

# Anterior Decompression and Fixation with Webb-Morley Procedure in Dorsolumbar Spinal Injury

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## ABSTRACT

**Objective:** To evaluate the neurological outcome of anterior decompression and fixation with Webb-Morley procedure in dorsolumbar spinal injuries.

**Study Design:** A case series study.

**Place and Duration of Study:** The Neurosurgery Department, Jinnah Postgraduate Medical Centre, Karachi, from May 2008 to July 2010.

**Methodology:** Patients with post-traumatic unstable dorsolumbar spine having compression of the spinal cord with bony fragments of the fractured vertebra were included in the study. Patients below the age of 15 years and patients with bed sores and unfit for anaesthesia were excluded. Plain X-rays and magnetic resonance imaging (MRI) were done. All patients were treated for dorsolumbar fractures by anterior decompression and fixation with Webb-Morley procedure. All patients were assessed clinically by the Frankel's grading before and after surgery.

**Results:** Among 60 patients, 41 were males and 19 were females. Mean age was  $37.2 \pm 4$  years. Major cause of trauma was road traffic accident. The commonest level of the fracture was at the dorsolumbar junction i.e. 71.66% (n = 43). About 19 (31.66%) patients improved to the Frankel's grade-E, while 41.66% (n = 25) improved to grade-D after surgery. There was no postoperative mortality.

**Conclusion:** According to the current study, anterior decompression and fixation with Webb-Morley procedure is an effective and safe approach. Those patients who had complete motor deficit showed no improvement in power but those who had partial motor deficit, had excellent improvement.

**Key words:** Dorsolumbar spine fractures. Webb-Morley procedure. Anterior decompression. Frankel's grading. Motor deficit.

## INTRODUCTION

Dorsolumbar junction is prone to fractures and subluxation because it is a site of transition between the stiff and mobile sections of the spine.<sup>1</sup> There are multiple environmental forces responsible for causing dorsolumbar fractures, like fall from height, road traffic accidents, fall of heavy objects on back and assault. These victims can present with backache due to fracture, motor and sensory deficits, sphincter dysfunction and associated problems secondary to the injury. Improvement in autonomic and motor activities occurs slower than sensory modality. Frankel's grading is used to assess neurological deficit.<sup>1</sup> X-rays and MRI are ideal diagnostic tools. There is two-column theory by Whiteside and three-column theory by Denis, to categorize the type of fractures and stability of spine,<sup>2,3</sup> while integrity of spine is determined by White and Punjabi criteria.<sup>4</sup> Injury to the anterior and middle columns may lead to 70% decrease in support so their

restoration is essential for maintaining stability of the spine.<sup>5</sup>

Acute injuries of the spine and spinal cord are among the most frequent causes of severe disability and death after trauma.<sup>1</sup> About 40.5% of all spinal fractures are found in the dorsolumbar segment, with a compression fracture of the type observed in 10 – 20% of cases.<sup>5-8</sup> Surgical procedures for these fractures have been performed via both anterior and posterior approaches but anterior approach has better advantage of canal clearance than posterior pedicle screws and plates system. In lumbar region, fractures are more common at L1 level while less common in lower lumbar region as more force is applied for lower lumbar fractures and mostly associated with pelvic fractures. Considering these factors, the anterolateral approach is applied to enhance spinal decompression and reconstruction of the anterior column, with less fusion of vertebral segments in comparison to the posterior approach.<sup>9,10</sup>

The approach has further advantages such as access to the knowledge of the midline, the lack of lung structures, vascular and visceral and eases of revision surgery.<sup>9</sup> The complications may be loss of alignment, presence of anterior compression and failure of fixation observed in 9 – 54% of cases, lack of support earlier.<sup>9-11</sup> The anterior approach is indicated for patients with greater

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than 50% reduction of vertebral height and spinal canal compromise greater than 30% in T11 and T12, L1 in 40% and above 50% in L2, for providing better decompression of the spinal canal being observed and more neurological recovery when compared with the posterior.<sup>10</sup>

There are many options of material used for anterior fixation but Webb-Morley procedure is better as it is a shorter, low cost, easy procedure with good results. This study was conducted to determine the neurological outcome of dorsolumbar spinal injury after decompression and fixation with Webb-Morley procedure.

### METHODOLOGY

This study was carried out in Neurosurgery Department of Jinnah Postgraduate Medical Centre, Karachi, from May 2008 to July 2010. Patients of either gender who had spinal fractures with bony fragments compressing spinal cord from anterior side, were included. Those patients who were below 15 years of age and those who were not fit for anaesthesia and those who had bed sores were excluded. The study was approved by the Ethics Committee of the Hospital and informed consent was taken from all patients included in the study.

X-rays and MRI of the spine were done and level of fractures was identified. These patients were assessed according to Frankel's grading both pre-operatively and postoperatively to assess the neurological status before surgery and to compare the postoperative neurological outcome as shown in Table I.

In all patients anterior decompression was done followed by grafting and fixation with Webb-Morley procedure. Postoperative check X-rays were done and the hospital stay was about 8 – 15 days after surgery. Follow-up was done for 6 months.

All patients underwent physiotherapy schedule including postural turning every 2 – 4 hours, skin care, and bladder care both pre-operatively and postoperatively. Bedding must be changed frequently, particularly for those patients suffering urinary incontinence. Patients were kept on broad-spectrum antibiotics and analgesics for one week after surgery.

The data about the age, gender, causes, presenting complaints, MRI findings, and surgical outcomes was entered in to a proforma for collection and analysis. The data was analyzed with the help of statistical program Statistical Package for Social Sciences (SPSS), version 12. Chi-square test was applied and p-value < 0.05 was considered significant.

### RESULTS

During the study period, 60 patients underwent Webb-Morley procedure. Among them, 41 (68.33%) were males and 19 (31.66%) were females. Male to female

**Table I:** Frankel's grading for neurological assessment of spinal injury.

A	Complete (no sensory or motor function)
B	Incomplete (sensory function present, but no motor function below the neurological level)
C	Incomplete (motor function intact but useless, below the neurological level, and have a muscle power grade of < 3) with intact sensation
D	Incomplete (motor function intact and useful, below the neurological level, and have a muscle power grade of ≥ 3)
E	Normal

**Table II:** Comparison between pre-operative and postoperative neurological status showing outcome of Webb-Morley procedure.

Pre-operative Frankel's grading	Postoperative Frankel's grading					p-value
	A	B	C	D	E	
A = 10	02	08	-	-	-	0.673 (A and B)
B = 06	-	04	02	-	-	
C = 30	-	-	-	22	08	0.006 (C and D)
D = 12	-	-	-	03	09	
D = 02	-	-	-	-	02	< 0.001
Total = 60	02	12	02	25	19	

ratio was 2.1:1. Mean age at presentation was 37.2 ± 4 years (ranging from 17 to 56 years). The common age group involved was between 31 – 40 years (n = 31, 51.66%). Major cause of trauma was fall (n = 34, 56.66%), while others were RTA (n = 14, 23.33 %), fall of heavy objects (n = 08, 13.33 %) and assault (n = 04, 6.66%). Backache and limb weakness were present in all patients (n = 60, 100%).

On radiological basis (plain X-rays and MRI), the commonest level of the fracture was at the dorsolumbar junction i.e., 71.66% (both L1 = 27 and D12 = 16), 08 (13.33%) at L2 level, 06 (10%) at D11, 02 (3.33%) at L3 and one (1.66%) at L4 level.

Postoperatively 19 (31.66%) patients improved to the Frankel's grade-E, while 25 (41.66%) improved to grade-D as shown in Table II. There was no improvement in power in patients with grade-A and B (p = 0.673), however, significant improvement was observed in Frankel's grade-C and D (p = 0.006, Table II). So those patients who had complete motor deficit showed no improvement in power but those who had partial motor deficit, had excellent improvement. There was no postoperative mortality. On second postoperative day, check X-rays were done in all cases. Overall hospital stay was one week. In one patient there was post-operative CSF leak which resolved spontaneously and in one patient there was hemothorax for which the chest tube was changed and the hematoma was drained. All patients had pain at the graft donor site.

### DISCUSSION

This study evaluated the outcome of anterior decompression and grafting followed by fixation with Webb-Morley as assessed by Frankel.

Brohi *et al.* reported that ages of patients with dorsolumbar trauma varied from 18 to 50 years<sup>5</sup> and the common age group was from 31 to 40 years which comprised 33%.<sup>5</sup> The mean age of their patients was 37.2 years (from 17 to 56 years).<sup>5</sup> Older age can affect the surgical outcome to some extent in terms of good healing.

The duration of symptoms ranged between within hours to 5 to 7 days. Majority of the patients came to the hospital for medical help within 3 days after trauma. Prabhakar *et al.* stated that most of their patients were admitted within 3rd to 4th day of injury.<sup>9</sup>

Fall from height and RTA's are the most common causes of spinal injury. Brohi *et al.* reported patients with trauma were either due to motor vehicle accidents 20 (55.6%) cases, or fall from height 16 (44.4%) cases.<sup>5</sup> Prabhakar *et al.* observed fall of wall in 55.5%, fall of heavy object in 26.3% and fall from the height in 18.05% were the common mode of trauma.<sup>9</sup> While in this study, the same formed the bulk causes of dorsolumbar injury, like fall from height 56.66% (n = 34) and RTA 23.33% (n = 14).

Thoracolumbar spine injuries are a common complication of blunt multitrauma and up to one third of fractures are associated with spinal cord dysfunction.<sup>10</sup> Trauma is responsible for 13% to > 30% of spinal injuries in multitrauma patients.<sup>11</sup> Associated injuries include hemothorax, retroperitoneal haematoma and limb fractures.<sup>5</sup> In the study, Calista *et al.* 56.25% of the patients (36 cases) were classified as having multiple trauma.<sup>7</sup> We found limb fractures in 03 (15%), hemothorax in 01 (5%) and abdominal trauma in 01 (5%) patient as part of associated injuries.

Dorsolumbar injury can present with paraparesis, accompanied with autonomic disturbances including urinary defecation and fertility dysfunctions.<sup>12</sup> Common presentations in a local study were weakness of lower limbs, backache, deformity, urinary retention and constipation.<sup>5</sup> Shah had radiological evidence of spinal cord or quada equina compression, with either monoparesis, paraparesis or sphincter dysfunction alone.<sup>13</sup> In the present study, patients presented with backache, limbs weakness and sphincter disturbances.

The dorsolumbar fractures can be treated conservatively as well as surgically.<sup>14</sup> There are strong proponents of conservative therapy<sup>15</sup> and those that believe in surgical management.<sup>16</sup> Disadvantages of conservative treatment include deterioration in neurological status in 17% of the patients progressive kyphotic deformity in 20%, persistent backache,<sup>17</sup> decubitus ulcer and deep venous thrombosis.<sup>18</sup>

Surgical options include an anterior approach, a posterior approach, or a combined anteroposterior approach. Generally, the anterior approaches are best used at the dorsolumbar junction; posterior approaches

are ideal for low lumbar injuries and lumbar injuries that result in complete spinal cord injuries, while the anteroposterior surgeries are typically reserved for highly unstable fracture subluxations. Many surgeons prefer anterior approach for surgical intervention in fractures of dorsolumbar region because it allows direct decompression of the neural elements and correction of deformity.<sup>19</sup> Dorsolumbar segment is the second most frequent injured site after cervical spine in adults. The injury, although not associated with high mortality, causes severe morbidity and mortality of 0.5% as compared to 20% in the cervical spine.<sup>20</sup> Shah managed traumatic lesions of thoracolumbar spine in 77.7% of his patients by anterolateral approach, bone grafting and spine fixation with Webb-Morley system through a transpleural or retroperitoneal approach and found favourable results.<sup>13</sup>

As long as surgical improvement is concerned, Brohi *et al.* categorized 5.55% in Frankel's grade-A, 2.78% in Frankel's grade-B, 16.67% in Frankel's grade-C, 11.1% in Frankel's grade-D and 11.1% in Frankel's grade-E, that is overall improvement was 47.22% and 52.7% remained in a static neurological condition.<sup>5</sup> In this study, about 31.66% (preop = 4.5%) patients improved to the Frankel's grade-E, while 41.66% improved to grade-D after surgery; overall improvement was 96.66%, whereas only 3.33% remained in the same neurological status.

Brohi *et al.* displayed that, postoperatively 5.6% patients had empyema thoracic that needed decortications, Webb-Morley screw fractured in 2.8% and were left as such because bony fusion had already occurred. Intercostal neuralgia was noted in 8.3% cases, which was managed with analgesics and local anaesthetics.<sup>5</sup> In Ramani *et al.* study, one patient died due to pneumonia while under rehabilitation, one month after injury.<sup>21</sup> In several patients lateral cutaneous nerve was damaged; bed sores were also found. The rate of infection was high (33%). One developed severe epididymo-orchitis due to self catheterization. Bladder stones were removed from 3 patients. Dural laceration with or without CSF leak occurred in 7 cases. It should be suspected when posterior column is injured and particularly when there is fracture of lamina. Prabhakar *et al.* reported superficial bed sores in 20 (33.33%) and deep bed sores in 8 (13.33%).<sup>9</sup> In this series, one patient had CSF leak, which resolved later on; one patient had hemothorax that was managed by re-adjustment of the chest tube and all of them had pain at the graft donor site, which was managed with analgesics.

Different authors followed patients from 6 months to 1 – 2 years at least. Postoperatively these patients were followed for at least 6 months to assess the neurological recovery and bony fusion.

## CONCLUSION

According to the current study, anterior decompression and fixation with Webb-Morley procedure is an effective and safe approach. Those patient who had complete motor deficit showed no improvement in power but those who had partial motor deficit, had excellent improvement.

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