

Clinical Article

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An Experience of Management of Homeless Neurosurgical Patients

Objective : Homeless patients probably have epidemiologic features that are different from those of general population. However, there have been no published articles about clinical characteristics of neurosurgical homeless patients. The authors tried to assess the clinical characteristics and treatment outcome of homeless neurosurgical patients.

Methods : We retrospectively reviewed the medical records and radiological films of 76 homeless patients and 72 non-homeless patients following head trauma who were admitted to our neurosurgical department between June 2001 and June 2005. We compared two groups of the patients with the demographics, the clinical and laboratory characteristics. Also, 30-day mortality was determined according to Glasgow Coma Scale (GCS) score.

Results : Age of homeless patients was younger than that of non-homeless patients. Homeless patients had previous craniotomy evidences in skull x-rays more frequently (10.5% vs. 1.4%). Acute subdural hematoma was the most common type of head injury in the two groups. Moderate and severe head injury, based on GCS score on admission was more frequent in homeless patients (64% vs. 39%). Fifty percent of homeless patients underwent operation for traumatic head injury. However, 30-day mortality according to GCS score was not significantly higher in homeless patients.

Conclusion : Most homeless neurological patients were relatively young men. Also, moderate or severe brain injuries were observed more frequently. However, mortality rate of homeless patients in neurosurgical field is not significantly higher in the present study.

KEY WORDS : Homeless persons · Craniocerebral trauma · Treatment outcome.

INTRODUCTION

“Homelessness” is defined as the inability to secure regular housing when such housing is desired¹⁹⁾ and it is a major social problem in both developing and wealthy countries. Recently, there are rapid increase in the number of homeless people during the last years. It is well known that thousands of homeless people live in Seoul’s subway stations and parks⁹⁾.

Homeless people generally have poor economical state and low social status. They have no houses and no regular occupations. They are also estranged from a community. A number of homeless people have psychological problems as well as medical illnesses^{1,5,11,12,15)}. They are predisposed to infections and frequent trauma because of physical and psychological problem and lack of hygiene^{2,6)}. However, homeless patients are likely to be behind the modern medical care in spite of severe illness. Emergency room of the public hospital is often the only source of care for homeless patients following medical illness or injury.

There are only limited data on an epidemiology, clinical characteristics and treatment outcome of homeless patients. Authors have tried to assess the clinical characteristics and treatment outcome of homeless neurosurgical patients.

MATERIALS AND METHODS

“Homeless patients” were defined as those with illness or injury without physical shelter who sleep outdoors, in vehicles, abandoned buildings, subways, parks or other places not intended for human habitation. In present study, we excluded some homeless patients whose identifications could not be made because of inaccuracy of data. From June 2001 and June 2005, a total of 76 homeless patients (71 men and 5 women) was admitted via emergency room due to head trauma to our neurosurgical department. Seventy-two, non-homeless patients

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(60 men and 12 women) with head injury were also selected randomly as a control group. The medical records and radiological films of homeless and non-homeless patients were reviewed retrospectively. All homeless patients were taken to emergency room of our hospital by ambulance with police officers. The duration between the onset of injury and time to admission and past medical history could not be checked because of impaired consciousness or poor compliance. On admission, patients' demographic data including age, sex, past medical histories were documented. Age of homeless patients was checked by their identification card or identified retrospectively after recovery of consciousness as a result of appropriate treatment. Physical and neurological examinations were initially carried out and then radiological films including chest x-ray, skull x-rays and computed tomography of brain were obtained. Blood samples for laboratory data were obtained before management or operation. Homeless patients with large intracranial hematoma with severe neurological deficit, midline shift underwent evacuation of hematoma and decompressive surgery.

We compared two groups of the patients with the demographics, the radiological characteristics (previous craniotomy evidence, the main lesion types including subdural hematoma, epidural hematoma, intraparenchymal contusions or hematoma, subarachnoid hemorrhage). We divided two groups into mild (13-15), moderate (9-12) and severe (3-8) degree according to GCS score on admission and measured the statistical difference between two groups. We also assessed the laboratory data including various serum titers of infectious disease (hepatitis B surface antigen, hepatitis C virus antibody, human immunodeficiency virus antibody, venereal disease research laboratory (VDRL)) and hepatic enzymes (aspartate aminotransferase and alanine aminotransferase). Also, 30-day mortality was determined according to GCS score.

For the statistical comparison, we performed a Student's t-test and Chi-square test using SPSS 12.0 for windows. Statistical significance was determined at p-values less than 0.05.

RESULTS

There were 71 men and 5 women among 76 homeless patients admitted due to traumatic head injury. Most of homeless patients had poor hygiene. Age of homeless patients was younger than that of non-homeless patients. Moderate and severe head injury based on GCS score on admission was more frequent in homeless patients (64% vs. 39%). On the other hand, 44 of non-homeless patients had a higher proportion of mild head injury (61%). Also, there was statistically significant difference between two groups on age, the clinical grade according to GSC score ($p < 0.001$).

Table 1. Demographics and clinical findings of homeless and non-homeless patients

	Homeless (N=76)	Non-homeless (N=72)	p-value
Age (years)			0.044
<50 (%)	36 (47)	22 (30)	
≥50 (%)	40 (53)	50 (70)	
Sex			>0.05
male	71	60	
female	5	12	
GCS score on admission			<0.001
3-8 (No. of patients) (%)	20 (26)	15 (21)	
9-12 (No. of patients) (%)	29 (38)	13 (18)	
13-15 (No. of patients) (%)	27 (36)	44 (61)	
No. of previous craniotomy (%)	8 (10.5)	1 (1.4)	0.034
Lesion type			>0.05
SDH	35	30	
IPCH	18	15	
EDH	12	13	
SAH	6	5	
Others [†]	5	9	
No. of operated patients (%)	38 (50)	18 (25)	0.002

*N : total number of patients, GCS : Glasgow coma scale, SDH : subdural hematoma, IPCH : intraparenchymal contusion or hematoma, EDH : extradural hematoma, SAH : subarachnoid hemorrhage, [†]Others: skull fracture or cerebral concussion

Table 2. Laboratory findings of homeless and non-homeless patients

	Homeless	Non-homeless	p-value
Infectious disease markers			
HBsAg (%)	5/54 (8.5)	2/70 (2.8)	>0.05
HCV Ab (%)	6/35 (14.6)	2/70 (2.8)	0.026
HIV Ab	-	-	-
VDRL (%)	6/60 (10)	1/72 (1.4)	0.046
Hepatic enzymes			
AST (unit/liter)	123.1 ± 114.6	40.7 ± 32.8	<0.001
ALT (unit/liter)	46.8 ± 41.5	30.0 ± 23.5	0.006

HBsAg : hepatitis B surface antigen, HCV Ab : hepatitis C virus antibody, HIV Ab : human immunodeficiency virus antibody, VDRL : venereal disease research laboratory, AST : aspartate aminotransferase, ALT : alanine aminotransferase

Table 3. Thirty-day mortality of homeless patients according to GCS score on admission

	Homeless	Non-homeless	p-value
30 days mortality according to GCS score on admission (%)			>0.05
3-8 (%)	9 (45)	6 (40)	
9-12 (%)	2 (6.9)	1 (7.7)	
13-15 (%)	-	-	
Total (%)	11 (14.5)	7 (9.7)	

GCS : Glasgow coma scale

Eight of homeless patients had previous craniotomy evidences in skull x-rays (10.5% vs. 1.4%). Acute subdural hematoma was the most common type of head injury in two groups. Thirty-eight (50%) of homeless patients underwent decompressive surgery for traumatic head injury (50% vs.

25%) ($p < 0.05$). Table 1 summarizes the demographic data, the clinical and radiological findings of homeless patients.

The positive rate of hepatitis C virus antibody in homeless patients was higher than non-homeless patients (14.6% vs. 2.8%). Six of homeless patients were positive for VDRL (10% vs. 1.4%). There was no human immunodeficiency virus antibody positive patient. Aspartate aminotransferase and alanine aminotransferase of homeless patients was 123.1 ± 114.6 unit/liter (U/L) and 46.8 ± 41.5 U/L and are higher than non-homeless patients ($p < 0.05$). The positive rate of hepatitis B surface antigen showed no significant difference between two groups. Other laboratory findings were within normal limit. Table 2 showed laboratory findings of homeless and non-homeless patients.

Thirty-day mortality of homeless patients was determined according to GCS score on admission (Table 3). Mortality cases of homeless patients with moderate or severe head injury (GCS score 3-12) were 11 (22%). On the other hand, 7 (25%) of non-homeless, moderate or severe grade patients resulted in fatal outcomes. Thirty-day mortality according to GCS score was not significantly higher in homeless patients ($p > 0.05$).

DISCUSSION

“Homeless people” refer to those who are sleeping in shelters for the homeless and those without physical shelter who sleep outdoors, in vehicles, abandoned buildings or other places not intended for human habitation⁷. Most of homeless persons are relatively young men^{6,8,11}. This is likely to be related to social and psychological factors of men in industrialized urban.

Homeless people have many psychological, psychiatric problems as well as medical illness^{1,5,11,12,15}. Prevalence rates of chronic alcoholism and psychiatric disorders are much higher in homeless people than in the general population^{5,15}. In addition, many homeless people are exposed to infectious disease such as hepatitis, tuberculosis, acquired immune deficiency syndrome and other sexually transmitted diseases^{1,11,12,15}. Also, they tend to be susceptible to various trauma because of frequent violence, high prevalence of alcoholism and psychiatric problems^{2,6}. Nevertheless, they face many barriers that impair their access to medical care. Homeless people often obtain their medical care in public hospital's emergency room which are likely to be the only source of care for the homeless persons following medical illness or injury¹⁴. Most of those who were detected by citizens in delayed fashions and have been brought to the emergency room of the public hospitals by police officers while the others has been referred from smaller hospitals and institutions for the homeless⁸. They

have a high proportion of hepatitis C virus¹⁷. Abnormalities of liver functions are also frequently observed in homeless persons. It may be due to their hepatitis and chronic alcoholism^{3,4}. They also have a greatly increased risk of death^{6,16}. The main cause of death of homeless patients in the emergency room were pneumonia and intracranial hemorrhage⁸. Some studies also reported that homeless patients most commonly admitted to medical and neurosurgical department⁸.

Homeless persons tend to be more susceptible to traumatic injury than general population. It is maybe related to behavior patterns of the homeless such as excess alcohol intake and fights^{10,20}. Approximately 47% of homeless people in Seoul are chronic alcoholics⁵. Alcoholism has been identified as a strong correlate of traumatic injury in the homeless²². Antisocial personality disorder is more prevalent in homeless people and it is also possible that antisocial persons are likely to be involved in fight^{13,18}.

Injury or disease severity of homeless patients seems to be remarkably higher than that of general population²¹. Moderate or severe brain injury is likely to be more frequent in homeless patients as shown in this study. On the other hand, non-homeless patients had a higher proportion of mild head injury. It may probably be due to social, psychological factors such as delayed rescue following traumatic injury, less attention to health care and need for medical services, extreme poverty, and non-adherence to therapy²¹.

In general, mortality rates of homeless patients are much higher than that of general population^{6,8,16}. Some studies reported that their mortality rates were 8-9 times higher for males, 31 times higher for females and higher for young persons^{6,16}. However, in neurosurgery field, treatment outcome of the homeless patients has not been reported in the literature. Treatment outcome of homeless neurosurgical patients was also expected to be more serious. But, mortality rates according to GCS score were not significantly higher in homeless patients. This may be probably due to a small number of homeless neurosurgical patients with head injury.

The limitations of the present study are a small number of homeless neurosurgical patients and lack of informations that may have provided by the accompanied police officers or rescue members. In the future, further prospective studies of treatment outcome of homeless neurosurgical patients are mandatory.

CONCLUSION

Most of homeless neurosurgical patients were relatively young men. Moderate or severe brain injury also seems be more frequent. It is probably because of their behavior

patterns, social and psychological factors. However, mortality rate of homeless patients in neurosurgical field is not significantly higher in the present study. A large, randomized, and community-based study should be performed to determine treatment outcome of homeless neurosurgical patients.

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COMMENTARY

This is a unique report on the results of head injuries in homeless people, whose health condition including the immunity is very poor. This report can be an important data on this special group. We can confirm the fact that their health condition is so critical. Despite of the fact that the homeless patients were younger than the non-homeless patients, there were more severe or moderate head injuries, and the need of surgical treatment was more common in the homeless people. The incidence of previous craniotomy and the evidences of liver disease were higher in the homeless patients than the non-homeless patients. Although the mortality rate was not significantly different from each other according to the GCS on admission, which may be a bias from the age distribution, it is necessary to have more concerns on these vulnerable people. Besides the mortality rate, the quality of life might be more critical after head injury in these compromised people.

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