

Rehabilitation outcome of spinal cord injury patients managed with spinal fixation and conservative management

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Abstract

Aim: To explore the effect of management with the spinal fixation in comparison to conservative management for traumatic paraplegic spinal cord injury (SCI) patients. **Methodology:** A retrospective survey design was done to find out the result. The documents of traumatic spinal cord injury patients who had received treatment from January 2005 to August 2008 were reviewed. 20 outcome measurement forms of paraplegic spinal cord injury with spinal fixation (group-1) and 20 outcome measurement forms of paraplegic SCI with conservative management (group-2), were chosen conveniently. From outcome measurement form, length of stay, initial and discharge ASIA scale, initial and discharge score of sensory, motor and functional improvement were measured. By these initial and discharge scores, rehabilitation outcomes were measured in both groups. **Data analysis:** Data was analyzed by descriptive statistics (mean and standard deviation) with SPSS software. **Result:** Male SCI (85%) was more common than female SCI (15%). In case of length of stay (LOS) in hospital, group-1 has more LOS (107.45±34.8) compared to group-2 (89.15±26.68). In ASIA scale, improvement occurred more in group-2 (40%) than group-1 (35%). Sensory improvement score was more in group-2 (6.25±5.99) than group-1 (4.74±5.2). In motor improvement score group-2 shown more improvement (14.4±13.91) than group 1 (8.85±9.93). But functional improvement score has shown approximately similar results with group 1 (107.8±17.16) and group 2 (107±15.18) though the Group2 shown more steady than group 1. **Conclusion:** Rehabilitation outcome was found better among traumatic paraplegic SCI patients who were managed conservatively without spinal fixation.

Key words: Spinal fixation, Conservative management, Paraplegia, Spinal cord injury (SCI), Rehabilitation.

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Introduction

Spinal Cord Injury (SCI) is one of the debilitating and devastating injuries and about 4.6% people are disabled due to spinal cord injuries or lesion in Bangladesh (Haque et al. 1999). Spinal trauma complicated by injury to the spinal cord is a devastating event on personal and family level, as well as a tremendous financial burden to society because of its attendant morbidity, expenses and prolonged treatment requirements. (Kiwerski, 1981)

Prolong length of stay at hospital, the risk of severe complication, increased burden of care during discharge and loss of productivity of these patients indicate that special effort should be made to improve rehabilitation outcome (Scivoletto et al. 2003). Formulation of treatment plan for SCI patients depends on the presence and extent of neurologic injury and existing spinal stability. Both surgical and nonsurgical treatment options are available to achieve the goals of preservation of neurologic function and restoration of spinal stability (Vaccaro et al. 1997). There is much controversy and confusion in the management of spinal trauma cases, as eminently qualified surgeons advocate opposing treatment regimens (Smith and Walter, 1985).

Literature review

Spinal surgery is recommended only in two conditions: immediate instability or late instability and persistent neurological compression. Although, the agreement is largely shared on the necessity of cord decompression and spine fixation, but its effectiveness are still controversial (Jacquot et al. 2000).

Spinal fixation is used to maintain position and alignment and to the vertebral body or posterior elements with wire, screw and hooks in the treatment of fractures, degenerative disease, infection, and tumors and correct congenital deformities such as those seen in scoliosis (Slone et al. 1993).

Following traumatic SCI, if the spine is unstable, surgical fusion and bracing may be necessary to obtain vertical stability and prevent re-injury of the spinal cord from repeated movement of the unstable bony elements. And in that case spinal fixation surgery is recommended to promote early rehabilitation and mobilization (Bengall et al. 2003).

It is generally felt that surgical stabilization of spinal injuries results in better reduction, better preservation of neural components and earlier ambulation than the conservative treatment regimens (Smith and Walter, 1985). Ball and Sekhon (2006) found that early spinal fixation in traumatic spinal injuries shortens the length of both intensive care and hospital admissions. A meta-analysis of 1687 cases and analysis found that early spinal fixation within 24 hours resulted in a statistically better outcome compared with both conservative and late management more than 24 hours (Rosa GLA et al. 2004). Incomplete SCI had shorter acute hospital and rehabilitation length of stay compared with those managed non-surgically (Chen et al. 1985).

On the other hand, Tator et al. (1987) found that there was no difference in the length of stay or neurological recovery among the patients managed with spinal fixation and conservatively. Rahimi-Movaghar et al.

(2005) found that SCI patients with an incomplete deficit had improved lower extremity motor and/or bladder function with either non-operative or operative intervention. Another meta-analysis found that there was no advantage of surgical over nonsurgical treatment in regard to neurological improvement (Boergeret al. 2000). Grootboom and Govender (1993) found that SCI patient who had partial neurological deficit due to injuries to the upper thoracic spine from T2 to T9 improved overtime with conservative management.

Methodology

Study Design

Retrospective type of descriptive survey design was chosen since the aim of this study is to explore the "To explore the effect of management with the spinal fixation in comparison to conservative management for traumatic paraplegic spinal cord injury (SCI) patients". Therefore this study needed as much information as possible and survey was only way to use a large number of data.

Study area

Spinal Cord Injury unit of the Centre for the Rehabilitation of the Paralyzed (CRP) Savar was selected as the study area. CRP is the largest SCI rehabilitation centre in south Asia. So the investigator found that this place is the best place to obtain desired data for the study.

Data Collection Procedure

Outcome measurement forms of 20 paraplegic SCI patients with spinal fixation (Group 1) and 20 patients with conservative management (Group 2) were selected. Both groups were matched in sex, number of complete and incomplete patients, neurological level, number of patients to avoid extraneous variable. All patients of both groups had completed full rehabilitation program from Centre for the Rehabilitation of the Paralyzed (CRP) of Bangladesh. Rehabilitation outcome was measured by Changed in ASIA Scale (from initial and discharge ASIA scale), Hospital Length of Stay (LOS), improvement in sensory score (from initial and discharge sensory score), improvement in motor score (from initial and discharge motor score) and improvement in functional score (from initial and discharge functional score).

Study period

This study was conducted from October to December of 2010.

Data analysis procedure

Data was analyzed by descriptive statistics (mean and standard deviation) with SPSS software. The graph technique was used to analyze the data, calculated as percentages and then presented the using in bar charts and pie charts.

Results

In this study 40 SCI patients were included, among them 85% (n=36) were male and 15% (n=4) were female (Fig-1).

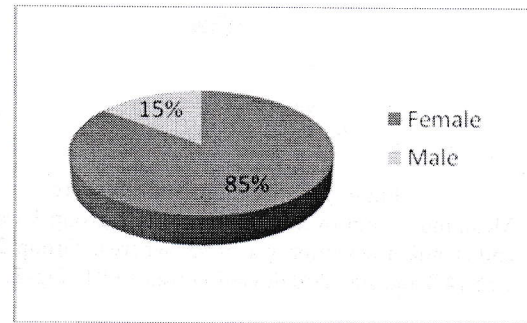


Fig-1: Male-Female Ratio

The LOS in Group-1 was 107.45 ± 34.8 day whereas Group-2 had 89.15 ± 26.26 day (Fig-2).

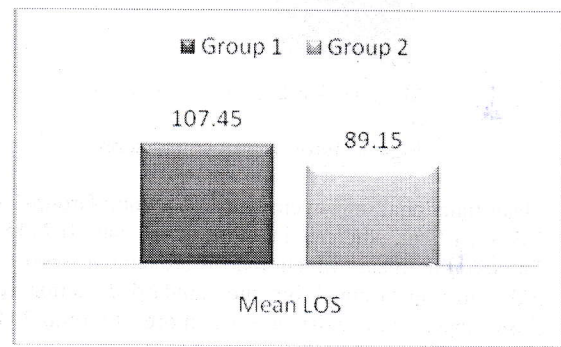


Fig-2: Length of Stay

Changes in ASIA Scale was higher among the Group-2 SCI patient 40% (n=8) compared to Group-1 (35%, n=7) (Fig-3).

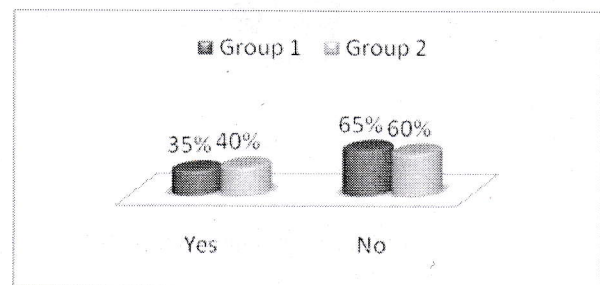


Fig-3: Changes in ASIA Scale

Mean sensory improvement score was also found higher among the Group-2 SCI patients (6.25 ± 5.99) compared to Group-1 (4.75 ± 5.2) (Fig-4).

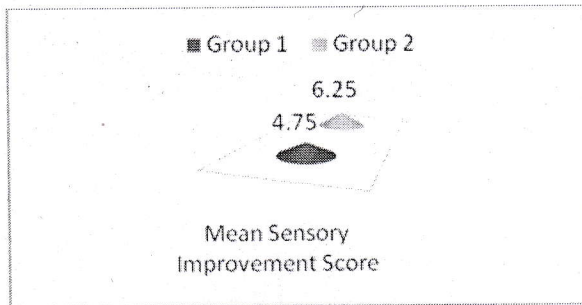


Fig-4: Sensory improvement score
Mean motor improvement score among group 1 was 8.85 and standard deviation was 9.93; whereas Group 2 mean was 14.4 and standard deviation was 13.91 (Fig-5).

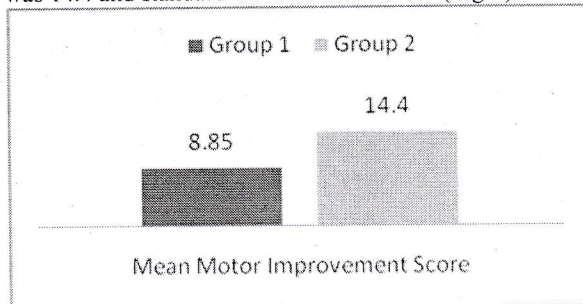


Fig-5: Motor improvement score

Mean functional improvement score among Group-1 was 107.8 ± 17.16 ; whereas in Group-2 it was 107 ± 15.18 . Though the mean functional improvement score was little more in Group-1 but the standard deviation score shows that, data consistency was more in Group-2 (Fig-6).

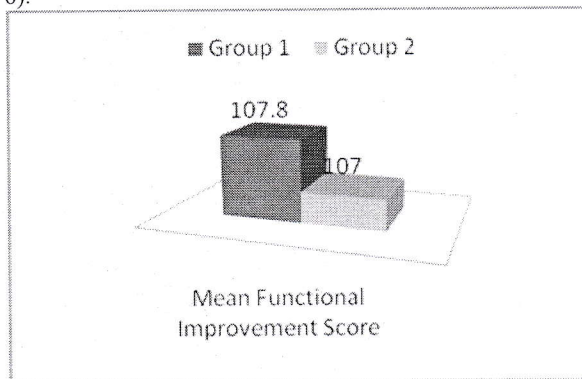


Fig-6: Functional improvement score

Discussion

From the data base it was found that male SCI is more common than female SCI which is supported by a recent study which found 4:1 as male female ratio (Jackson et al. 2004).

This study also found that the length of stay (LOS) was longer among the patients with spinal fixation compared to the patients with conservative management. This findings also in line with a study conducted by Wilmot and Hall (1986). The authors found that the length of hospital stay was 133 days for those having surgery and 119 days for nonsurgical cases

In case of changes in ASIA Scale, improvement occurred more among patients with conservative management than patients with spinal fixation. McKinley et al. (2004) found that, subjects in the conservative group had significantly higher change in ASIA scale than the surgical groups.

Sensory improvement score was higher in patients without spinal fixation and this findings is supported by a published study (Tator et al. 1987).

This study did not found significant difference in terms of motor improvement score between spinal fixation and conservative groups. A study conducted by Water et al. (1996) also stated that the motor score does not significantly differ between patients categorized spinal fixation groups and those treated non-surgically.

There was no significant difference in functional improvement score patients with conservative management and patients with spinal fixation which is also supported by a study stated that spinal fixation and conservative management does not have significant changes in FIM scale (McKinley et al. 2004).

Conclusion

This study found that paraplegic SCI patients who got conservative management had shorter hospital LOS, more improvement in ASIA scale, sensory score, motor score and functional score rather than paraplegic SCI patients with spinal surgery. But it is not possible to generalize the results in wider population due to small number of sample size, use of retrospective methodology. These findings have important implications for the interdisciplinary rehabilitation process in the overall management and outcome of individuals with SCI. Prospective, controlled, randomized studies are required to clarify the role of spinal surgeries in case of traumatic paraplegic SCI.

References

- Haque, F, Grangeon, C, & Reed, K 1999, *Spinal Cord Lesion in Bangladesh and Epidemiological Study 1994-1995*, Spinal Cord Journal, vol.37, no.3, pp.857-860.
- Kiwerski J, Weiss M. Neurological improvement in traumatic injuries of cervical spinal cord. Paraplegia. 1981;19:31-37. Online, Retrieved 20 December 2008, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1808272/>.
- Scivoletto, G, Morganti, B, Ditunno, P & Molinari, M 2003, 'Effect of age o spinal cord lesion patients rehabilitation', Spinal Cord Journal, vol.41, no.7-12, pp.457-564, Online retrieved December 26, 2008, from <http://www.nature.com/sc/journal/v41/n8/full/3101489a.html>
- Vaccaro, AR, Daugherty, RJ & Sheehan, TP 1997, 'Neurological outcome of early versus late surgery for cervical spinal cord injury' Spine. 1997;22:239-246, Online, Retrieved 15 October 2008, from <http://www.pubmedcentral.nih.gov/toocmder.fcgi?journal=230&action=archive>.
- Smith, GK & Walter MC 1985, *Fractures and luxations of the spine*, Online, Retrieved 20 December, from <http://www.scholar.google.com/scholar?q=49.%09Smith,+GK+%26+>

[Walter, MC+1985+Fractures+And+Dislocations+=of+the+spine+&hl=en&um=1&ie=UTF-8&oi=scholarls.](#)

Momin, AKM 2003, 'The level of integration of people with spinal cord lesion in Bangladesh'. PhD thesis, University of Leeds, Retrieved 28 December, from Bangladesh Health Professions Institute Library.

Jacquot, F, Loubert, G, Loeb, T, Signoret, F, &Feron, JM 2000. 'Initial management of acute traumatic spinal cord injuries'. Online, Retrieved 7 February 2009, from http://www.maintriseorthop.com/corpusmaitri/orthopaedic/102-duquenoy/pec_trauma_med_us.html.

Slone, RM, Macmillan, M & Montgomery, WJ 1993, Spinal fixation part 1. Complications of spinal instrumentation, Online, Retrieved 5th December 2008, from, <http://radiographics.rsna.org/cgi/reprint/13/4/797>.

Bangall, AM, Jones, L, Richardson, G, Duffy, S & Riemsma, R 2003, 'Effectiveness and cost effectiveness of acute hospital based spinal cord injuries services: systemic review, Online, Retrieved 5th December 2008, from http://mrw.interscience.wiley.com/cochrane/clsystrev/articles/CD004725/pdf_fs.html

Ball, JR & Sekhon, LH 2006, 'Timing of Decompression and Fixation After Spinal Cord Injury- When is Surgery Optimal?', Online, Retrieved 20th December 2008, from <http://www.anzca.edu.au/jficm/resources/ccr/2006/march/SurgicalreviewTDF.html>.

Rosa GLA, Conti A, Cardali S, Cacciola F, Tomasello F., 2004. Does early decompression improve neurological outcome of spinal cord injured patients? Appraisal of the literature using a meta-analytical approach. *Spinal Cord* (2004) 42, 503–512. Online, Retrieved 20th December 2008, from <http://www.ncbi.nlm.nih.gov/pubmed/15237284>

Chen, TY, Dickman, CA, Eleraky, M & Sonntag, VKH 1985, 'The role of decompression for acute incomplete cervical spinal cord injury in cervical spondylosis', Online, Retrieved 12th January 2009, from <http://cat.inist.fr/?aModele=afficheN&cpsid=1604104>.

Tator, CH, Duncan, EG, Edmonds, VE, Lapzack, LI ZA & Andrews, DF 1987, 'Comparison of surgical of surgical and conservative management in 208 patients with acute spinal cord injury', *Can J*

Neural Sci. 1987; 14:60-69, Online, Retrieved 15th October 2008, from <http://www.pubmedcentral.nih.gov/tocrender.fcgi?journal=230&action=archive>.

Rahimi-Movaghar V, Vaccaro, AR, & Mohammadi, M 2005, 'Efficacy of surgical decompression in regard to motor recovery in the setting of Conus Medularis Injury, Online, Retrieved 5th December 2008, from <http://www.pubmedcentral.nih.gov/tocrender.fcgi?journal+350&action+archive>.

Boerger TO, Limb D, Dickson RA. 2000. Does 'canal clearance' affect neurological outcome after thoracolumbar burst fractures? *J Bone Joint Surg (Br)*; 82B: 629–635. Online, Retrieved 16th December 2008, from http://www.boneandjoint.org.uk/highwire/filestream/5024/field_highwire_article_pdf/0/629.full-text.pdf

Groothboom MJ & Govender S, 1993, Acute injuries of the upper dorsal spine, Online, Retrieved 20th December 2008, from <http://www.pubmedcentral.nih.gov/tocrender.fcgi?journal+350&action+archive>.

Jackson AB, Dijkers M, Devivo MJ and Poczek RB. 2004. 'A demographic profile of new traumatic spinal cord injuries: change and stability over 30 years.' *Arch Phys Med Rehabil.* 2004 Nov;85(11):1740-8. Online, Retrieved 16th December 2008, from <http://www.ncbi.nlm.nih.gov/pubmed/15520968>

Wilmot, CB & Hall, KM 1986, 'Evaluation of the acute management of tetraplegia: conservative versus surgical treatment, Online, Retrieved 2nd October 2008, from <http://www.ncbi.nlm.nih.gov/pubmed/3748593>.

McKinley W, Meade AM, Kirshblum S, Barnard B. 2004. Outcomes of Early Surgical Management Versus Late or No Surgical Intervention After Acute Spinal Cord Injury. *Arch Phys Med Rehabil* Vol 85. doi:10.1016/j.apmr.2004.04.032. Online, Retrieved 5th December 2008, from [http://www.archives-pmr.org/article/S0003-9993\(04\)00627-6/pdf](http://www.archives-pmr.org/article/S0003-9993(04)00627-6/pdf)

Water, RL, Adkins, RH, yakura, JS & Sie, I 1996, 'Effect of surgery on motor recovery following traumatic spinal cord injury', *Spinal Cord*. 1996;34:188-192, Online, Retrieved 5th December 2008, from <http://www.ncbi.nlm.nih.gov/pubmed/8963962/>