Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2013; 1(1): 1155-1159 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2013.v01i06.0104
Received: 04-10-2013, Accepted: 26-11-2013, Published: 31-12-2013

Research Article

Evaluation of Outcomes of Surgical Management of Cervical Spine Injuries

Erfanul Huq Siddiqui[1*], Sheikh Forhad[2], Jannat Sultana[3], Shah Muhammad Aman Ullah[4], A. K. Al Miraj[5]

[1]Medical Officer, Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh
[2]Medical Officer, Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh
[3]Medical Officer, Department of Paediatric, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh
[4]Medical Officer, Department of Burn and Plastic Surgery, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh.
[5]Research Assistant, Department of Vascular Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU) Dhaka, Bangladesh

***Corresponding author**
Erfanul Huq Siddiqui

Abstract: ***Background:*** Cervical spine injuries occur in 3% of blunt force trauma patients with the subaxial cervical spine being a common location within the cervical spine. Cervical spinal cord injuries represent 20–33% of total spinal injuries with the prevalence of the subaxial levels. ***Aim:*** This study aimed to evaluated outcome of operated subaxial cervical spine injuries. ***Methods:*** This retrospective study was conducted in 60 patients admitted to at the Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh with subaxial cervical spine injuries admitted and operated from July 2011 to June 2012. The patients with subaxial cervical spine injuries with SLIC score ≥4, relative sagittal plane translation >3.5 mm, relative sagittal plane rotation >11 degrees, and/or 3 columns injury and two columns injury with neurological deficit were included. Patients medically unfit for surgery, operated through posterior approach, SLIC scores<3, and with single and two columns injury without neurological deficit, were excluded. ***Results:*** Sixty (60) patients were included in the study. In this study, 38.3% patients had compressive flexion followed by distractive flexion (250%), and vertical compression (20.0%), majority of fractures were type B (53.3%) followed by type C (43.3%), and type 1 (1.6%) fractures. Fracture was the most common injury (46.6%) followed by post-traumatic disc prolapse without significant bony injury (26.6%), pure subluxation (15.0%), and fracture dislocation (11.6%). Retropulsed fragment was present in 33.3% patients, 53.3% had ruptured disc, ALL and PLL was intact in 61.6% and 11.6% patients respectively. 30.0% patients had no disability while 61.6% had mild disability. Only 10.0% patients had moderate disability. None of the patients had severe or complete disability. 68.3% were in Bridwell fusion grade 1 followed by 30.0% in grade 2, and 1.6% in grade 3. Transient dysphagia was the only complication in 70.0% patients. Remaining patients had no complications. ***Conclusion:*** Cervical spinal cord injuries patients after operation have better functional, neurologic, and radiologic outcome. Clinical symptom which improved in most was motor power, followed by deep tendon reflexes, bladder & bowel function, tone of limbs and least improvement in sensory function. Decrement was noted in bulk and tone of few patients.
Keywords: Subaxial cervical spine, SLIC score, ASIA grade.

INTRODUCTION

Cervical backbone accidents arise in 3% of blunt pressure trauma sufferers with the subaxial cervical backbone being a not unusualplace place in the cervical backbone; 50% of accidents arise among C5 and C7 [1]. These may be visible in younger sufferers with excessive power mechanisms of damage or older sufferers with low power mechanisms of damage. The subaxial cervical backbone includes degrees C3 via C7 and consists of each the bony anatomy in addition to the ligamentous anatomy. Injuries to the subaxial cervical backbone may be bony, smooth tissue, or a aggregate of the two [2]. Subaxial cervical backbone fractures may be the end result of excessive-power mechanisms along with motor automobile injuries and falls from heights to mild power mechanisms along with touch and non-touch sports. They may even arise decrease power mechanisms along with ground-degree falls. The cervical backbone is susceptible to damage because of the large quantity of movement allowed on this vicinity of the backbone [1]. The unique mechanisms of damage result in each unique fracture styles in addition to numerous ligamentous

accidents. This truth has been attributed to the propensity for the aged to maintain easy falls an extra chance for motor automobile injuries and the biochemical attrition related to senile osteopenia, maximum usually because of number one osteoporosis. The occurrence of cervical backbone accidents withinside the aged is anticipated to gradually growth in Europe and North America, as populace demographics change. In aged sufferers the damage styles are unique from that amongst more youthful sufferers. The severa fracture and dislocation styles of the subaxial cervical backbone lend to problem in developing a dependable and reproducible category machine that lets in concise communication, control choice making, and prognostication. Of the extra current category structures proposed via way of means of the Spinal Trauma Study Group, the subaxial Injury Classification System (SLIC) is usually used. This is a machine primarily based totally at the damage morphology, competency of the DLC, and the neurological reputation of the affected person. This is because of the distinction in bone density, damage mechanism and presence of degenerative changes. Injuries because of outside reasons can bring about damage deaths and instances of everlasting disability. This is in particular authentic for neck accidents, with the capability to reason spinal wire trauma. At present, information from unique elements of the arena factor at lowering neck damage prevalence traits for age companies below sixty-five years, even as the prevalence is consistent or growing withinside the aged. Cervical backbone trauma may be devastating whilst an affected person sustains neurological sequelae. It is anticipated that 2–three% of all trauma sufferers maintain cervical backbone accidents and, of these, among three and 25% go through extension of these accidents from delays in prognosis or unwarranted manipulation withinside the emergency department. The control of cervical backbone accidents in aged sufferers can be complex through some of factors, together with pre-current clinical situations inclusive of cardiopulmonary compromise, dwindled cappotential to tolerate halo immobilization and decreased cappotential for osseous union. The goal of the examine became to assess the morbidity, mortality and final results in aged sufferers with cervical backbone accidents. Surgical intervention may be finished both via an anterior or posterior method and must be primarily based totally at the pathology of the harm pattern. Anterior methods can be related to fewer wound headaches and a better fusion fee on the danger of postoperative swallowing difficulties [3]. There are but no variations in neurological recuperation or patient-pronounced final results measures [3,4]. This examine aimed to evaluated final results of operated subaxial cervical backbone accidents.

METHODS AND MATERIALS

This retrospective study was conducted in 60 patients admitted to at the Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh with subaxial cervical spine injuries admitted and operated from July 2011 to June 2012. The patients' records were obtained from medical records and these patients were called for follow up, assessed radiologically, neurologically using ASIA chart and for functional outcome as per neck disability index. The patients with subaxial cervical spine injuries with SLIC score ≥4, relative sagittal plane translation >3.5 mm, relative sagittal plane rotation >11 degrees, and/or 3 columns injury and two columns injury with neurological deficit were included. Patients medically unfit for surgery, operated through posterior approach, SLIC scores<3, and with single and two columns injury without neurological deficit, were excluded.

Positioning of patient

The patient was positioned supine on the operating table. The standard in line endotracheal intubation was performed with the head slightly extended. The Crutchfield tong was applied anterior to the ear. The top of the patient's head extended just past the upper end of the fixed aspect of the operating table. This facilitated neck flexion/extension by raising /lowering the head section of the table. The head slightly rotated to about 10 to 15 degrees to the opposite side. Reverse Trendelenburg position of about 10 degrees given to decrease the dependency of the head and neck surgery and decrease venous plexus congestion.

Anterior approach to cervical spine (Southwick and Robinson)

The medial border of the sternocleidomastoid is palpated and marked from the mastoid process to its insertion onto the clavicle. The longitudinal incision made below the mandible parallel to sternocleidomastoid over left side of neck at the level of surgery. Palpation of surface landmarks is useful in deciding on the location. The cricoid cartilage is at the level of the C6 vertebral body, the thyroid cartilage is at the level of the C4-C5 disc space, and the hyoid bone is at the level of the C3 vertebral body.

Data analysis

The results are presented in frequencies, percentages and mean+/-SD. The categorical variables were compared by using the Chi-square test. The p-value <0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

General characteristics

Sixty (60) patients were included in the study. In our study mean age of the patients was 38.07±12.64 years. Majority of the patients were younger; only 3.3% patients aged above 75 years. Male to female ratio was 2.75:1. Forty-nine percent were farmers. Fall from height was the most common mode of trauma in 56.7% patients. All patients had pain as well as difficulty in movements. Fortyone percent had radiculopathy while upper motor

neuron (UMN) features were present in 11.6% patients.
Sixty-one percent patients had neurologic deficit.

Table 1: Demographic characteristics of the study patients (n=60)

	Frequency	Percentages
Age (years)		
15-30	20	33.3
31-45	22	36.6
46-60	13	21.6
61-75	3	5.0
>75	2	3.3
Sex		
Male	44	73.3
Female	16	26.7
Occupation		
Farmer	29	48.3
Labourer	13	21.7
Others	18	30.0
Modeof trauma		
Roadtrafficaccident	26	43.3
Fall fromheight	34	56.7
Radiculopathy		
Yes	25	41.6
Neurologic deficit		
Yes	36	60.0
UMN features		
Present	7	11.6

Classification of subaxial spinal injury

In this study, 38.3% patients had compressive flexion followed by distractive flexion (25.0%), and vertical compression (20.0%) (Figure 1).

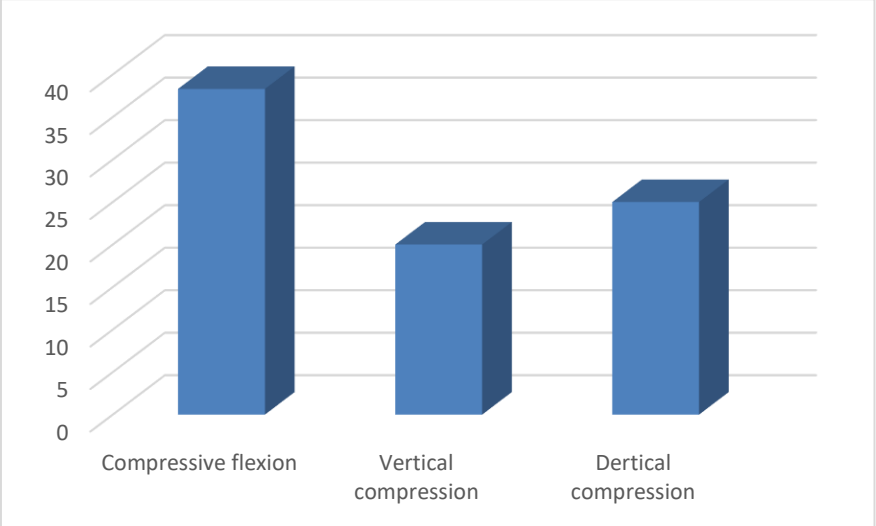

Figure 1: Allen and Ferrugsons classification

AO classification:
In this study, majority of fractures were type B (53.3%) followed by type C (43.3%), and type 1 (1.6%) fractures.

Type of injury:
Fracture was the most common injury (46.6%) followed by post-traumatic disc prolapse without significant bony injury (26.6%), pure subluxation (15.0%), and fracture dislocation (11.6%).

Intraoperative findings:

Retropulsed fragment was present in 33.3% patients, 53.3% had ruptured disc, ALL and PLL was intact in 60.0% and 11.6% patients respectively (Table 2).

Table 2: Intraoperative findings

	Frequency	Percentages
Retropulsed fragment		
Present	20	33.3
Absent	40	65.7
Disc status		
Ruptured	32	53.3
Degenerated	9	15.0
Prolapsed	19	31.7
ALL status		
Intact	36	60.0
Torn	24	40.0
PLL status		
Intact	7	11.6
Torn	53	88.4

Post-operative findings:

ASIA grading:

Table 3 shows improvement in ASIA grading. Pre-operatively, 41.6% patients were in ASIA type E grade followed by type D (33.3 %), type C (21.6%), and type B (1.6 %). Postoperatively, none of the patients was in type B grade. Sixty-one percent were in type E grade followed by 36.6% patients in type D.

Table 3: Improvement in ASIA grading

	Post-operative		
Pre-operative	**Type C**	**Type D**	**Type E**
Type B	0	1	0
Type C	1	12	0
Type D	-	9	12
Type E	-	0	25

Disability:

In this study, 30.0% patients had no disability while 61.6% had mild disability. Only 10.0% patients had moderate disability. None of the patients had severe or complete disability.

Bridwell fusion grade:

Our study found that 68.3% were in grade 1 followed by 30.0% in grade 2, and 1.6% in grade 3.

Complications:

Transient dysphagia was the only complication in 70.0% patients. Remaining patients had no complications.

DISCUSSION

Cervical spine injuries are not uncommon in the elderly population, and are more frequently the result of a relatively minor trauma. Upper cervical injuries are the most common, have the longest hospital treatment, and are caused mainly by low energy falls [5]. Total Sixty (60) patients were included in the study. In our study mean age of the patients was 38.07±12.64 years. Majority of the patients were younger; only 3.3% patients aged above 75 years. Male to female ratio was 2.75:1. Forty-nine percent were farmers. Fall from height was the most common mode of trauma in 56.7% patients. At present, data from different parts of the world report a decreasing neck injury incidence for age groups under 65 years, while the incidence is constant or increasing for elderly. The incidence of cervical spine injuries in the elderly is greater than that among all other age groups. This distribution has been attributed to the tendency for the elderly to sustain simple falls, to have a greater risk of motor vehicle accidents, and to the biochemical attrition associated with senile osteopenia. Our study support previous studies, which reported that a simple fall was the most common mechanism of injury among the elderly, particularly females [6-9]. Subaxial cervical spine includes C3 to C7 vertebra. Individual subaxial cervical spine injuries represent a wide spectrum of damage to the anatomic structures of the neck, including fractures, ligamentous injury, and disc disruption, often with injury to the cervical spinal cord and nerve roots [10]. Given its considerable mobility and its close proximity to the more rigid thoracic region, the subaxial cervical spine is particularly susceptible to traumatic disruption, which may often be accompanied by catastrophic neurologic insults as well [11]. Many surgical series recommend early treatment with aggressive canal decompression, improving neurological

outcomes and also offering immediate stablization. In subaxial cervical spine injuries, SLIC score is used to determine the threshold for surgical intervention. In our study for these patients with SLIC score 4 preferentially early surgery was indicated in view of refinements of spinal instrumentation and early mobilization, most of the patients in our study with SLIC score 4 were in young age group (55% in 15-30 years and 80% in 15 to 45 years), severe radiculopathy involving motor and sensory impairment, and radiological parameters associated with failure in conservative management of these injuries, such as more than 40% of height compression, kyphotic angulation higher than 15° or 20% of subluxation of one vertebra on another are not addressed by the SLIC score. Surgical stablization has been described using both anterior and posterior approach or combined approach. In our study subaxial cervical spine injuries treated operatively with anterior corepctomy and stablization with cage filled with autologus bone graft of vertebral body and cervical locking plate are studied. The advantages of using interbody cages for reconstruction after anterior cervical corpectomy fusion include, avoidance of morbidity associated with autologous bone graft (iliac crest) harvesting, compared with multi-level anterior cervical discectomy and fusion should result in lesser fusion rates because of increased graft host interfaces where fusion needs to occur 98. In our study, there was an improvement in ASIA grading, fusion rates which is in agreement with previously reported studies. Postoperative transient dysphagia was most common complication seen in our patients. The majority of elderly patients appear to tolerate the halo frame relatively well. Pin sites were complicated by infection in three patients. The halo braces in these cases were replaced by Minerva casts and infection controlled with antibiotics. Halo loosening occurred in three patients, requiring readjustment and later replacement by Minerva casts. Weller reported no complications with halo immobilization [12]. There were few complications related to use of orthoses in our patients. Occipital and chin pressure ulceration were seen in two patients. Three patients complained of Minerva loosening; two were reapplied, and a third underwent internal stabilization of atlanto-axial complex with anterior plating because of persistent instability. Three patients developed non-union; all had odontoid type II fractures. When the fracture is unlikely to heal or is unstable, or if the halo device cannot be tolerated, internal fixation should be considered.

CONCLUSION

Cervical spinal cord injuries patients after operation have better functional, neurologic, and radiologic outcome. Clinical symptom which improved in most was motor power, followed by deep tendon reflexes, bladder & bowel function, tone of limbs and least improvement in sensory function. Decrement was noted in bulk and tone of few patients.

REFERENCES

1. Feuchtbaum E, Buchowski J, Zebala L. Subaxial cervical spine trauma. Curr Rev Musculoskelet Med. 2016; 9:496-504
2. Stauffer ES. Subaxial injuries. Clin. Orthop. Relat. Res,1989:239:30-39.
3. Kwon BK, Fisher CF, Boyd MC, et al. A prospective randomized controlled trial of anterior compared to posterior stabilization for unilateral facet injuries of the cervical spine. J Neurosurg Spine,2007:7:1-12.
4. Brodke DS, Anderson PA, Newell DW, Grady MS, Champan JR. Comparison of anterior and posterior approaches in cervical spinal cord injuries. J Spinal Disord Tech,2003:1:229-35
5. Brolin K. Neck injuries among the elderly in Sweden. Inj Control Saf Promot. 2003;10(3):155–164.
6. Lomoschitz FM, Blackmore CC, Mirza SK, Mann FA. Cervical spine injuries in patients 65 years old and older. AJR. 2002; 178:573–577.
7. Olerud C, Andersson S, Svensson B, Bring J. Cervical spine fractures in the elderly, factors influencing survival in 65 cases. Acta Orthop Scand. 1999;70(5):509–513.
8. Ryan MD, Henderson JJ. The epidemiology of fractures and fracture-dislocation of the cervical spine. Injury. 1992;23(1):38–40.
9. Spivak JM, Weiss MA, Cotler JM. Cervical spine injuries in patients 65 and older. Spine. 1994; 19:2302–2306.
10. Raniga SB, Menon V, Al Muzahmi KS, Butt S. MDCT of acute subaxial cervical spine trauma: a mechanism-based approach. Insights Imaging,2014:5:321-338
11. Whang PG, Patel AA, Vaccaro AR. The development and evaluation of the subaxial injury classification scoring system for cervical spine trauma. Clin Orthop Relat Res,2011:469(3):723-731.
12. Weller SJ, Malek AM, Rossitch E. Cervical spine fracture in the elderly. Surg Neurol. 1997; 47:274–281.