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Trauma

Pitfalls in treatment of acute cervical spinal cord injury using high-dose methylprednisolone: a retrospect audit of 111 patients

Han-Chung Lee, MD, Der-Yang Cho, MD*, Wen-Yuan Lee, MD, Hao-Che Chuang, MD

Department of Neurosurgery, China Medical University Hospital, Taichung, Taiwan 404, ROC

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Abstract

Background: Earlier studies suggested that the use of high-dose IV MP was the gold standard of care for the treatment of ASCI, but this has been debated. This study aims to identify the effects of high-dose MP in treatment of cervical SCI and how the treatment might be improved.

Methods: The medical records of 138 patients with cervical spinal injury secondary to blunt injuries were retrospectively reviewed to determine the steroid administration protocol, effects, and complications. The findings on admission were compared with those at discharge and at the most recent outpatient follow-up visit. Significant neurologic improvement was defined as increase in at least 1 clinical grade according to the Frankel classification system.

Results: Significantly more motor and sensory recovery was noted (complete ASCI, 69% vs 0; incomplete ASCI, 70% vs 50%) in patients treated with surgery and MP than in patients without such treatment. Moreover, 87% (14/16) of patients with complete ASCI (unlike patients with incomplete [8/28, 28.6%] and mild [2/14, 14.3%] ASCI) treated with MP had steroid-related complications, and 1 patient died from sepsis related to a perforated peptic ulcer. Mean hospitalization was significantly shorter for the patients who underwent tracheostomy (49 days, ranged from 22 to 110 days) vs nontracheostomy(94 days, ranged from 28-268 days).

Conclusion: Early intervention with surgery and MP is critical. Although treatment with MP for 24 or 48 hours significantly improves motor and sensory function of patients with ASCI, harmful side effects limit its functional efficacy in patients with complete ASCI. Early tracheostomy can shorten hospital stay in patients with complete ASCI.

Keywords: Acute spinal cord injury; Methylprednisolone; NASCIS; EMT; Tracheostomy

1. Introduction

Accidents are the fourth leading cause of death in Taiwan and an even more common cause of death in the second and third decades. Paralysis by trauma to the spinal cord is one of the most physically disabling and psychologically devastating conditions. Its socioeconomic impact is significant depending on the level of independence. The high-dose intravenous MP protocol has become the standard of care for ASCI since publication of the NASCIS II and III in 1990 and 1997 [3,4]. The authors reported that MP, when administered within 8 hours of injury, resulted in statistically significant motor and sensory recovery in both complete and incomplete SCI. However, whether the NASCIS actually showed the benefits of high-dose MP [18] is debatable because of its harmful side effects. This study aimed to evaluate the effects of high-dose MP in treatment of cervical SCI and to

Abbreviations: ASCI, acute spinal cord injury; EMT, emergency medical team; IV, intravascular; MP, methylprednisolone; NASCIS, National Acute Spinal Cord Injury Studies; SCI, spinal cord injury.

* Corresponding author. Tel.: +886 4 22052121x4434; fax: +886 4 22062121x4435.

E-mail address: braintumorgbm@yahoo.com.tw (D.-Y. Cho).

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Table 1
Frankel classification system

A	No sensory or motor function distal to neurologic lesion (complete injury)
B	Sensory sparing only
C	Motor sparing that is not functional (ie, motor strength is not sufficient to permit or significantly ease performance of activities of daily living)
D	Motor sparing that is functional
E	Complete recovery

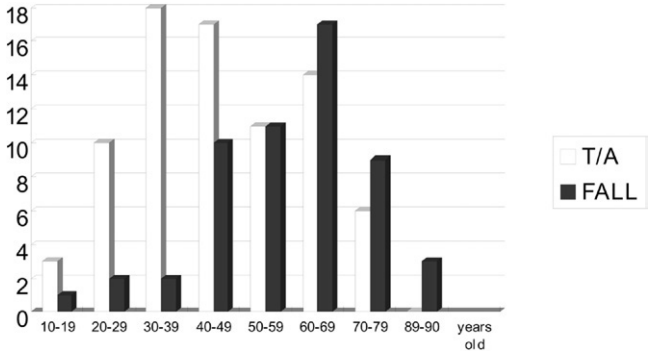
determine how these effects might be improved and the side effects reduced.

2. Patients and methods

Between January 2002 and December 2003, 138 patients with cervical spinal injury secondary to blunt injuries were admitted to China Medical University Hospital, Taichung, Taiwan, ROC. This 1300-bed hospital and the attached multispecialty clinic serve as a referral trauma center for middle Taiwan. Patients are often treated at smaller community hospitals before transfer to this hospital. Inpatient and outpatient records were retrospectively reviewed. The database included sex, age, date and time of injury, mechanism, date of referral and admission, associated injuries, length of hospital stay, and surgical interventions. Serial neurologic evaluations were performed by 1 of 5 neurosurgical attending staff. The findings on admission were compared with those at discharge and at the most current outpatient follow-up visit. Significant neurologic improvement was defined as increase of at least 1 clinical grade according to the Frankel classification system, which describes degrees of distal sensory and motor preservation after spinal injury (Table 1) [1,12,21].

Records were also reviewed to determine which steroid administration protocols were used and whether the high-dose protocol as outlined in NASCIS II and III was used. The time interval between injury and the onset of steroid administration was determined. All complications were listed.

Table 2
Age distribution of incidence of injuries stemming from T/A and falls



T/A indicates traffic accident.

Table 3
Demographic and clinical characteristics of patients with SCI

Feature	Total population and % of total		
	Complete SCI	Incomplete SCI	Mild incomplete SCI
Age (y)			
Range	22-82	10-86	18-78
Mean	47.5	49	45
<40	5 (20%)	16 (36%)	11 (26%)
40-60	9 (36%)	12 (27%)	15 (37%)
>60	11 (44%)	17 (37%)	15 (37%)
Total (patients)	25	45	41
Sex			
Male	16 (64%)	29 (65%)	26 (64%)
Female	9 (36%)	16 (35%)	15 (36%)
Injury mechanisms			
Falls	13 (52)	16 (36%)	12 (27%)
Road traffic accidents	10 (40%)	27 (60%)	29 (73%)
Diving mishaps	2 (8%)		
Miscellaneous		2 (4%)	
Injury level			
C1-C2	3 (10%)	3 (7%)	
C3-C5	15 (60%)	31 (69%)	28 (70%)
C6-C7	7 (30%)	11 (24%)	13 (30%)
Injury severity score			
Range	18-36	13-34	8-22
Mean	20	16	11

3. Results

Of the 138 patients with cervical spinal injury (44 female and 94 male; mean age, 48.5 years [range 10-86 years]) treated between January 2002 and December 2003,

Table 4
Results of treating complete and incomplete SCI

Features	Total population		
	Complete SCI	Incomplete SCI	Mild SCI
Rate of surgery	18/25	31/45	26/41
No. using MP	16	28	14
Rate of complication related to MP use	14/16	8/28	2/14
Survival rate	23/25	45/45	41/41
Length of hospitalization (d)	28-268	4-116	
Mean hospital stay (d)	71.8	21.6	
Significant improvement in Frankel scale score			
OP	0/7	4/8	
MP + OP	11/16	21/31	
EMT transferred directly	9/12	14/19	
Complete recovery rate	0	4/19	
Transferred from clinics	2/4	7/12	
Complete recovery rate	0	1/12	

OP indicates surgery.