RESEARCH PAPER | Medical Science | Volume : 5 | Issue : 7 | July 2015 | ISSN - 2249-555X

Outcomes of Treatment of Dorsolumbar Spine Fractures – A Prospective Study

KEYWORDS: Dorsolumbar spine injury, SF-36 scoring system, Frankel scoring

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ABSTRACT *Dorso-lumbar spine injury is the most common orthopaedic spinal cause of morbidity and mortality. It is the most common cause of paraparesis and paraplegia. Objective of the study is to evaluate the outcome of patients having fracture of dorsolumbar spine with either conservative or operative management. We studied 36 patients of fracture at dorsolumbar region (D11 to L2), treated with either conservative or operative method on randomised control basis. The functional outcome was assessed using the SF-36 score. Fall from height is the most common cause of dorsolumbar fractures with majority affected belonging to young population and presenting with significant neurological deficits. Patients who had Frankel C, D, or E grade at the time of presentation showed neurological improvement. In patients presenting with Frankel grade D&E without visceral involvement and with kyphosis angle<150, conservative management seems rational. Evaluation with SF-36 score showed excellent and good outcomes in most of these patients.*

Introduction-

"Patients with paraplegia should be treated either superlatively well or not at all" - Ernst Nicoll (1953).

In this developing era, with urbanization and industrialization, orthopaedic spinal trauma is increasing in incidence. Spinal injuries constitute one of the greatest calamities known to the medical world, causing great mortality and morbidity [1]. Dorsolumbar trauma is the most common cause of paraparesis and paraplegia [2]. In India, as in most developing countries, very little is known about the exact incidence of spinal cord injury.

Most of them sustain this injury by fall down from unprotected roofs, trees or fall into uncovered wells. In all Indian series, fall from height rates highest among the etiological factors, whereas in advanced countries road traffic accidents (RTA) ranks highest [3]. The dorsolumbar segment of spine (D11 to L2) is an unstable zone between fixed dorsal and mobile lumbar spine at a junction of dorsal kyphosis and lumbar lordosis [4]. The injury, although not associated with high mortality, causes severe morbidity (mortality 0.5% as compared to 20% in the cervical spine). In India, majority of patients have axial load injury with unstable burst fractures of vertebral bodies. It is estimated that approximately 75% of patients with dorsolumbar injuries sustain variable degree of neurological deficit. Early mobilization and rehabilitation is the most important aim of the management. Optimal goals of the management include establishment of a painless, balanced and stable spinal column with fusion of least number of vertebra. The choice of management depends on severity of kyphotic deformity, canal compromise, vertebral height loss, and neurologic status.

Objective -

Objective of the study is to evaluate the outcome of patients having fracture of dorsolumbar spine with either conservative or operative management over a period of more than two years.

Materials and methods –

1) In our prospective, all inclusive, un-blinded study, we have studied 36 patients of fracture of dorsolumbar spine (D11 to L2), treated with either conservative or operative method. All the patients with post traumatic dorsolumbar fracture who were admitted in the trauma ward of our institute were examined for inclusion in study. Once the patients were stabilized and all associated injuries identified & investigated, a thorough neurological examination was done & patients were graded according to Frankel classification. Prophylactic antibiotics were started to all patients.
2) X-rays were taken - AP and Lateral view of Dorsolumbar spine. In patient with associated injuries, other indicated X-rays, ultrasound or CT scan were also taken as per need.In patients with neurological involvement injection methyl prednisolone was given as per NASCI III.
3) Fractures were classified using the Dennis classification of fractures of Dorsolumbar spine. MRI of all the patients was done with emphasis on canal diameter, cord compression and cord status. Amount of retropulsion was also noted. All the patients were admitted in the ward and were planned accordingly for operative or conservative management.
4) Following surgery all the patients were mobilised in the form of log roll immediate post operatively. All patients were advised for regular daily physiotherapy. Self intermittent catheterization was explained and taught to the patients with bladder involvement. Sitting and Walking was allowed at around 6 weeks or as per neurological improvement. Patients were regularly followed up at 6 weeks, 3 months, 6 months & at 1 year for final follow up. At each follow up examination of wound, neurological status of the patient and radiological examination in the form of x ray to look for any change in the kyphotic angle were done & functional status of patient was also assessed.

Assessment standards –

- The level of the functional outcome was assessed using the SF-36 score.[6]

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- Neurological deficit was classified by Frankel Grade (modified) [7]
- Grading for Neurological improvement was taken from multicenter spine fracture study conducted by Scoliosis Research Society coordinated by Gertzbein S.D.

Observation and discussion-

Our goal of doing this study was to evaluate the functional outcome of patients sustaining dorsolumbar junction injury following conservative or operative management using SF-36 score, so we can modify or eliminate the risk factors and decrease the incidence of morbidity. We have compared our study with Ramani and Singhaniya study [8], Been and Bauma study [9], Basheer and Gupta study [2].

1) Age:

Maximum number of patients was in age group of 20-29 years. The reason for this is that, this age group represents the working class of our society, who is involved maximally in outdoor activities & manual labour and are hence more prone to sustain injuries due to trauma and accident.

2) Sex:

There was male predominance in our study consisting of 30 patients (83.3%). The ratio of male to female of 5:1 in this study compares well with other literature. This observation can be explained on the basis that in our society men are more involved in outdoor activities.

3) Mode of injury:

There was predominance (69.2%) of fall from height in our study followed by motor vehicular accidents. In all Indian series fall from height rates highest among the etiological factors, whereas, in advanced countries RTA ranks highest. However, there is trend towards increasing incidence of RTA as compared to previous Indian studies.

4) Occupation:

Labourers were affected the most by such fracture. Our study consists of 22 labourers (61.6%), followed by farmers consisting of 13.8%.

5) Fractured vertebral level:

Most commonly involved vertebrae were D12 and L1 (75%).In Basheer and Ramani study, L1 was most commonly involved level.

6) Associated injuries:

There were total 11 (31%) patients, who had associated injuries. In Basheer study 32% patients had associated systemic injuries and 14% patients had head injuries. In Been study 40% patients had associated injuries.

7) Mode of treatment:

In our study 61.2% patients were treated operatively with posterior or anterior instrumentation and 38.8% treated conservatively. All the patients in whom surgery was done, fixation was done one segment above and one segment below (short segment fixation) without fusion.

8) Fracture type:

We classified the fractures as per Denis method. Burst fracture type was highest with 18 patients (50%) followed by wedge compression with 14 patients (38.8%).In Basheer study also, burst fracture (29.8%) was the highest fracture type.

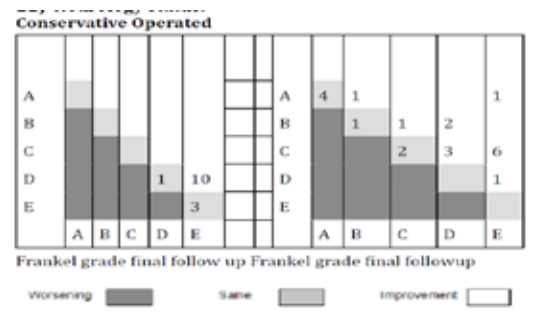
9) Pre-operative neurological status (FRANKEL GRADE):

Majority of our patients i.e. 27 patients (75.0%) belonged to Frankel grade B, C, D, i.e., incomplete motor and sensory loss below the level of injury. While 6 (16.6%) patients were having complete neurological deficit, only 3 patients (8.3%) were not having any neurological involvement. In Basheer study 67% patients were having frankel grade A on admission & remaining had partial neurological involvement (33%).

10) Kyphotic angle assessment:

In our study, loss of correction at follow-up was greater in conservatively treated patients with average final loss of correction of 6.9 degree.Those who were operated had 4.90 degree. Significant loss of correction of more than 10 degree was present in 3 patients treated with posterior instrumentation as compared to zero patients in anterior instrumentation group with p value > 0.05 suggesting insignificant difference. 2 patients had implant failure. In Been study, loss of correction of more than 5 degree occurred in 68% patients in posterior instrumentation group.

11) Neurology status:



Worsening Same Improvement

In our study, 10 out of 14 patients (71.42%) who were treated conservatively and of the 22 patients, who were treated operatively 15(68.1%) patients showed improvement of at least 1 Frankel grade. 6 patients were having Frankel grade A on admission out of which 4 patients didn't show any improvement. 1 patient was having Frankel grade B and one having Frankel grade E on final follow up. Whereas out of the 16 patients who were having partial neurological involvement (Frankel B, C or D) preoperatively, 13(81.2%) showed improvement and only 3 patients didn't show improvement of up to 1 Frankel grade. None of the patients had neurological worsening in both the groups.

12) Complications:

Complications	Operated	Conservative
Neurological Worsening	0	0
Infection	3	0
Implant failure	2	0
DVT	0	1
UTI	3	1
Bed sore	3	3
Chest infection	0	1
Persistent backache	3	6

Among conservatively treated patients, 6 were having persistent backache, 3 were having bedsore. Among the operated patients, 3 patients had infection, 2 had implant failure, 3 patients were having persistent backache (in whom kyphosis angle was>150) and 1 patient had chest infection. Breakage of osteosynthesis material was noted in one pa-

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tient, who underwent implant removal.

13) SF-36 score:
Out of 36 patients, 16 (44.44%) were having SF-36 score of >75, showing excellent outcome. Out of which 10 (27.8%) patients were treated conservatively and 6 (16.66%) patients were from operative group. 9 (25%) patients were having SF-36 score between 51-75, out of which 4 (11.11%) were from conservatively treated group and 5 (13.9%) from operative group suggesting good outcome. 5 (13.9%) patients showed poor SF-36 score <25, remaining 6(16.6%) were having average score between 26-50.

14) Work status on final follow up:
24(66.66%) patients were doing some sort of activity, either light duty work or other work for their living. Rest of them remained dependant on others for their living. Other studies have not mentioned about patients working ability on follow-up.

15) Mobility status on follow up:
Out of 36 patients, 17(47.2%) were able to walk without support & 13(36.1%) patients were walking with support. 6 patients who were either bedridden or able to move in wheelchair, were having either Frankel A or B grade on admission. Other studies have not mentioned about mobility status.

CONCLUSION -
From our study we device the following conclusions:

- Fall from height is the most common cause of dorsolumbar fractures with majority affected belonging to young population and presenting with significant neurological deficits.

- The only factor which was significant in deciding outcome of such injuries is primary cord damage; which is reflected by Frankel grading. Almost all patients in our study who had Frankel C, D, or E grade at the time of initial presentation showed neurological improvement. This is shown in other studies as well.

- In patients presenting with Frankel D&E, neurological status without visceral involvement and with kyphosisangle<150, conservative treatment seems rational. Disadvantages of conservative management include persistent backache, increase in kyphotic deformity, decubitus ulcer and deep venous thrombosis.

- Surgical management is safe and helps in early mobilization and rehabilitation and thus facilitating possible neurological recovery. Indirect decompression of spinal cord by posterior distraction and short segment stabilization with pedicle screws is sufficient treatment for majority of unstable dorsolumbar fractures.

- Anterior decompression with pedicle screw fixation does provide rigid stabilization, good clearance of the canal with satisfactory decompression of the spinal cord and allows early rehabilitation with short hospital stay.

- Subjective evaluation with SF-36 score shows good or excellent outcome in most of these patients with neurological improvement. Out of 36 patients 17(47.2%) were able to walk with support and 13(36.1%) patients were walking with support. 6 patients who were either bedridden or able to move in wheelchair, were having either Frankel A or B Grade on admission.

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