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Evaluation of the intensive care management of patients with spinal cord trauma

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Abstract

Spine traumas and the resulting spinal cord injuries are among the most important health problems with their physical and psychosocial impacts due to significant mortality and morbidity. Our objective in this study was to evaluate the issues that should be taken into consideration during the intensive care treatment management of patients monitored for spinal cord trauma. Patient files were examined for obtaining the demographic and clinical properties of 68 patients followed up with spine trauma diagnosis at the Intensive Care Unit during the dates of June 2011- 2016. Age, gender, cause of trauma, trauma localization, trauma injury accompanying the spine trauma, deep vein thrombosis development, infection development, ASIA (American Spinal Injury Association) score, duration of intensive care stays, and properties were examined. An evaluation was made in our study according to ASIA scoring as a result of which it was determined that there are 4 ASIA A patients (5.88%) hospitalized or discharged, 5 ASIA B patients (7.35%), 14 ASIA C patients (20.58%), 24 ASIA D patients (35.29%) and 5 ASIA score E (neurologically intact) (7.35%) patients, while mortality rate was determined as 16 patients (23.52%). It was determined as a result of the evaluation carried out with regard to post-trauma intensive care unit length of stays that the average length of stay was 21.3 days with the shortest length of stay as 1 day and the longest as 96 days. Care attributes should be familiar for this patient group that requires a multidisciplinary approach and serious rehabilitation and a sufficient level of knowledge should be reached by all those involved in the follow-up procedure.

Keywords: Intensive care management, spinal cord trauma, rehabilitation

Introduction

Spine traumas and the resulting spinal cord injuries are among the most important health problems of nowadays with their physical and psychosocial impacts due to significant mortality and morbidity. In addition; an economically expensive table with intensive care management such as medical and surgical, long term hospital care and rehabilitation requirement [1,2].

Annual incidence of spinal cord injuries in European countries varies between 13,9 – 19,4 in a million, while the ratio for North America has been determined as 43,3 – 51 in a million. In addition, it is estimated that traumatic (non-osteoporotic) spinal fractures have an annual incidence rate of about 40 cases or about 12.500 new cases per one million in USA including those who die at the site of the accident [3]. For our country, this rate is estimated at 12.7/1,000,000 per million yearly on average [4]. It is estimated that there are about 2,5 million people with spinal injuries living worldwide. The incidence of traumatic spinal cord injury cases in developing countries is 25, 5/million/year. Whereas the number of new cases varies between 12, 1–57.8 million for developed countries.

Even though the etiology of traumatic spine injuries differs according to the development level of the country, it is known that 41, 1% of the cases are caused by motor vehicle accidents, while 34, 9% are caused by falling [5].

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Demographic and clinical data acquired from the files of patients monitored at the intensive care unit (ICU) with spinal cord trauma diagnosis were examined in our study. Our objective in the study was to evaluate the issues that should be taken into consideration during the intensive care treatment management of patients monitored for spinal cord trauma.

Material and Method

Following the approval of Malatya Clinical Studies Ethics Council, files were examined for obtaining the demographic and clinical properties of 68 patients followed up with spine trauma diagnosis at the Brain and Nerve surgery and Anesthesia Reanimation ICU in Malatya Inonu University Faculty of Medicine Turgut Özal Medical Center during the dates of June 2011- June 2016. Age, gender, cause of trauma, trauma localization, trauma injury accompanying the spine trauma, deep vein thrombosis development, infection development, ASIA (American Spinal Injury Association) score, duration of intensive care stay and properties were examined.

Results

A total of 68 patients were hospitalized and treated for spinal cord trauma at our ICU during a period of five years. Of these patients, 41 (60.29%) were male, 27 (39.70%) were female. When the etiological causes of spine and spinal cord trauma are considered, injuries due to falls were ranked first (35 patients: 51.47%), followed by traffic accidents (30 patients: 44.11%) and firearm injuries (3 patient: 4.41%) (Table 1).Orthopedic traumas were ranked first with 43 patients (63.23%) among additional

pathologies determined in the patients other than spinal trauma, followed by head traumas 41 patients (60.29%), thoracic traumas in the 3rd place with 31 patients (45.58%) and abdominal injuries in the 4th place with 27 patients (39.70%) (Table 1).

Table 1. Patient clinical and demographic characteristics

No	Year	Gender	Cause of Trauma	Trauma Injury Accompanying	Initial ASIA Score	Discharged ASIA Score	LOS	Infection	Trauma Localization
1	60	F	1	T-O-K-A	A	EX	3	-	C-T
2	42	M	2	K	C	D	17	-	T
3	33	M	1	K	B	D	9	-	TL
4	28	M	1	T-O-A	A	EX	13		C-TL
5	18	M	2	T-A	A	C	18	-	C
6	23	M	3	K-A	A	EX	1	-	T
7	27	M	1	O-A	B	B	16	-	TL
8	38	F	2	T-O	C	D	5	-	T
9	71	F	2	K-O	A	EX	14	P	TLC
10	53	M	2	T-O-K	B	D	19	P	T
11	29	M	1	T-O	C	D	8	-	T
12	33	M	1	K-O	C	E	5	-	C-T
13	37	F	1	T-K-O	B	D	34	U-P	C
14	41	M	2	T-O-K-A	A	EX	2	-	C
15	39	M	1	T	A	B	21	-	C
16	25	M	2	K-A	A	EX	23	M	C
17	28	M	2	K-O	A	A	17	P	TL
18	77	F	2	K-O	C	D	14	-	T
19	84	M	2	K-O	C	D	6	-	TL
20	36	M	1	K-O	A	A	10	-	TL
21	44	F	3	T	A	EX	11	P	T
22	20	M	1	T-O-K	A	B	21	P	C
23	24	M	2	T-K	A	EX	8	-	C
24	19	F	2	T-O-K-A	A	EX	22	U-P	C
25	27	M	2	T-O	A	C	39	P	C
26	29	M	1	T-O	A	C	41	P	C
27	47	F	1	T-K	C	E	11	-	C
28	53	F	1	T-O-A	C	E	96	U-P	CT
29	40	M	3	T-A	A	EX	13	-	C-TL
30	58	F	1	A	C	C	8	-	TL
31	66	M	1	T-A	C	D	47	P	C
32	19	M	1	T-O-K-A	C	EX	37	U-P	T
33	73	F	2	T-O-K-A	A	EX	67	-	C-T
34	31	F	2	O-K-A	B	C	6	-	T
35	28	F	1	K-O	B	C	23	-	TL
36	52	M	1	T-O	B	D	14	-	C
37	43	F	1	T-O	B	EX	73	U-P	C
38	39	M	1	K	B	C	10	-	C
39	48	M	2	K	B	D	41	M	C
40	45	F	1	K-A	A	C	17	-	TL
41	23	M	1	T-O	C	C	23	-	T
42	64	M	1	O-A	B	B	28	P	C
43	70	M	2	O-A	B	D	8	-	C
44	54	F	1	T-O	A	C	33	U-P	C
45	56	M	1	O-A	A	EX	3	-	C
46	61	F	1	K-O	C	D	14	-	C
47	27	F	2	T-O	C	D	12	-	T
48	48	M	2	T-O	B	D	21	-	TL
49	22	M	1	O-A	B	D	17	-	TL
50	18	M	2	K-A	B	EX	37	U-GIS	C-T
51	31	F	1	K-A	B	D	14	-	T
52	22	F	2	K	C	D	12	-	TL
53	69	M	2	O-A	C	C	23	P	TL
54	25	M	2	T	C	D	5	-	TL
55	43	M	2	K-O	C	D	9	-	T
56	24	M	1	K-O	C	D	24	-	C
57	39	F	2	T	B	C	19	-	TL
58	50	M	1	T-O	B	D	54	U-P	C
59	36	M	1	K-T	B	D	21	-	TL
60	52	F	2	K	B	E	16	-	TL
61	34	F	2	K	C	D	13	-	T
62	18	F	1	K	C	E	17	-	T
63	61	M	1	K-O	B	C	25	-	T
64	26	F	2	T-O-K-A	A	EX	3	M	C-T
65	42	F	1	T-O-K-A	A	A	58	P	C
66	37	M	1	K-A	A	B	32	U-P	C
67	35	M	1	O-K-A	A	A	35	-	C
68	45	M	2	K-O	A	C	13	P	C
			1= fall 2=traffic accident 3=firearm injury	T=torax O=ortophedic K=cranium A= abdomen				P=pulmoner U=uriner M=menengus	C=cervicaL T=torakal L=lumbal

An evaluation was made in our study according to ASIA scoring as a result of which it was determined that there are 4 ASIA A patients (5.88%) hospitalized or discharged, 5 ASIA B patients (7.35%), 14 ASIA C patients (20.58%), 24 ASIA D patients (35.29%) and 5 ASIA score E (neurologically intact) (7.35%) patients, while mortality rate was determined as 16 patients (23.52%) (Table 1).

Infection development was observed most in cervical (18 patients; 26.47%) and thoracic spinal trauma patients (4 patients; 5.88%), thoracolumbar trauma patients were ranked 3rd in terms of frequency (2 patients; 2.94%) and the most frequent infections were observed as respiratory tract infections ranked first (21 patients; 30.88%)) followed by urinary tract infection in the second place (9 patients = 13.23%) and meningitis in third place (3 patients; 4.41%).

DVT developed in 4 patients (5.88%) despite the administration of low molecular weight heparin (40 mg Enoksaparin: Clexane 0.4 ml s.c./day) for DVT prophylaxis, whereas gastrointestinal system hemorrhage was determined in 1 exitus patient (1.47%) followed due to traffic accident.

It was determined as a result of the evaluation carried out with regard to post-trauma ICU length of stays that the average length of stay was 21.3 days with the shortest length of stay as 1 day and the longest as 96 days (Table 1).

Discussion

The care and follow up of spine and spinal cord injury patients in ICU require a multidisciplinary approach due to complicated instances and accompanying traumas. Patients have to be protected from and evaluated with regard to many factors such as airway and respiratory system management, surgical management, pharmacological protection requirement for the spinal cord, cardiovascular management, deep vein thrombosis management as well as many other factors. There was an additional accompanying organ trauma in all patients in our study who were followed up at the ICU. The most frequent accompanying injury was orthopedic injuries with a rate of 63.23% followed by head trauma in second place with a rate of 60.29%, thorax injury in third place with a rate of 47.05% and finally abdominal injury ranked fourth with a rate of 39.70%. It is a familiar fact that the care and treatment of patients get complicated due to complicated injuries. Multiple level spine and spinal cord injuries were detected in 12 (17.64%) of the cases in our study. It has been reported in literature that neighboring or non-neighboring multiple spine fractures are observed at rates of 6-15% and that additional injuries are observed in about 50% of the patients [6,7].

Attainment of normal spinal alignment is primary for preventing secondary injury and decreasing the impact of primary damage that develops in the spinal cord of patients stabilized with regard to respiratory and cardiovascular systems. For this purpose, immobilization can be carried out using surgical or non-surgical methods. Surgical treatment encompasses the decompression of the neural tissue in addition to the attainment of the mechanical stability of the spine and normal anatomic alignment. Bed rest and traction, external immobilization, open reduction and internal fixation methods can be used for treatment purposes in such cases. Infectious complications may frequently develop during the follow up of this patient group with differing degrees of paresis or plegia despite protective and corrective interventions. Infection development in our study was observed most frequently as in cervical (18 patients; 26.47%) and thoracic spinal trauma patients (4 patients; 5.88%) with thoracolumbar patients ranked 3rd in terms of frequency (2 patients; 2.94%) with the most frequent infection as respiratory tract infection (21 patients; 30.88%)) followed by urinary tract infection (9 patients=13.23%) and meningitis ranked third (3 patients=4.41%). Infectious complications are among the primary causes for post-spinal cord injury deaths and morbidities and most frequently includes lungs and the urinary tract. Aspiration, prolonged tracheal cannulation, decrease in the ability to clean secretions and atelectasis have been put forth as causes that increase the risk of pneumonia [8].

Another important factor that should be taken into consideration for patients with spinal cord injuries is the development of deep vein thrombosis (DVT). It was stated that the DVT risk was around 9–32% for patients at ICU which were subject to prophylaxis. This risk for patient's subject to prophylaxis (Clexane 0.4 cc s.c./day) in our study was determined as 5,88%. Low dose non-fractionated heparin, adjusted dose fractionated heparin, low molecular weight heparin, warfarin, aspirin / dipyridamole, pneumatic compression devices, graduated compression stockings, electrical stimulation, rotating bed and vena cava filters are used for spine injury prophylaxis [9].

In this study, data for the spinal cord injury patients followed up at our ICU during a period five year were evaluated in the accompaniment of related literature. A mortality rate of 23 % was observed despite all care and treatment applied and only 7.35 % of the patients were healed without sequel (ASIA E). Average hospitalization period was determined as 3 weeks (21.3 days) and the treatment of such patients is difficult and costly and may not always end well [10]. The objective of spinal cord injury management is to limit secondary injury and attain maximum neurological recovery. Pressure on the neurological structures is removed by way of medical treatment and surgical interventions applied for this purpose thereby ensuring that the spinal cord is well fed, and that cell damage is limited. However, the need for good care in the practical sense, a multidisciplinary approach and requirement for serious rehabilitation is indisputable.

Conclusion

Care attributes should be well-known for this patient group that requires a multidisciplinary approach and serious rehabilitation and a sufficient level of knowledge should be reached by all those involved in the follow-up procedure.

Competing interests
The authors declare that they have no competing interest

Financial Disclosure
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