E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2020; 6(4): 743-746

www.orthopaper.com
Received: 27-08-2020
Accepted: 11-10-2020

Dr. Pratik Israni
M.S. Ortho, ASSI Spine Fellow, Department of Orthopaedics, Civil Hospital, Ahmedabad, Gujarat, India

Dr. Deepak Agrawal
M.S. Ortho, ASSI Spine Fellow, Department of Orthopaedics, Civil Hospital, Ahmedabad, Gujarat, India

Dr. Shrey K Desai
3rd Yr. Resident, Department of Orthopaedics, Civil Hospital, Ahmedabad, Gujarat, India

Dr. Sharad Parmar
2nd Year Resident, Department of Orthopaedics, Civil Hospital, Ahmedabad, Gujarat, India

Corresponding Author:
Dr. Deepak Agrawal
M.S. Ortho, ASSI Spine Fellow, Department of Orthopaedics, Civil Hospital, Ahmedabad, Gujarat, India

Retrospective epidemiological study and rehabilitation benefit of patient with sub-axial cervical spine injuries in western India

Dr. Pratik Israni, Dr. Deepak Agrawal, Dr. Shrey K Desai and Dr. Sharad Parmar

DOI: https://doi.org/10.22271/ortho.2020.v6.i4k.2413

Abstract
Study design: Retrospective study.
Purpose: to extract epidemiological data related to sub-axial cervical spine injury managed at our spine institute and evaluate outcome with rehabilitation protocol.
Overview of literature: sub-axial cervical spine injuries are very serious injuries in all spinal injuries and usually associated with SCI or with neurological deficit and have highest morbidity and mortality in all type of spinal injuries.
Method: Total of 142 patients study included who were admitted with sub-axial cervical (C3-C7) spine injury our spine institute western India from period of Feb 2018 to December 2019 and managed conservatively or operative manner and Rehabilitation protocol were given. Detailed information on epidemiological study was analyzed based on the medical records of patients and follow-up and final outcome evaluated.
Results: most common age group was 30-50 yrs.48%, 94% male and 6% female with male to female ratio of 14:1. The commonest mode of trauma was fall from height 56% followed by 37% of RTA, 77% were laborers, average admission delay was 6.1 days, admission to surgery delay was 2.3 days, 53% had incomplete & 44% complete neurological deficit, 73% had involvement of bladder/ bowel, 74%were managed conservative while 26% operated, 6% had other associated injuries, 86% had received complete rehabilitation protocol, average hospital stay around 26 days, and significant improvement in ASIA score with rehabilitation protocol.
Conclusion: This study evaluate epidemiological data and burden of sub-axial cervical spine injury in community, so improving awareness, infrastructure build up and early recognition and proper management and rehabilitation protocol have high chances of improvement with low mortality or morbidity.

Keywords: Sub-axial cervical spine, epidemiology, rehabilitation protocol, spinal cord injury

Introduction
Sub-axial Cervical (C3-C7) spine injuries is a very mobile area of spine so it is more prone to trauma and post traumatic instability and high chances of SCI or gross neurological deficit. These injuries occurs due to high velocity trauma like road traffic accidents, fall from height, sports injury etc. it is about 45-50% prevalence and have highest morbidity and mortality rates in all types of spinal trauma [1].

One large population based study in Canada suggest yearly incidence of the spine was 64/100000 population in which 12/100000 consist of cervical spine injury and 55% cases have spinal cord injury also [2-6]. It has bimodal age distribution first more common in young (15-30) and secondly, in elderly 60-80yr and more common in male population [7, 8]. Management of sub-axial cervical spine injury as conservative with early immobilization of neck with traction or cervical collar or as operative as internal fixation with decompression and followed by rehabilitation protocol. Role of steroids is still controversial according to NASCIS-III, Methyl prednisolone succinate who came to hospital within 8 hr. of trauma at 30mg/kg bolus and then 5.4mg/kg/hr for 2days [5]. In this study, we have analyzed demographic data related to sub-axial cervical spine injury and its functional outcome related with rehabilitation protocol benefits.

Material and Methods

It is a retrospective study of 142 patients with sub-axial cervical spine injury managed at our spine institute between the period of February 2018 to December 2019 who were managed either conservatively or with and Rehabilitation protocol were given. The Detailed information on epidemiological study was analyzed based on the medical records of patients suffering from Sub-axial spine fractures from C3 –C7 level, including age, sex, marital status, education level, occupation, date of injury, cause of injury, level of injury, mode of injury, injury to hospital duration, hospitalization to surgery duration, ASIA score at time of injury and current time, Rehabilitation status, bedsore, associated injuries.

Results

Age and sex: The most common age group was 30-50 yrs. 68(48%) patients belongs to this age group. Next common age group is 20-30 yrs. 26(19%), >60 yr. group include 21(15%), 17(12%) from 50-60 yrs. 10(7%) from 10-20 yrs. age group. In our study 133(94%) male and 9 (6%) female with male to female ratio of 14:1.

Mode of injury: The commonest mode of trauma was fall from height 79(56%) patients followed by RTA 52 (37%) patients, 7(5%) patients with trivial fall, 2(1%) patients of heavy weight lifting and 2 (1%) of hit by an object.

Geographic distribution: Total of patients 98(69%) from Gujarat, 21(15%) from Rajasthan, 19(13%) from MP, 4(3%) from UP state.

Occupation: 142 patients, 109(77%) were laborers, 7(5%) housewife, 7(5%) student, 6(4%) servicemen, 5(3.5%) farmer and 8(5%) retired patient.

Educational status: Most of patients 137(98%) patients educated up to or below 10th std Average income: average income of all patient is about 5067 INR per month.

Injury to hospital delay: Most of patients presented to our institute in average delay of 6.1 days and most patients came within 10 days in our hospital.

Neurology: Out of 142 patient, 76(53%) patients suffer from incomplete, 62(44%) patients from complete neurological deficit, and 4(3%) patients with normal neurology and as per ASIA grading at the time of admission 62 (43%) patient from ASIA A, 31(22%) of ASIA B, 27(19%) of ASIA C, 18(13%) of ASIA D, and 4(3%) patients of ASIA E.

Bladder and bowel involvement: In our study total 104(73%) with involvement and 38(27%) patients had no involvement.

Admission to surgery delay: Average admission to surgery delay was 2.3 days, most patients were operated within 5 days from admission.

Mode of management: In our study, 105(74%) patients were managed conservative while 37(26%) patients operative managed. Total of 47 (33%) patients were admitted within 48 hrs. of injury so steroid therapy as NASICS –III was given to all these patient.

Associated injuries: In our study, 134(94%) patient had no any associated injury with Sub-axial cervical spine injuries and 9(6%) patient had other associated injuries out of which 5 patients from upper limb, 3 patient with lower limb and 1 patient with head injuries, and 21(15%) patients also had spinal injury at another level along with Sub-axial cervical spine injuries.

Rehabilitation status: out of 142 total 122 (86%) patients have received complete rehabilitation protocol and 20(14%) patient either denied for taking rehabilitation or left in few days after starting of protocol. At the time of current final follow-up in out of 142 patients 41(29%) patients are on wheel-chair bound, 33(23%) patients walk with major or minor assistance, 27(19%) patients has independent walking and 41(29%)patients has lost follow-up in current rehab status.

Improvement in neurology: as with ASIA grading system also found on current follow-up of 99 patient out of 142 patients result shows 35(35%) patients of ASIA A, 8(8%) ASIA B, 9(9%) ASIA C, 17(17%) ASIA D and 30(30%) of ASIA E after rehabilitation in our institution.

Average hospital sta: average hospital stay of all Sub-axial cervical spine patients were around 26 days.

Bedsore status: Out of 142 patients, 88 (62%) patients had no bedsore, 35(25%) patients had bedsore less than 10 cm and 19(13%) patients had bedsore size more than 10 cm with significant intervention.

Patient death: 12 patients had expired which is around 8% of total cases.

Level of injury: In these patients most common Sub-axial vertebrae to be involved is C6 which is involved in nearly 56 pts (39%).

Summary of results in form of Sociodemographic profile of patients and Management and Rehabilitation status of patients are mentioned in Table 1 and Table 2 respectively.

Table 1: Sociodemographic profile of patients

Characteristics	No of cases	Percentage (%)
Age		
10 to 20	10	7.04%
21 to 40	59	41.5%
40 to 60	52	36.7%
> 60	21	14.8%
Gender		
Male	132	92.96%
Female	9	6.34%
Occupation		
Labour	107	75.35%
Farmer	5	3.5%
Housewife	7	4.9%
Other	23	16.2%
Education status		
Up to 10th	138	97.18%
Up to 12th	3	2.1%
Graduate	1	0.7%
Monthly income (INR)	4575 ± 2096	

Table 2: Management and Rehabilitation status of patients

Bedsore status		
No bedsore	88	62.0%
<10 cm bedsore	35	24.6%
>10cm bedsore	19	13.4%
Rehabilitation status (N=75)		
Bound to wheelchair	41	44.0%
Walk with major or minor support	68	34.7%
Independent walking	27	21.3%

Discussion

Spine and spinal cord injuries are one of the most common specialized areas of acute trauma management and healthcare delivery. It has significantly high financial implications for the government, society and the family, the management modalities have improved greatly, with advancement in specialized medical and operative treatments for Sub-axial spinal injuries. The primary injury occur at the accident and secondary insult to the spine with inflammation, edema, hemorrhage etc, but improper method of transport aggravates the primary injury, lack of spinal boards with head binder or inadequate training with less than 6 persons for lifting and shifting patient shows lack of training and infrastructural support in the healthcare setting.

Cervical spine injuries are a major economic burden in the population so careful transport, timely evaluation and proper time based management of these injuries largely depends on several factors including demographic, socio economic and infrastructural issues, apart from the general medical and injury–related patient status [6-10].

In this retrospective study related to epidemiology of Sub-axial cervical spine we found that the incidence of Sub-axial cervical spine is 142 patient from 425 patients having traumatic spine injury, which is around 33% in the all type of spine injuries in compare to Canadian study from 1996, which has incidence of Sub-axial cervical fracture is around 19% admitted in hospital [5].

We observed male predominance among our study, which in accordance to various study reports [11-14]. The age distribution in our series reveals the highest frequency of cervical spine fracture among 30-50yr age group where some other study also suggested the highest incidence of Sub-axial cervical spine injury in 15-45 yr of age group [11, 12, 16].while in counter to study done in Norway which has highest incidence among age group of 60-90 [12].

We found that most common mode of trauma leading to Sub-axial cervical spine injury is fall from height some studies suggestive same results what we got but other study suggest road traffic accidents as most common mode of trauma leading to cervical spine injury [11, 17, 18]. Overall together these two mechanism corresponded with 90% of patient have Sub-axial cervical spine injury. In this study, highlighting the need of public policies to reduce car accidents, guidance about the risk of fall from height at work place, and warning about the risk of diving in shallow water in order to prevent these incidents and possibly reduce the cost of healthcare

Overall mortality associated with Sub-axial cervical spine injury is observed around 8% (12 out of 142 patients) which almost similar to study done in Norway which suggest mortality rate is 9% in conservatively managed patient where as 7 % in operatively managed patients [15].

Total of 26% of all patient with Sub-axial cervical spine injury managed operatively while other 74% managed conservatively which shows similar results in comparing with other study [15]. Our suggest that c5-c6 level is most common level to be involved in Sub-axial cervical spine injury which involved in 27% of all patient in our study where some study suggest that c6-c7 is most common level to be involved in Sub-axial cervical spine injury [18].

Our study suggest improvement occurs in Current ASIA score from comparing ASIA score at time of admission who had followed complete rehabilitation protocol at our institute. At admission 62 (43%) patient from ASIA A, 31(22%) of ASIA B, 27(19%) of ASIA C, 18(13%) of ASIA D, and 4(3%) patients of ASIA E. which are improved to current ASIA grade as to 35(35%) patients of ASIA A, 8(8%) ASIA B, 9(9%) ASIA C, 17(17%) ASIA D and 30(30%) of ASIA E.

Role of steroid in controvercial in spinal cord injuries which also effective in only when it is given within 8 hours of injury but we could only get 47 patients within 48 hours so we cant comment on role of steroid but if it has some role in reducing cord edema we have considering its effect and we had given it to all patients included in our study.

Conclusion

Patients admitted with Sub-axial cervical spine injury should require special attention and care at admission and special care for their rehabilitation should be taken. Patients with Sub-axial cervical spine injury have more chances of improvement with incomplete spinal cord injuries. And also patients who complete rehabilitation protocol has higher chances of improvement and low mortality rate with less chances of complications.

Conflict of interest: This study do not have any conflict of interest.

Source of support or funding: Nil

Reference

1. Kenneth Egol A, Kenneth koval J, Joseph Zuckerman D: Hand book of Fractures 5th edition: general spine. Dipompeo CM, M Das J Sub-axial Cervical Spine Fracture 2020.
2. Egmond Alves Silva Santos: Epidemiology of severe cervical spinal trauma in the north area of Sao Paulo city: J Neurosurg: spine/ 2009,11.
3. Hu R, Mustard CA, Burns C: Epidemiology of incident spinal fracture in complete population. Spine (Phils Pa 1976) 1996,21:492-499.202097/00007632-199602150-00016.
4. Vincent Cheung, Reid Hoshide, Clark Chen C. Methylprednisolone in the management of spinal cord injuries; surg neurol Int 2015;6:142.
5. Vignesg S, Pradeep B, Balasubramanian D. Early outcome of surgical intervention in Sub-axial cervical spine injuries. Int. j Res Med Sci 2018;6:2308-12.
6. Clayton JL, Harris MB, Weintraub SL, Marr AB, Timmer J, Stuke LE *et al*. Risk factor for cervical spine injury, injury 2012;43:431-435.
7. Hills MW, Deane SA. Head injury and facial injury; is there an increased risk of cervical spine injury? J trauma 1993;34:549-553.
8. hoffman JR, Schriger DL, Mower W, Luo JS, Zucker M: Low risk criteria for cervical spine radiolography in blunt trauma: prosprctive study. Ann Emrg Med. 1992;21:1454-1460.
9. Lowery DW, Wald MM, Browne BJ, Tigges S, Hoffman

JR, Mower WR: Epidemiology of cervical spine injury victims. Ann Emrg Med 2001;38:12-16.
10. Rizvi HL, Lied SAM B *et al*. the epidemiology of traumatic cervical spine fracture: a prospective population study from Norway. Scand J Trauma Resusc Emerg Med 2012;20:85.
11. Schoenfeld AJ, Sielski B, Rivera KP, Bader JO, Harris MB: Epidemiology of cervical spine fracture in the US military. Spine J 2012,24-4.
12. Roberg RJ, Wears RC, Kelly M, Evans TC, Kenny MA, Daffner RD *et al*. Selective application of cervical spine radiography in alert victims of blunt trauma: A prospective study. J Trauma 1988;28:784-788.
13. Bohlman HH. Acute fractures and dislocations of the cervical spine. An analysis of three hundred hospitalized patients and review of literature. J bone joint Surg Am 1979;61:1119-1142.
14. Leucht P, Fischer K, Muhr G, Mueller EJ: Epidemiology of traumatic spine fracture. Injury 2009;40:166-172.
15. Michael DB, Guyot DR, Darmody WR: coincidence of head and cervical spine injury. J neurotrauma 1989;6:177-189.
16. O'Malley KF, Ross SE: the incidence of injury to cervical spine in patient with craniocerebral injury. J Trauma 1988;28:1476-1478.
17. Joel Torretti A, Dilip Sengupta K. cervical spine trauma. Indian J Orthop 2007;41:255-267.