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# ROLE OF ANTERIOR DECOMPRESSION WITH INTERNAL FIXATION IN DORSAL SPINE TUBERCULOSIS

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## ABSTRACT:

**Objective:** To assess efficacy of anterior decompression and internal fixation using mesh cage and rod with screws in patients with dorsal spine tuberculosis. **Material and methods:** This observational study was conducted in the Department of Neurosurgery Lady Reading Hospital Peshawar from July 2010 to June 2012 (2 years). There were 38 patients with dorsal spine tuberculosis who underwent anterior decompression and fusion using anterior spinal instrumentation and allograft replacement. We included those patients in our study, who undergone anterior decompression with internal fixation for dorsal spine tuberculosis, of both genders irrespective of their age. We excluded those patients who were unfit for surgery, treated conservatively, involved spine other than dorsal spine or undergone procedure other than anterior approach for Carri's spine. Clinical outcome of the patients was assessed using the frankle grade. The patients were observed for post-operative complications, neurological improvement and bony fusion. **Results:** We had total of 38 patients who undergone the procedure in whom 23 (60.5%) were males and 15 (39.5%) females with male / female ratio of 1.5: 1. Their age ranged from 4-70 years (mean 37 years). The most common level involved were between D5-D12 for which thoracotomy was needed. Preoperative neurodeficit was observed in 76.3% patients of whom 89.7% showed improvement after surgery. Our patients had 7.9% complications after surgery. We had wound infection in 5.3% and dyspnea in 2.6% cases. There were no graft related complications and bony fusion was observed in all the patients. **Conclusion:** It is concluded from our study that anterior decompression with internal fixation using cage and rod with screws is an effective procedure in dorsal spine tuberculosis. It has few complications and yields good results.

**Key words:** Anterior spinal decompression, Carri's spine, Mesh cage, Spondylo-discitis

## INTRODUCTION

Spinal tuberculosis is an important neurosurgical entity. Previously tuberculosis was considered to be a disease of under developed countries but now its incidence is increasing in developed nations, because of growing cases of HIV, tourism and people migration. It may spread to the spine from lungs and abdomen or it may manifest as primary disease<sup>1</sup>.

Sir Percival Pott presented the classic description of spinal tuberculosis in 1779 and hence the disease was named Pott's disease<sup>1-3</sup>. It commonly involves the dorsal spine (50%), followed by lumbar (40%) and cervical (10%) spines<sup>3,4</sup>.

The management of tuberculous spondylitis is not uniform everywhere<sup>5</sup>. Chemotherapy have pivotal role in the treatment of tuberculous spine. Indications for surgery in spinal tuberculosis are the presence of a large Para-spinal abscess, the presence of severe bone

destruction and Kyphotic deformity, neurological deficit with cord compression and lack of response to medical treatment<sup>6</sup>.

Tuberculous spine can be approached both from anterior and posterior sides. Anterior approach is considered the gold standard for debridement and decompression in Pott's spine, which was popularized by Hodgson in 1960<sup>7-9</sup>. Anterior fusion with instrumentation appears to be more advantageous than posterior instrumentation, as both instrumentation and grafting are done as a single stage procedure through the same approach minimizing blood loss, operative time and graft slipping out due to turning of the patient for posterior instrumentation. It also prevents fusing an unnecessarily large number of spinal levels.<sup>10,11</sup>

Meticulous debridement to remove all infected tissue is the aim of the surgical management of spinal infections<sup>12,13</sup>. The anterior column defect is then reconstructed with bone graft (tricortical iliac crest, ribs,

fibula)<sup>12,14</sup>. Titanium cages can also be used to reconstruct these defects<sup>12</sup>. The use of titanium mesh cage was started in 1993 for the reconstruction of the anterior column in patients with tuberculous spinal infections.<sup>12,15,16</sup>

Anterior debridement and fusion (bone grafting) with instrumentation is one of the different surgical treatments of tuberculous spondylitis.<sup>6,17</sup> Although the use of instrumentation has no relation with the improvement in the neurological status, however anterior fusion with instrumentation can properly correct and stabilize the spine, minimize graft-related complications and the patient can be rehabilitated earlier and quicker<sup>5,6</sup>. In comparison anterior decompression and fusion (using bone graft) without instrumentation provides only 41% of the stability to the spine and correction of kyphosis is less<sup>6</sup>.

The aim of this study is to evaluate the results of anterior decompression with internal fixation using mesh cage and rod with screws in patients with dorsal spine tuberculosis.

## MATERIAL AND METHODS

This Observational study was conducted in the Department of Neurosurgery Lady Reading Hospital Peshawar from July 2010 to June 2012 (2 years). we operated on 38 patients and included those patients in our study, who undergone anterior decompression with internal fixation for dorsal spine tuberculosis, of both genders irrespective of their age. We excluded those patients who were unfit for surgery, treated conservatively, involved spine other than dorsal spine or undergone procedure other than anterior approach for Carrie's spine. The preoperative diagnosis was made on the basis of clinical examination, plain radiograph and magnetic resonance imaging (MRI) supported by serological investigation (erythrocyte sedimentation rate, ESR) and in each case the histo-pathologic diagnosis of tuberculosis was confirmed after surgery. The indications of surgery in these patients was neurological deficient with cord compression, abscess / puss collection, and or unstable spine with Kyphotic deformity. All the patients were put on anti-tubercular drugs for 18 months after surgery and had regular follow up during treatment. After taking approval from the ethical committee, Consent was taken from the patients or their relatives. Clinical outcome of the patients was assessed using the frankle scale. The patients were observed for post-operative complications, neurological improvement and bony fusion. The bony fusion was assessed with the help of plain X-rays taken

every 3 monthly. The demographic and clinical data of the patients was entered in a specifically designed Performa. This data was analyzed using SPSS version 11.

## OPERATIVE PROCEDURE

### 1- Position and exposure:

Under general anesthesia, the patients is put in supine position and midline sternotomy is done with Gigli's saw to expose for T1 to T3 corpectomy. Then the dissection plain between trachea and esophagus medially and great vessels laterally is followed to reach to the target. For T4 to T12 vertebrae right or left thoracotomy is done. The patients are put in lateral decubitus position and then rolled 20 degrees posteriorly. The table is extended 20 degrees at the diseased level. Skin incision is started anteriorly extends along the rib two levels above the diseased vertebra and ends midway between medial border of scapula and spinous process. The skin, subcutaneous tissue, latissimus dorsi, and serratus anterior are cut in layers. The exposed rib is cut with rib cutter at the costochondral junction anteriorly and rib angle posteriorly. Retro pleural plain is followed to reach the anterior and lateral surface of the diseased vertebra. The level is confirmed by identifying the deformity, rib counting and per operative image.

### 2- Decompression:

Decompression is achieved by removing the diseased vertebra and intervertebral discs above and below along with posterior longitudinal ligament with the help of curettes and .drill.

**3-Stabilization:** In the trough made after decompression mesh cage filled with auto graft (rib) is placed and rod screw fixation is done at the vertebral body above and below.

**4-Closure:** Closure is done in reverse fashion after securing haemostasis and wash with 0.9% saline and povidone solution. Chest drain is put if the pleura is opened accidentally.

## RESULTS:

We had total of 38 patients who undergone anterior decompression with bone graft and fixation for tuberculosis of the dorsal spine.

s.no	Gende r	Frankle grade (pre-op)	Frankle grade (post- op)	Degree of improvement
1	F	A	A	0
2	F	A	B	1
3	M	B	D	2
4	F	C	E	2
5	F	D	E	1
6	M	C	E	2
7	M	E	E	=
8	M	E	E	=
9	F	D	E	1
10	M	B	D	2
11	M	B	D	2
12	F	E	E	=
13	M	C	D	1
14	F	A	A	0
15	M	B	D	2
16	M	E	E	=
17	F	E	E	=
18	M	B	D	2
19	F	C	D	1
20	M	D	E	1
21	F	A	D	3
22	M	E	E	=
23	M	C	D	1
24	F	D	E	1
25	F	A	E	4
26	M	C	E	2
27	M	C	D	1
28	M	B	D	2
29	M	A	C	2
30	M	E	E	=
31	M	C	E	2
32	F	A	C	2
33	M	B	C	1
34	M	A	C	2

**AGE DISTRIBUTION**

Age of the patients ranged from 4 years to 70 years with the mean age of 37 years.

**GENDER OF PATIENTS**

Out of 38 patients 23 (60.5%) were male and 15 (39.5%) female with male / female ratio of 1.5: 1.

**OUTCOME**

Out of 38 patients, 29 (76.3%) had preoperative neurodeficit. There were 9 patients with frankle grade A, 8 with frankle grade B, 8 with grade C and 4 patients with frankle grade D. There were 26 (89.7%) cases that had improvement in the neurology. The rest three patients who had no improvement were having preoperative frankle grade A neurodeficit. Nine patients who had no weakness remained neurologically intact

Table 1

**Complications:**

The list of post-op complications is given in table 2.

**Table 2**

Complications	No of patients	% age
wound Infection	02	5.3%
Dural tear	00	00
Dyspnea	01	2.6%
Neurodeficit	00	00
Implant complication	00	00
Graft complications	00	00
<b>Total morbidity</b>	<b>03</b>	<b>7.9%</b>

**BONY FUSION**

On follow up plain X-rays was observed in all patients.

**Images**

**Figures 1** to 3 showing preoperative (figure 1) and postoperative (figures 2 and 3) images

**Figures 1:**pre-opMRI of tuberculous dorsal spine



**Figure 2:** plain xray with mesh cage



**DISCUSSION:**

The skeletal system is involved in 1-2 % cases of tuberculosis of which 50% involve the vertebral bodies. Spinal tuberculosis is by definition, an advanced disease, requiring meticulous assessment and aggressive systemic therapy. The objective of treatment in spinal

**Figure 3:** post-op x-ray showing cage with rod screw fixation



tuberculosis is to cure the disease with normal neurology and almost near normal functional spine<sup>18</sup>. As most of the spinal cord compression is usually located anteriorly, anterior approach and decompression is the preferred route for neural decompression<sup>5,19</sup>. In our total of 38 patients, 23 (60.5%) were males and 15 (39.5%) females. Other studies have also reported that males are more commonly affected than females in spinal tuberculosis<sup>1,12</sup>. In a study of 162 cases, there were 89 males and 73 females<sup>20</sup>. However, according to some authors this disease is more common in females<sup>3,21</sup>. The reason that men were more common in our study is exactly unknown. The mean age of our patients was 37 years (range 4-70 years). Ali and colleagues studied 81 patients with spinal tuberculosis with mean age of 30 years (range 13-65 years). Other studies have reported average ages of 25<sup>3</sup> and 45 years<sup>12</sup>. This means that most of the patients with carries spine are either young or have middle age.

One of the indications for anterior decompression in tuberculous spine is progressive neurological deficit due to cord compression. In our study 76.3% (29/38) of the patients had preoperative neurodeficit. Gabriel and colleagues<sup>12</sup> studied seventy patients with vertebral osteomyelitis who underwent anterior debridement and reconstruction of the anterior column with titanium mesh cage. In their study neurological deficit was seen in 45.7% patients. The neurodeficit was more in our study; this could be because of late presentation and diagnosis of the patients.

Like other surgical procedures this approach also have some complications. We observed complications in 7.9% cases. The most common complication was

wound infection in 5.3% (2) cases followed by postoperative dyspnea in one (2.6%) patient. None of our patient had dural tear or deterioration in neurology.

In a study of 73 cases that were treated with surgical debridement and inter-body bone grafting and fixation, two (2.7%) patients developed sinus next to the incision and in 3 (4.1%) cases appeared subcutaneous emphysema. The overall morbidity was 6.8%<sup>20</sup>. In one study, in which both anterior and posterior approach was adapted, the incidence of infection was 3.9% and graft-related problems 6.5% with total complication rate of 10.4%.<sup>15</sup>

Only one (2.6%) of our patients had significant wound infection who needed wound lavage. However implant was not removed. The second patient with wound infection and the one with dyspnea due to partial lung collapse were treated conservatively. In Gabriel study<sup>12</sup>, one (1.4%) patient had deterioration of neurological status after surgery following a Brown-Sequard syndrome, however this recovered in 10 days. Their 4.3% patients with wound infection required wound lavage and debridement and 1.4% (one) patient with persistent discharging sinus needed implant removal. Accidental durotomy was none in our study as compared to 4.3%<sup>12</sup>.

In one study of patients with tuberculous paraplegia with anterior decompression, significant numbers of complications were observed. There were 9.1% (2/22) cases each with neurological deterioration and cerebrospinal fluid leak. Neurapraxia of the cord was seen in (4/22) 18.2% cases with overall morbidity of 36.6% (8/22)<sup>22</sup>.

So we had comparably low complications than other studies but the spectrum of complications was different in our patients. Shi and colleagues<sup>21</sup> studied 18 patients with spinal tuberculosis who were treated using anterior debridement, auto-graft of bone and primary internal instrumentation and none of their patients had postoperative complications. This means that the results vary in different studies regarding post-operative complications for anterior decompression and internal fixation in spinal tuberculosis.

The aim of treatment in spinal tuberculosis is to cure the disease by achieving stable spine (bony fusion) with improvement in neurological status. In our study we had bony fusion in all the patients and improvement in neurological status in 89.7% cases. Studies have reported neurological recovery and bony fusion in up to 93.7% patients each. Healing of infection was seen in all patients<sup>12</sup>. In another study of anterior decompression with bone grafting and fixation all the patients had bony



fusion within the average time 3.6 months 21. It means that our results are comparable to international studies regarding neurological improvement and bony fusion after treatment.

In our study we had no complications regarding the graft as slippage, resorption and failure. Talu et al<sup>23</sup> reported graft slippage in 3 and resorption in 2 of 127 patients. The reason for low graft complications in our study is that we used cage and / rods and screws in most of our patients. And these complications can easily be overcome with the use of cages, as they have teeth which 'bite' into the adjacent vertebra when compressed, facilitating a secure purchase within bone. In addition, the use of cages provides a more secure, accurate and dependable deformity correction than when structural bone graft is used<sup>12</sup>.

## CONCLUSION

It is concluded from our study that anterior decompression with internal fixation using cage and rod with screws is an effective procedure in dorsal spine tuberculosis. It has few complications and yields good results.

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