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Epidemiology of the Spinal Cord and Cauda Equina Injury in Korea -Multicenter Study-

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Study Design: Multi-center study, questionnaire survey.
Objectives: To offer a database of spinal cord injury (SCI) by reviewing statistics and literatures of other countries, investigating the overall mechanism, injury patterns and treatment of SCI.
Summary of Literature Review: There are no preexisting domestic studies (collectively conducted by multi-centers) of the prevalence and treatment of SCI.
Materials and Methods: From September 2006 to August 2009, 47 cases of SCI in 6 universities were investigated retrospectively. 17 questionnaire contents including the courses of injury-to-treatment were studied with data gathered from surveys.
Results: The average age of patients was 48.4-years-old, male to female ratio was 33 to 14. The cases of falling from a height were 22 cases (47%), lumbar area 19 cases (40%), and unstable bursting fracture 24 cases (51%) the most. Complete and incomplete paralyses were 19 cases (40%) and 28 cases (60%), respectively. High dose steroids were injected in 16 cases (NASCIS II) and 9 cases (NASCIS III). 14 cases presented complications and operations were performed 46 cases (98%). 12 cases (26%) arrived at the hospital within 4 hours of injury, 11 cases (23%) in 8 hours. On the way to the hospital, proper emergency treatment was performed in 25 cases (53%), and 30 cases (64%) had a clear understanding of SCI after the final diagnosis.
Conclusions: This is the first study that offers a comprehensive database of spinal cord injury (SCI), by investigating the overall mechanism, injury patterns, and treatment of SCI; this study is expected to be used in the future as an important reference material for spinal cord injury statistics and a standard for care.

Key Words: Spinal cord injury, Multi-center study, Prevalence

INTRODUCTION

Recently, the number of patients suffering from spinal cord injuries (SCI) from industrial and traffic accidents, due mainly to the rapid industrialization and explosive growth in vehicle traffic, have increased significantly.[1)] According to international statistics, the annual occurrence rate of SCI is 721 case for 1 million people with a 6% fatality rate. Since over 50% of SCI results in paralysis of the limbs or paralysis of the lower limbs, these injuries inflict not only mental and physical pains but also cause an increase in the societal costs as well.

Although, in the mid 1990s, the Korea Ministry of Health and

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Welfare and the Korea Institute for Health and Social Affairs conducted studies on the occurrence rate of complications from the after-effects of SCI for the disabled persons and their epidemiology, these studies were conducted without an accurate registration system; these studies reported that, among all the disabled persons in Korea, 67,204 cases (9.2%) were paralyzed in the lower limbs, and 32,827 cases (4.5%) were paralyzed in all four limbs; Nah et al.2) reported that the full paralysis cases, rather than partial paralysis cases, comprised the majority of all paralyses; these were pretty much the extent of these studies. In contrast, in Europe, Australia or the U.S., annually or during a planned period, studies of SCI patients and various items such as complication occurrence rates, early treatment methods, recovery after injury, length of hospital stay, and treatment costs are being conducted on a continual basis, and the huge amounts of data collected from these studies are being amassed and utilized as valuable materials for establishing clinical guidelines or welfare policies.

Up until now in Korea, the pathophysiology and epidemiological information or data for SCI have been insufficient, and the criteria for the diagnosis and treatment of SCI has been vague.[1-3] With the sponsorship of the Spine Research Society at the Korean and Society of Spine Surgery, we, in conjunction with a number of universities jointly, wanted to provide the basic material to be utilized in the future as the basic material for the overall research regarding SCI in Korea, by conducting analyses of the overall history, characteristics, treatment status of SCI, and by having discussions about various literature

RESEARCH SUBJECTS AND METHODS

Among the 987 spinal trauma injury patients who visited and received treatment, during the period from September 1, 2006 through August 31, 2009, at the hospitals of Chungnam National University, Yonsei University, Chosun University, Hallim University, Wongwang University, Catholic University, and Soonchunhyang University, 47 cases were retrospectively studied. 17 items that could be used to identify the patient's injury-to-treatment process were prepared, made into a questionnaire, and distributed (Fig. 1). This questionnaire was distributed to orthopedic spine surgeons at each of these institutions to be completed, and using the medical information systems at each location, the record of these patients were retrieved and their medical records and radiographic findings were discussed and prepared.

RESULTS

The average age of spinal cord injury patients was 48.4-years-old, which was relatively young enough to work, and the male-to-female ratio was 33:14. The causes of injuries were falls in 22 cases (47%) and traffic accidents in 15 cases; the injury sites were the lumbar spine in 19 cases (40%) which was the most frequent, thoracolumbar in 11 cases (23%), cervical spine in 7 cases (14%), thoracic in 5 cases (11%), cervical spine and thoracolumbar combination damage in 5 cases (11%). On spinal injuries, unstable bursting fractures were the most with 24 cases (51%), and the next most common was fracture-dislocation in 12 cases (26%). Full paralysis and partial paralysis were, respectively, in 19 cases (40%) and in 28 cases (60%); among the partial paralysis cases, the cauda equina syndrome was most common with 10 cases, and anterior spinal cord syndrome was 5 cases and Brown-Sequard syndrome was 5 cases. Based on the injury level classifications of the American Society of Spinal Cord Injury (ASIA scale), ASIA A (complete injury; complete loss of all motor and sensory functions including sacral nerve roots 4-5) was in 19 cases, and in partial paralysis cases, ASIA D was the most with 12 cases (26%). After the diagnosis, high-dose steroids were administered in 25 cases (54%); among these 25 cases, in 14 cases medicine was administered within 8-hours of injury. In terms of the injection protocol, the NASCIS (National Acute Spinal Cord Injury Study) II was used in 16 cases, and NASCIS III was used in 9 cases. There were complications in 14 cases: respiratory complications like pneumonia or atelectasis occurred in 5 cases; pressure sores occurred in 5 cases, gastrointestinal bleeding occurred in 1 case; 2 cases of urinary tract infection; and 1 case of deep vein thrombosis.

All 46 cases except for 1 case (98%) underwent surgery; the 1 case without surgery was because of an internal illness which accompanied the patient's lumbar burst fracture at lumbar 1 and as a result emergency decompression procedure was not performed, but since after 72 hours of injury patient's conditions started showing improvement in his partial paralysis the patient was given a conservative treatment. 21 cases underwent surgery

한국인의 척수 손상 연구를 위한 제 1차 예비보고

대한척추외과학회 척수연구회 공동연구

(조사 기간 : 2006년 9월 1일 ~ 2009년 8월 31일)

1. 귀 병원에서 상기 기간 동안 발생한 **척추 손상 환자**는 총 몇 예 였습니까?
(예)

*경추골절부터 천추골절까지 모두를 포함합니다.

2. 상기 기간 동안 발생한 척추 손상 환자 중 **척수 손상**을 보인 예는 총 몇 예였습니까?
(예)

❖ 완전과 불완전 마비 모두를 포함합니다.

다음페이지는 각 증례별로 각각 기록하여 주시는 내용입니다.-

:증례 번호:

※각각의 척수 손상 환자의 해당 되는 항목에 체크 또는 기술해 주십시오.

1. Patient's information

Sex: Male ☐, **Female** ☐ **Age:** 세

2. Injury mechanism
☐ **TA**
☐ **slip down injury**
☐ **Fall from height injury**
☐ **sports injury**
☐ **postoperative injury**
☐ 기타 :

§ 기타에 해당되는 경우 수상 기전을 자세히 기술해 주십시요

3. 수상부위 **(**다발성 골절인 경우 모두 표시**)**
☐ **Cervical area**
☐ **Thoracic area**
☐ **Thoracolumbar area**
☐ **Lumbar area**
☐ **Sacrum**

4. Diagnosis (골절의 형태와 부위를 기술하여 주십시오**)**
( )

5. Neurologic status
☐ **complete**
☐ **Incomplete**

6. Incomplete spinal cord injury
☐ **Central cord syndrome**
☐ **Brown -Sequard syndrome**
☐ **posterior cord syndrome**
☐ **anterior cord syndrome**
☐ **conus medullaris syndrome**
☐ **cauda equina syndrome**

7. Initial ASIA impairment scale
☐ **A:** 제 **4-5**천추 신경근을 포함한 모든 운동 및 감각 기능의 소실
☐ **B:** 감각기능은 보존되어 있으나 운동 기능 소실
☐ **C:** 운동기능 부분적으로 보존되며 수상부위 이하 주요근육 반이상이 근력**3**이하
☐ **D:** 운동기능 부분적으로 보존되며 수상부위 이하 주요근육 반이상이 근력**3**이상
☐ **E:** 정상

8. Emergent Treatment
☐ **High dose Methylprednisolone** 투여함
☐ **High dose Methylprednisolone** 투여안함
☐ 기타 약물적 치료**(**약명과 용량 기록하여 주세요**) :**

9. Injury 시간부터 **MP** 투여 시 까지 시간
☐ **3**시간 이내
☐ **3-8**시간 이내
☐ **8-24**시간 이내
☐ **24**시간 이후

10. MP 투여 **protocol**
☐ **NASCIS II**
☐ **NASCIS III**

11. spinal cord injury 이후 발생한 **complication**
☐ **Respiratory infection/Problems**
☐ **UTI**
☐ **Sore**
☐ **Deep vein thrombosis**
☐ **Pulmonary embolism**
☐ **GI bleeding**

12. Operative Treatment 시행여부
☐ **operative Tx** 시행
☐ **operative Tx** 시행 안함

13. Injury부터 **Operative Treatment** 까지 시간
☐ **8**시간이내
☐ **24**시간 이내
☐ **48**시간 이내
☐ **48**시간 이후

14. Injury부터 최종 귀병원까지의 도착시간
☐ **4**시간이내
☐ **8**시간 이내
☐ **24**시간 이내
☐ **24**시간 이후

15. Injury부터 귀병원까지 도착할때까지 응급치료는 합당하였다고 생각되는가**?**
☐ 그렇다
☐ 그렇지않다

16. 최종 진단후 환자는 척수 손상에 대하여 인지하고 있었는가**?**
☐ 그렇다
☐ 그렇지않다
☐ 조금 알고 있다

17. 환자의 수술 전과 수술 후 까지 치료상에서의 문제점을 간단히 기술하여 주십시오.

감사합니다.

Fig. 1. Multi-center study, questionnaire survey. 17 contents asked of 6 university spine surgeons.

within 24-hours of injury (44%); 25 cases underwent surgery after 24-hours of injury (53%); 12 cases were brought to a hospital within 4-hours of injury (26%); 11 cases within 8-hours of injury (23 %); 5 cases within 8- to12-hours of injury (11%); 19 cases were brought to a hospital after 24-hour of injury (40%). Simple decompression was performed in 12 cases; decompression and fixation with device via posterior approach were performed in 27 cases; decompression and fixation with device via anterior approach were performed in 7 cases. Before arriving at a hospital, 25 cases received appropriate emergency treatment (53%; high-dosage steroid injection); after the final diagnosis, 30 cases (64%) clearly acknowledged spinal injury (Table 1).

DISCUSSION

The average age of the spinal injury patients was 48.5-years-old, which was higher than the 40.2-year-old average age for Americans based on the National Spinal Cord Injury Center (NSCIC; the U.S.) statistical data of 2005 to 2007. This difference can be attributable to the fact that most Americans obtain their drivers license at 16 years of age, i.e., cultural and systematical differences. On the other hand, the average of American SCI patients was 27.8-years-old, based on the 1973-1979 statistical data; the research of Young et al.[4] showed 28.7-years-old for the average age of SCI patients, which was similar to 27.8; and the reason for this rather young average age increasing to the current age can be reconciled by the fact that the life expectancy has increased since then and also the development of transportation system resulted in a greater number of drivers.[5]

The male:female ratio for this study was 33:14 (70%:30%), and this was not that much different from the NSCIC statistic of 8:2 (80%:20%); we believe that this higher percentage for males is due males tend to have higher activity levels. Eric et al[5] reported that, using the 1973-1998 NSCIC statistical data, the causes of SCIs were traffic accidents 34.3%, falls 19%, gunshots 17%, and diving accidents 7.3%. Stover et al[6] reported that traffic accidents accounted for the most common cause of SCI; the NSCIC statistics also showed that traffic accidents accounted for 41% and falls 27%; however, in our study, falls accounted for the most of SCI causes; in addition, our study showed cervical spine in 7 cases (14%), thoracolumbar in 11 cases (23%), lumbar in 19 cases (40%). Typically, most foreign studies have shown that the most common cause of SCI is cervical spine. Among the patients in the 5-year follow-up research by Dustin et al.,[7] 320 of 675 patients suffered cervical spins injury, 209 thoracic lumbar, and lumbar 46, i.e., cervical spine injury were the most. In our study, studying cauda equina syndrome along with spinal injury contributed to the showing of large number of lumbar injury. In this study, full paralysis and partial paralysis, respectively, were 19 cases (40%) and 28 cases (60%); and among the partial paralysis cases, the cauda equina syndrome was most common with 10 cases, and anterior spinal cord syndrome was 5 cases and Brown-Sequard syndrome was 5 cases. Based on the injury level classifications of the American Society of Spinal Cord Injury (ASIA scale), ASIA A (complete injury; complete loss of all motor and sensory functions including sacral nerve roots 4-5) was in 19 cases, and in partial paralysis cases, ASIA D was the most with 12 cases (26%). And also in the NSCIC statistics, there were more partial paralysis cases with full paralysis cases being 39.8% and partial paralysis cases 59.8%. Although anatomically cauda equina is not included in the spinal cord, in this study cauda equina cases were included with SCIs, and this was due to considering cauda equina syndrome as a syndrome that occurs in nerve damage situations and also due to the fact that textbooks categorize cauda equina syndrome as partial paralysis.

High-dose steroid was administered in 54% of the cases, and the reasons for not administering to the rest stemmed from the differences of opinions among the spine surgeons, priority given for the treatment of injury, association of the patients with internal medical illnesses.[8-12] Among these 25 cases, in 14 cases medicine was administered within 8-hours of injury. In terms of the injection protocol, the NASCIS (National Acute Spinal Cord Injury Study) II was used in 16 cases, and NASCIS III was used in 9 cases. The high-dosage steroid use is much controversial worldwide regarding its effect. Although many clinicians have adhered to the use of high-dosage steroid, due to their peer reviews and legal issues, as reported by McCutcheon et al.[13] there are studies that suggest the initial medical costs increase and the length of hospitalization prolonged; Ito et al.[14] showed that the reality is that there are doubts about steroid use and neurological improvement, and that there are negative sides due

Table 1. Summary of cases of spinal cord injury

No	Sex	Age	Injury mechanism*	Arrival time	Level†	Diagnosis‡	Neurology	ASIA scale	MP injection	Treatment	Complication
1	M	19	FFH	~4 hrs	Cervical	Fx & DL	Complete	A	~3 hrs	Op~8 hrs	
2	F	22	TA	24 hrs~	Cervical	Etc	Complete	A	No record	Op 48 hrs~	
3	M	25	TA	24 hrs~	T+L	Bursting	Incomplete	C	No injection	Op 8~24 hrs	Respiratory
4	M	27	FFH	24 hrs~	C+T+L	Bursting	Complete	A	No injection	Op 48 hrs~	
5	M	29	FFH	~4 hrs	Lumbar	Bursting	Incomplete	D	3~8 hrs	Op 8~24 hrs	
6	F	29	TA	24 hrs~	T+L	Bursting	Incomplete	C	No injection	Op 48 hrs~	
7	M	30	FFH	24 hrs~	Lumbar	Etc	Incomplete	B	No injection	Op~8 hrs	Sore
8	M	31	Postop	~4 hrs	Cervical	Fx & DL	Complete	A	~3 hrs	Op 48 hrs~	
9	M	33	FFH	~4 hrs	T+L	Fx & DL	Complete	A	3~8 hrs	Op 48 hrs~	
10	M	37	TA	24 hrs~	Lumbar	Bursting	Incomplete	D	No injection	Op 48 hrs~	
11	F	38	TA	~4 hrs	Cervical	Fx & DL	Complete	A	~3 hrs	Op 48 hrs~	
12	F	38	Slip down	24 hrs~	Thoracic	Bursting	Incomplete	C	No injection	Op 8~24 hrs	
13	M	40	Postop	4~8 hrs	Thoracic	Fx & DL	Incomplete	B	No injection	Op 8~24 hrs	
14	M	41	Slip down	24 hrs~	C+T+L	Bursting	Incomplete	B	No injection	Op 48 hrs~	Respiratory
15	M	42	FFH	4~8 hrs	T+L	Fx & DL	Complete	A	8~24 hrs	Op 48 hrs~	
16	F	42	TA	~4 hrs	Lumbar	Etc	Incomplete	C	~3 hrs	Op 8~24 hrs	GI bleeding
17	M	43	FFH	24 hrs~	Lumbar	Bursting	Incomplete	D	No injection	Op 8~24 hrs	
18	M	43	FFH	24 hrs~	Thoracic	Bursting	Incomplete	B	No injection	Op 8~24 hrs	
19	F	43	FFH	24 hrs~	Lumbar	Bursting	Incomplete	D	No injection	Op 48 hrs~	
20	M	44	TA	4~8 hrs	T+L	Fx & DL	Complete	A	8~24 hrs	Op~8 hrs	
21	M	44	TA	24 hrs~	Lumbar	Fx & DL	Complete	A	No record	Op 8~24 hrs	
22	M	46	FFH	4~8 hrs	Cervical	Fx & DL	Incomplete	D	3~8 hrs	Op 48 hrs~	Sore
23	M	47	FFH	8~24 hrs	Lumbar	Bursting	Incomplete	D	No injection	Op 48 hrs~	
24	M	49	FFH	4~8 hrs	Thoracic	Bursting	Incomplete	C	3~8 hrs	Op 48 hrs~	
25	M	49	Slip down	4~8 hrs	T+L	Etc	Incomplete	D	No injection	Op 24~48 hrs	
26	F	49	FFH	4~8 hrs	Lumbar	Bursting	Incomplete	E	No injection	Op~8 hrs	
27	F	49	FFH	8~24 hrs	T+L	Bursting	Incomplete	C	No injection	Op~8 hrs	Sore
28	M	50	TA	~4 hrs	Lumbar	Fx & DL	Complete	A	No injection	Op 8~24 hrs	
29	M	51	Direct injury	4~8 hrs	Lumbar	Bursting	Incomplete	B	No record	Op 48 hrs~	
30	F	52	TA	24 hrs~	T+L	Etc	Complete	A	No record	Op 48 hrs~	
31	F	55	FFH	24 hrs~	Lumbar	Etc	Incomplete	C	No injection	Op 48 hrs~	
32	M	56	FFH	8~24 hrs	Lumbar	Bursting	Complete	A	8~24 hrs	Op 48 hrs~	Respiratory
33	M	57	TA	8~24 hrs	T+L	Etc	Complete	A	8~24 hrs	Op 8~24 hrs	
34	F	57	FFH	4~8 hrs	T+L	Etc	Complete	A	8~24 hrs	Op 8~24 hrs	UTI
35	F	57	Slip down	24 hrs~	Cervical	Etc	Incomplete	E	No injection	Op 8~24 hrs	
36	M	58	Slip down	~4 hrs	Cervical	Fx & DL	Complete	A	~3 hrs	Op 8~24 hrs	Sore
37	M	58	FFH	~4 hrs	C+T+L	Fx & DL	Complete	A	~3 hrs	Op~8 hrs	Respiratory
38	F	58	TA	4~8 hrs	Lumbar	Bursting	Incomplete	C	3~8 hrs	Op 48 hrs~	DVT
39	M	62	FFH	4~8 hrs	C+T+L	Bursting	Complete	A	8~24 hrs	Op 8~24 hrs	
40	M	63	TA	24 hrs~	Lumbar	Bursting	Incomplete	D	No record	Op 8~24 hrs	Sore
41	M	67	FFH	~4 hrs	Thoracic	Bursting	Incomplete	D	~3 hrs	Op 48 hrs~	
42	M	67	FFH	24 hrs~	Lumbar	Etc	Complete	A	No injection	Op 48 hrs~	Respiratory
43	F	67	TA	~4 hrs	Lumbar	Bursting	Complete	A	~3 hrs	Op 48 hrs~	
44	M	71	Indirect injury	~4 hrs	T+L	Bursting	Incomplete	C	~3 hrs	Op 24~48 hrs	
45	M	76	Slip down	24 hrs~	Lumbar	Bursting	Incomplete	D	No injection	Conservative	
46	M	78	FFH	24 hrs~	Lumbar	Bursting	Incomplete	D	No injection	Op 48 hrs~	UTI
47	M	86	TA	8~24 hrs	C+T+L	Etc	Incomplete	D	No injection	Op 24~48 hrs	

* FFH: Fall from height injury, TA: Traffic accident, †C: Cervical, T: Thoracic, L: Lumbar, ‡Fx: Fracture, DL: Dislocation

to complications of pneumonia, urinary tract, wound infection, etc. The 2008 study done on Canadians by John[15] reported about the results of an interesting reversal trend in the recent 5 years for "injection:non-injection" mainly influenced by the literatures of negative results of high-dosage steroid use; Peter et al.[16] as well reported that statistically compliance by clinicians for the NASCIS III protocol has decreased, and that the reasons for this was unknown. Similar to the study by Eck[17] which suggested that, although 90% of the spine surgeons are using steroids, only 24% believed that an improved clinical outcome would result from it, we believe that is unclear as to whether the spine surgeons in Korea are convinced of improved clinical outcome from steroid use.

Menon et al.[18] reported that, among the 55 patients who visited the hospital due to urinary tract infection, 31% were quadriplegia, 38% paraplegia, and 7% cauda equina syndrome; Young et al.[4] reported that urinary tract infection among paraplegia was 66% and among quadriplegia 70%. Urinary tract infection has shown a gradually decreasing trend after the mid-90s, and we believe that this decrease is attributable to the availability of appropriate urination method choices and education.[19] Paul et al.[20] reported that complications of urinary tract infection have decreased. In our study, the complications of pressure sores and respiratory mechanisms were the most frequent with 5 cases each and urinary tract infections were in 2 cases.

21 cases underwent surgery within 24-hours of injury (44%); 25 cases underwent surgery after 24-hours of injury (53%); 12 cases were brought to a hospital within 4-hours of injury (26%); 11 cases within 8-hours of injury (23 %); 5 cases within 8- to12-hours of injury (11%); 19 cases were brought to a hospital after 24-hour of injury (40%). In other words, the cases that underwent surgery after 24-hour mostly were due to the delay in reaching the hospital after injury. It has not been reported that cases of undergoing surgery within 24-hours and after 24-hours are different in terms of the rehabilitation results or post-surgery results; only in studies using test animals it was shown that a decompression surgery within 24-hours resulted in more effective outcome for nerve regeneration; clinically, the critical time for surgical treatment has not been identified in any studies.[21] This was merely a case of setting 24-hour period as a convenience metric. However, according a number of studies, based on the generally-accepted concept and as predicted by professional organizations, receiving appropriate treatment more quickly resulted in shorter period of hospitalization and lower treatment costs; considering surgical care as a category of treatment, arriving at a hospital more quickly has importance.[7]

In other countries, full-fledged treatment for spinal cord patients began during the Second World War; the British Medical Council took special interests on the management of spinal cord injury patients, and instituted special care units for spinal injury patients at many hospitals.[4] Under Guttmann's guidance in the 1940s, a new comprehensive spinal rehabilitation unit was installed in Aylesbury, and later this has developed into the Stoke-Mandeville National Spinal Injury Center.[22] In the U.S., Munro[23] created in the Boston Municipal Hospital a 10-bed spinal cord injury unit and started providing comprehensive rehabilitation; under the Federal Veterans Administration, 18 Spinal Cord Injury Centers and 17 Civilian Regional Spinal Injury Center were developed. In addition, in most European countries and in Australia, there are spinal cord injury centers; in Asia, Japan has an integrated spinal cord injury treatment center, however, there are no systemized specialized facilities in Korea that can treat spinal cord patients for early treatment (conservative progress monitoring or surgical treatment) from the time a patient is admitted. However, this study has found that, in more than half of the cases, emergency treatment (high-dose steroid therapy) until hospital arrival has been administered properly, and this is attributable to the upgrade and professionalization of emergency medical system personnel and advancements in equipment and in social cognition. As Sorensen et al.[24] reported about the speed limit and seat belt legislations contributing to reduction in auto traffic accident-caused spinal cord injury, in order to reduce the incidence of spinal cord injury for drivers or industrial workers, the development and activation of training programs that target these individuals are needed, and the revamping of transportation and work environment are needed to reduce traffic accidents and industrial accidents. Tyroch et al.[25] studied spinal cord disabled persons registered with spinal cord injury registration system and reported that 60-70% of the cases were preventable and social support was needed for this; Rish et al.[26] conducted a 15-year follow-up observations of the disabled persons in the United States who were registered under the Vietnam Head and Spinal Cord Injury Registry and

reported about not only the prevalence rates but mortality rates as well; in Denmark, through long-term follow-up studies, it was reported that the cause of death for people with disabilities was changing.[27] In addition, Dustin et al.[7] reported about the differences in treatment costs for 675 patients by dividing them based on spinal injury areas into cervical spine, thoracic, and lumbar; Johnson et al.[28] contributed significantly to the welfare policy by producing the needed co-payments for treatment based on the degree of injury. As shown above, epidemiological studies based on database provide essential and systematic important materials about spinal cord disabled persons, and they are an essential social work for establishing welfare policies.

This study is significant for being a collaborative research by the multicenters of the Spine Research Society at the Korean and Society of Spine Surgery, and, if in future studies the number of participating institutions could be widened countrywide and amass data from a specific time period (annual or over many years), then similar to the U.S. and Europe it will be useful as the essential database for establishing policies for spinal cord injury patients.

CONCLUSION

This study is the first collaborative research by multicenters attempted in Korea for spinal cord injury, and also, as statistics for establishing a database, this study is expected to be used in the future as essential materials for spinal cord injury statistics and a standard for care.

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한국 척수 및 마미 손상 환자의 다기관 공동 역학조사

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연구 계획: 다기관(대학) 공동 연구, 설문 조사
목적: 한국인의 외상성 척수 손상에 대한 정확한 역학 조사가 이루어져 있지 않아 환자의 진단과 치료의 기준이 모호한 상태이다. 여러 대학과 공동으로 우리 나라 척수 손상의 전반적인 수상 기전, 양상, 치료 등에 대해 알아보고 외국의 여러 통계과 비교하여 척수 손상에 대한 기초 자료로 활용하고자 한다.
선행 문헌의 요약: 다기관 공동으로 시행된 척수 손상에 대한 유병율 및 치료 실태에 대한 기존의 국내 조사는 없었다.
대상 및 방법: 2006년 9월부터 2009년 8월까지 6개 대학 병원으로 내원한 척수 손상 환자 47예를 후향적으로 연구하였다. 환자의 수상 부터 치료에 이르는 과정을 확인 할 수 있는 17개의 항목을 작성하였고 설문지 양식으로 배포한 후 답변 자료를 수집하였다.
결과: 척수 손상 환자의 평균 연령은 평균 48.4세, 남녀 비는 33:14였다. 수상 기전은 낙상 22예(47%), 수상 부위는 요추가 19예(40%), 척추 손상으로는 불안정 방출성 골절이 24예(51%)로 가장 많았다. 완전마비와 불완전 마비는 19예(40%), 28예(60%), 진단 후 고용량 스테로이드는 25예(54%)에서 투여하였고, 투여 방법은 NASCIS Ⅱ 16예, Ⅲ 9예였다. 14예에서 합병증이 발생하였고, 1예를 제외한 46예(98%)에서 수술을 시행하였다. 수상 후 내원시까지의 시간은 4시간 이내 12예(26%), 8시간 이내 11예(23%)였고, 병원 도착 전까지 응급치료는 25예(53%)에서 적절하게 이루어졌고 최종 진단 후 환자는 척수 손상에 대하여 30예(64%)에서 명확히 인지를 하고 있었다.
결론: 본 연구는 국내에서 최초로 시도된 척수 손상에 대한 다기관의 공동 연구이며, 데이터베이스 구축을 통한 통계 조사로 향후 척수 손상의 통계, 치료의 기준 제시 등에 중요한 자료로 이용될 수 있을 것으로 사료된다.

색인 단어: 척수 손상, 다기관 공동 연구, 유병율
약칭 제목: 척수 손상에 대한 다기관 공동 연구