

Traumatic paraplegia: Outcome study at an apex trauma centre

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Abstract: Aim of this study was to assess neurological improvement after surgical intervention in cases of traumatic paraplegia classified by Frankel scoring. A retrospective study of operated cases of traumatic paraplegia over a period of fifteen months (Jan 2009 to March 2010) was carried out at Jai Prakash Narayan Apex Trauma Centre, AIIMS, New Delhi. The analysis included a total of 66 cases of paraplegia (Frankel A or B). Data collected from patient records included age, sex, time from injury to hospitalization, initial neurological status as per Frankel Score, MRI findings, surgery performed, postoperative course and neurological status at the time of discharge and latest follow up. Patients lost to follow up were not studied for outcome analysis. SPSS 16 was used for the statistical analysis.

The mechanism of injury was fall from height in 56.1 % (n=37) cases. & Road Traffic accident in 30.3% (n=20) cases. Median interval from time of injury to admission was 2 days (range, 0-75days). The most common site of injury was D11 to L1 in 57.57% (n=38) cases. Decompression and long segment pedicular fixation with bony fusion was the most common procedure performed. Median follow up period was six months (range, 1- 12months). Sixty two percent (n=41) were lost to follow up. Forty four percent (n=11/25) improved on continued follow up till August 2010. and 16% (n=4/25) improved to useful motor score Frankel D or E.

Traumatic paraplegia patients need a holistic approach. Instrumentation of spine facilitates early mobilization and adds to the ease of rehabilitation. The decision of operative management should be case based.

Keywords: traumatic paraplegia; decompression; posterior fixation

INTRODUCTION

Traumatic paraplegia is an unanticipated catastrophe in an individual's life, posing a huge economic as well as social burden. The healthcare does not end with fixation of spine and inculcates a programmed rehabilitation and preventive management plan involving multiple personnel and family members. In a developing country like India, where tertiary health care is not universally accessible and acceptable, the consequences of traumatic paraplegia and loss of manpower are well imaginable. We analyze the data of traumatic paraplegia at an apex trauma centre in India.

AIMS AND OBJECTIVES

Assessment of neurological improvement after surgical intervention in cases of traumatic paraplegia classified by Frankel scoring.

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METHODS AND MATERIALS

A retrospective study of operated cases of traumatic paraplegia over a period of fifteen months (Jan 2009 to March 2010) was carried out at Jai Prakash Narayan Apex Trauma Centre, AIIMS, New Delhi. The analysis included a total of 66 cases of paraplegia (Frankel A or B). Data was collected from patient records from time of injury to the last visit at follow-up OPD. Data included age, sex, time from injury to hospitalization, initial neurological status as per Frankel Score, MRI findings, surgery performed, postoperative course and neurological status at the time of discharge and latest follow up. On follow-up, clinical examination was done to assess the Frankel Score followed by radiological evaluation. Any change from Frankel Score A or B to Frankel Score C, D or E was considered as improvement. Patients lost to follow up were not studied for outcome analysis. Each independent variable was compared with outcome, as improvement or no improvement which was the dependent variable, to look for any statistical significance. SPSS 16 was used for the statistical analysis.

RESULTS

All patients were paraplegic (Frankel Score A or B). Of these, 52% (n = 34) were Frankel A and 48% (n = 32) were Frankel B. Mean age was 31.9 +/- 11.39 years. Most patients 74% (n = 49) were between 20 to 40 years of age. Males were 82% (n= 54). The mechanism of injury was fall from height in 56.1 % (n = 37) cases and road traffic accident in 30.3% (n=20) cases. Other modes of injury included fall of heavy object on back (n = 7) and gun shot injury (n = 2). Median interval from time of injury to admission was 2 days (range, 0-75 days). Median interval from time of injury to surgery was 16 days (range, 2-104 days). The most common site of injury was D11 to L1 in 57.57% (n = 38) cases. Decompression and long segment pedicular fixation with bony fusion was the most common procedure performed (Figures 1-6). One patient died of unrelated cause. Median follow up period was six months (range, 1-12months). Thirty eight percent (n = 25) had a follow up of at least one month and 62.12% (n = 41) were lost to follow up. Outcome analysis was done on this subgroup of patients with at least one month follow up. The results are shown in Table 1.

DISCUSSION

Fourty four percent (n = 11) improved on continued follow up till August 2010 and 16% (n = 4) improved



Fig 1: Burst fracture L4 vertebral body with spinal canal compromise. T2 weighted MRI image.



Fig 2: Reconstructed noncontrast CT scan of LS spine showing instruments in situ with normal alignment achieved postoperatively in the patient shown in Fig 1.

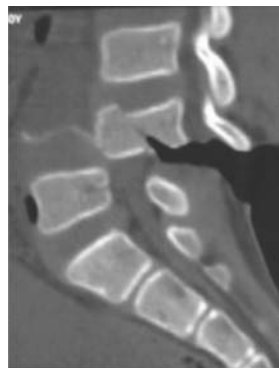


Fig 3: L5- S1 spondyloptosis on non-contrast CT scan.

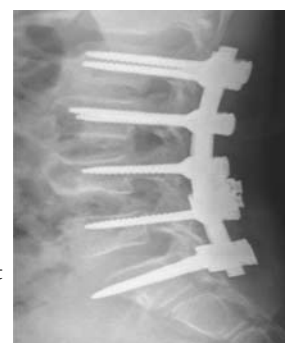


Fig 4: Postoperative non-contrast CT scan of LS spine of the patient shown in Fig 3 showing implants in situ with normal alignment



Fig 5: CT showing burst fracture D11



Fig 6: Postoperative radiograph showing implants in situ with normal alignment

Table 1: Outcome Analysis

	Improve- ment	No Improvement	p value
Age (yr) <40 (92 %)	43 %	57 %	0.697 Not significant
>40 (8 %)	50 %	50 %	
MOI (mechanism of injury) Fall (56%)	47 %	53%	0.496 Not significant
Road traffic accident (30%)	37%	63%	
Preop Frankel Score A (48%)	43%	57%	0.607 Not significant
B (52%)	45.5%	54.5%	
Total	41 %	59%	
Methyl prednisolone Yes (32%)	25%	75%	0.190 Not significant
No (68%)	53%	47%	
Interval from time of injury to surgery < 2 wks	33%	67%	0.231 Not significant
>2 wks	53.33%	46.67%	
Instrumentation Posterior	47.36%	52.64%	0.636 Not significant
Anterior	0	100%	
Both posterior & anterior	40%	60%	
Fracture site Dorsal	38.46%	61.54%	0.430 Not significant
Dorso-lumbar	50 %	50 %	

to useful motor score Frankel D or E. Fifty six percent (n = 14) remained same as preoperative FS. Vale et al¹ observed that 33% of patients with a complete thoracic SCI improved at least 1 Frankel or ASIA grade. They emphasized more on aggressive initial medical management with fluid resuscitation and vasopressors to maintain mean arterial pressure above 85 mmHg. No such augmentation of blood pressure was done in our study. Boerger et al² reported a meta-analysis on the value of surgical decompression in affecting neurological outcome in patients with thoracolumbar fractures. Their results showed that surgery did not offer a significant advantage compared with conservative treatment with respect to neurological outcome. Geisler et al³ concluded

that the sparseness of prospective data on the treatment of traumatic SCI at 28 centers in North America suggested that treatment guidelines have limited empirical support and should be made cautiously. Vafa Rahimi-Movaghar⁴ concluded that surgical decompression and fusion did not result in spinal cord recovery after complete SCI in the thoracic spine. In our study 45.5% patients with Frankel score B and 43% with Frankel score A showed improvement which was not statistically significant (p = 0.607).

In our study 53.33% patients operated more than two weeks of injury showed improvement as compared to 33% operated within two weeks of injury which was not statistically significant (p = 0.231). Bohlman and Freehafer⁵ have reported that greater neurologic recovery occurs if surgical decompression is performed within 2 years after the injury.

M. Reinhold et al⁶ reported complete neurologic deficits after injury to the thoracic spine improved in 9% of the cases, whereas 59% of the cases with complete neurologic deficit improved after injury to the thoracolumbar junction. In our study, improvement was seen in 50% patients with dorsolumbar fracture and 38.46% with dorsal fracture which did not attend statistical significance (p = 0.430). A comparison of various studies on traumatic paraplegia with percentage of patients who improved is shown in Table 2.

Table 2 : Various studies and outcomes (% improvement) in traumatic paraplegia

Vale FL, Burns J, Jackson AB, Hadley MN ¹ , 1997	33 %
Vafa Rahimi-Movaghar ⁴ 2005	8.3% (n = 1 out of 12 patients)
M. Reinhold, C. Knop, R. Beisse et al ⁶ , 2009	9% dorsal spine injury and 59% dorsolumbar injury
Our study 2010	44% (n = 11) 38.46% dorsal spine injury, 50% lumbar spine injury

In our study surgical instrumentation was effective for recovery of motor power in complete SCI. It facilitated early mobilization, chest physiotherapy and reduced time spent in bed. The loss of large number of patients to follow up decreased the power of our study. This could be accounted by many factors like financial difficulties, accessibility to rehabilitation centres and demoralization of caregivers. Mukund and Prabhakar⁷ concluded that rehabilitation is better after staged

anterior decompression and fusion in burst fracture of thoracolumbar junction with complete paraplegia.

The most common mode of injury in our series was fall from height (56%). This is contrary to the literature reports where motor vehicle accidents account for majority of spinal injuries (40-60%)^{8, 9}. This difference can be explained by the poor domestic environment and manual labourers working at risk situations in rural India. 47 % patients with fall from height as mechanism of injury improved as compared to 37% with road traffic accident which was not statistically significant ($p = 0.496$).

CONCLUSION

Traumatic paraplegia patients need a holistic approach. Instrumentation of spine facilitates early mobilization and adds to the ease of rehabilitation. The decision of operative management should be case based. Prospective randomized studies should be done to better define the role of spinal instrumentation in patients with traumatic paraplegia in the present arena of increasing awareness of care for spinal injury.

REFERENCES

1. Vale FL, Burns J, Jackson AB, Hadley MN. Combined medical and surgical treatment after acute spinal cord injury: results of a prospective pilot study to assess the merits of aggressive medical resuscitation and blood pressure management. *J Neurosurg.* 1997; 87:239-46.
2. Boerger TO, Limb D, Dickson RA. Does 'canal clearance' affect neurological outcome after thoracolumbar burst fractures? *J Bone Joint Surg Br.* 2000; 82:629-35.
3. Geisler FH, Coleman WP, Grieco G, Poonian D. Sygen Study Group. Recruitment and early treatment in a multicenter study of acute spinal cord injury. *Spine* 2001; 26(24 Suppl):58-67.
4. Vafa Rahimi-Movaghar. Efficacy of surgical decompression in the setting of complete thoracic spinal cord injury. *J Spinal Cord Med* 2005; 28:415-20.
5. Bohlman HH, Freehafer A. Late anterior decompression of spinal cord injuries. *J Bone Joint Surg Am* 1975; 57:10-25.
6. Reinhold M, Knop C, Beisse R, et al. Operative treatment of traumatic fractures of the thoracic and lumbar spinal column. Part III: Follow-up data. *Unfallchirurg* 2009; 112:294-316.
7. Mukund M. Prabhakar, Bhagwat Singh, Lilam Patel. Thoracolumbar burst fracture with complete paraplegia: rationale for second-stage anterior decompression and fusion regarding functional outcome. *J Orthop Traumatol* 2009; 10:83-90.
8. McAfee PC, Yuan HA, Lasda NA. The unstable burst fracture. *Spine* 1982; 7:365-73