The data about the age, gender, disease level, presenting complaints, MRI findings and surgical outcome was entered into a proforma for collection and analysis. Data was analyzed using SPSS version 20. Mean value ± S.D. was determined for quantitative data like age and frequencies (%) was determined for qualitative data like gender. Wilcoxon signed ranks test was applied to compare scores before and after surgery; p-value ≤ 0.05 was considered as significant.

**RESULTS**

During the study period all 79 patients underwent anterior decompression with iliac crest grafting and fixation with polyaxial screws and rods. Among them, 47 (59.49%) were males and 32 (40.50%) were females. Male to female ratio was 1.5:1. Mean age at presentation was 35.97 ± 8.88 years with minimum and maximum ages being 17 and 56 years respectively. The commonest age group was 31 - 37 years of age.

Backache, limbs weakness and spinal deformity were present in all patients (n=79, 100%). The duration of symptoms ranged from 3 weeks to 3 months. On radiological basis (plain X-ray and MRI), the commonest level of involvement was at the dorsolumbar junction (n=42, 53.16%) followed by upper dorsal spine (n=14, 17.72 %). Lumbar L2 - 3 (n=21, 26.58%) and lumbar L4 (n=2, 2.53%). Pre-operatively 5 patients were in grade A, 9 patients in grade B, 34 patients in grade C, 26 in grade D and 5 patients in grade E.
Average hospital stay was 11.4 days after surgery. Overall hospital stay was 10 - 15 days. Postoperatively one patient remained in grade A, 2 patients were in grade B, 6 patients in grade C, 13 patients in grade D and 57 patients in grade E. The maximum number of postoperative patients were in grade E having normal functional capacity with no disability, and 13 patients in grade D with negligible disability. Two patients deteriorated to lower grades (one from grade D to B and one from grade E to B). One patient remained static in grade A. Rest of the patients improved to higher grades. The outcome is summarized in Table III. A Wilcoxon signed ranked test gave significant improvement (p-value < 0.001) in ASIA Impairment Scale when compared with pre-treatment ASIA Impairment Scale.

There was no postoperative mortality. On the second postoperative day check X-rays were done in all cases. On the 10th postoperative day, when patients were relatively pain free, CT-scan with 3D reconstruction was done. In one patient there was postoperative CSF leak which resolved spontaneously. In another patient, there was haemothorax for which chest tube was changed and haematoma was drained. All patients had pain at the graft donor site and no other complication at donor site. There were grade I and grade II bony fusion in 100% of patients according to Bridwell criteria (Table II) after 1 year of surgery. Average improvement in kyphotic angle was 30°.

DISCUSSION

This study evaluated the outcome of anterior decompression, grafting and fixation with polyaxial screws and rods according to the ASIA Impairment Scale,9,10 and fusion of graft according to Bridwell grading.11,20 Pott's disease is usually secondary to an extra spinal source of infection. Kumar reported it to be the result of haematogenous dissemination from primary focus in the lungs, lymph nodes, etc.12 In adults, disk disease is secondary to the spread of infection from the vertebral body. Benzgamout et al. reported that Pott's disease occurs primarily in adults. In countries with higher rates of Pott's disease, involvement in young adults and older children predominates.13 Older age can affect the surgical outcome to some extent in terms of good healing.

Duration of symptoms range from 3 weeks to 3 months. Majority of patient came for medical help within 3 months of symptoms. Pola et al. reported average duration of symptoms at diagnosis is 4 months.3 Most common presenting symptoms in this study were lower limb weakness (ASIA), deformity (cobbles angle), pain, and palpable mass (gibbus). Turgut reported that the presenting symptoms were leg weakness (69%), gibbus (46%), pain (21%), and palpable mass (10%).14 Most common associated factors were low socioeconomic status, immunocompromised status and exposure to patients with pulmonary tuberculosis.

Most common level of involvement of caries spine in this study is dorsolumbar junction. Turgut reported that tuberculosis affecting the spine was commonly localized in the thoracic region and involved the vertebral body.5 Caries spine can be treated conservatively as well surgically. In 1970s, middle path regime was followed by the surgeons in India.15 They considered a fair trial of conservative therapy for a few weeks (3 - 4 weeks) before advocating surgery. 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.16 Surgical options include an anterior approach, a posterior approach, or a combined anterior and posterior approach all followed by Anti Tuberculous Treatment (ATT). The anterior approaches are best used at the dorsolumbar junction; posterior approaches are ideal for lower lumbar and lumbosacral areas that result in complete spinal cord injuries, while the combined anteroposterior surgeries are typically reserved for the highly unstable spine. Anterior debridement and fusion through anterior approach has been the most common standard surgical treatment of spinal tuberculosis. Prolonged external immobilization or more recently posterior fusion and instrumentation via posterior approach are also proposed.17

Recently, a variety of new approaches were introduced to facilitate and simplify the surgery. Posterior lumbar interbody fusion and posterior instrumentation is one of these approaches described by Lee for the lumbar tuberculosis spondylitis.18 In the past, most surgeons had some concerns about anterior instrumentation in the presence of tuberculosis infection partly because of introducing foreign material into infected tissue. In one of the first reports related to applying anterior instrumentation in the patients with tuberculous spondylitis in 1999, Yilmaz et al. observed no recurrence of the disease.19 Average correction of the deformity which they reported was 64% and 81% in the cases with one or two levels of involvement and the patients with more than two levels, respectively. They propose that anterior is more effective than posterior instrumentation for reducing the deformity and stabilizing the vertebral column in patients who have kyphosis due to spinal tuberculosis. In 2003, Benli20 reported their surgical results of 63 patients with Pott's disease who underwent anterior radical debridement, fusion and instrumentation. The mean age of the patients in this study was 46.8 years. They observed that the addition of anterior instrumentation increased correction rate of the deformity and maintaining it. Out of 25 patients with neurologic deficit, 20 had full and 4 had partial recoveries. They reported very few intra and post-
operative complications. They employed an aggressive neo-adjuvant chemotherapy prior to surgery (except in urgent cases with recently developed or progressive neurologic deficit) and reported no disease reactivation at all. Finally, they concluded that anterior instrumentation is a safe and effective method in the treatment of tuberculous spondylitis. Similarly, Jin reported the surgical results of one stage anterior inter-body auto-grafting and instrumentation in thoracolumbar spinal tuberculosis in 23 cases with spinal tuberculosis; while 14 out of 15 patients with neurological deficit showed obvious improvement. A mean of 18° kyphosis correction was achieved after surgery but a moderate progressive kyphosis occurred after 2½ years in a 9-year child. Ultimately, they recommended one-stage anterior inter-body auto-grafting and instrumentation in the surgical management of spinal tuberculosis in selected cases and suggested supplementary posterior fusion in children. We did in all our patients corpectomy, debridement of necrotic and granulation tissue and drainage of abscess followed by iliac crest grafting and fixation with polyaxial screws and rods in a single sitting.

Postoperatively, one patient had CSF leak that resolved spontaneously, and one patient had haemothorax that was treated with re-adjustment of chest tube and all patients had pain in intercostal area and graft donor site that was treated with analgesics.

CONCLUSION

According to the results of this study, anterior decompression, debridement, grafting and fixation is an effective and safe procedure in patients with dorsolumbar caries spine. Patients who have complete motor weakness achieve some improvement in power but those who have partial motor deficit achieve excellent improvement in power and in the degree of kyphosis.

REFERENCES