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An Analysis of Patients with Traumatic Intracranial Hemorrhaging Transported By Private Car

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Original Research Article

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Abstract: We performed a retrospective analysis of patients with head injury who visited our center by foot or in a private car in order to clarify the clinical features of acute intracranial hemorrhaging among such patients. A medical chart review was performed from October 2012 to September 2017 for patients with head injury who visited the acute critical care center of Numazu City Hospital by foot or in a private car. The inclusion criterion was traumatic acute intracranial hemorrhaging (ICH) on initial computed tomography (CT). The exclusion criterion was subacute or chronic ICH. The patients' sex, age, history, activities of daily living, complications, initial Glasgow coma scale, systolic blood pressure, heart rate, duration of hospitalization and Glasgow Outcome score were investigated. During the study period, there were five acute subdural hematomas and two acute epidural hematomas. The elderly patients had dementia or amnesia, and the infants had vomiting. All subjects were judged as behaving different from usual by their family. The GCS ranged from 14 to 15, and the vital signs of all subjects were normal. All subjects obtained a survival outcome by conservative therapy. In this study, the rate of ICH among the patients who visited the acute critical care center by foot or in a private car was 7%. If family members sense something about a patient is different from usual, then head CT should be performed to evaluate the presence of intracranial lesions.
Keywords: head injury, computed tomography (CT), intracranial hemorrhage, acute epidural hematomas.

INTRODUCTION

Numazu City Hospital has an acute critical care center including trauma treatment corresponding to a level 1 center in the United States. Due to the limited medical resources in this area, this center sometimes treats patients who have mild injuries or illnesses who visit the center directly or after triage by telephone. Most patients with mild injuries or illnesses are transferred to local night and holiday clinics by telephone triage administered by nurses.

Head injury is a common reason for visiting the emergency department, but few studies have evaluated the demographics and characteristics of walk-in patients with a head injury in Japan [1,2]. In addition, research on head injury is rarely performed for all-age groups.

Numazu City Hospital treats patients of all ages [3]. Accordingly, we performed a retrospective analysis for patients with head injury who visited this center by foot or in a private car in order to clarify the clinical features of such patients.

METHODS

The protocol of this retrospective study was approved by the review board of Numazu City Hospital and Juntendo Shizuoka Hospital, and all examinations were conducted in accordance with the standards of good clinical practice and the Declaration of Helsinki.

Numazu City Hospital has 426 beds and is a medical emergency center in eastern Shizuoka Prefecture, located near Tokyo, serving a population of approximately 190,000. A shortage of medical resources, including physicians, is a problem at Numazu City Hospital, so staff from the Department of Acute Critical Care Medicine at Shizuoka Hospital, Juntendo University, support this hospital.

A medical chart review was performed from October 2012 to September 2017 for patients with head

injury who visited the acute critical care center of Numazu City Hospital by foot or in a private car. The inclusion criterion was traumatic acute intracranial hemorrhaging (ICH) on initial computed tomography (CT). The exclusion criterion was subacute or chronic ICH. The patients' sex, age, history, activities of daily living, complications, initial Glasgow coma scale, systolic blood pressure, heart rate, duration of hospitalization and Glasgow Outcome score were investigated.

RESULTS

During the study period, 23,613 patients were treated in this acute critical care center. Among them, 1742 were treated by neurosurgeon. A total of 106 of these patients visited the center by foot or in a private car; 60 had soft tissue injury, 25 had chronic subdural hematoma (CSDH), 5 had cerebral concussion, 4 had skull fractures, 3 had cervical sprain, 1 had cervical spinal cord injury, 5 had acute subdural hematoma (ASDH), 2 had acute epidural hematoma (AEDH) and 1 had subacute EDH. Accordingly, the 5 with ASDH and 2 with AEDH were defined as the subjects.

The subjects' background characteristics are summarized in Table 1. The elderly patients had dementia or amnesia, and the infants had vomiting. All subjects were judged as behaving different from usual by their family. The GCS ranged from 14 to 15, and the vital signs of all subjects were normal. All subjects were able to survive by conservative therapy.

Table-1: Background of subjects

No.	Age	Sex	Mechanism	Transport	Reason for visit	ADL	PH
1	82	female	Fall	Family car	Appetite loss	Independent	Dementia
2	77	female	Fall	Family car	Mopey	Dependent	NPH, DM, depression,
3	77	male	Fall	Family car	Amnesia	Independent	Cerebral infarction,
4	70	female	Fall	Family car	Amnesia	Independent	none
5	0	male	Fall	Family car	Vomiting	Dependent	none
6	0	male	Fall	Family car	Vomiting	Dependent	none
7	0	male	Fall	Family car	Mopey, vomiting	Dependent	none

ADL: activities of daily living, Dx: diagnosis, PH: past history, NPH: normal pressure hydrocephalus, DM: diabetes mellitus

Table-2: The vital sign, diagnosis, treatment and outcome of subjects

No.	GCS	BP (mmHg)	HR (BPM)	Diagnosis	AIS	Operation	Duration (days)	GOS
1	14	138	85	ASH	3	no	10	3
2	14	145	91	ASH	4	no	3	2
3	14	104	56	ASH	3	no	14	1
4	15	170	100	AEH	3	no	4	1
5	15	110	130	AEH	3	no	3	1
6	15	85	130	ASH	3	no	3	1
7	15	not measured	133	ASH	3	no	0	1

GCS: Glasgow coma scale, BP: blood pressure HR: heart rate, BPM: beats per minute, AIS: abbreviate injury scale, Duration: duration of hospitalization, GOS: Glasgow outcome score

DISCUSSION

In this study, the rate of ICH among the patients who visited the acute critical care center by foot or in a private car was 7%. The decision to visit an acute critical care center was made by the patient's family based on the patient having a different attitude from usual.

Yokokawa *et al*. reported the results of an analysis of 1,153 cases of head injury who visited a medical facility that treated patients with minor to severe injuries[1]. In their report, there were 17 cases (1.4%) who required admission due to ICH. Among them, five needed emergency operations. In addition, there were 10 cases (0.8%) who had ICH who underwent observational treatment as outpatients. Accordingly, a total of 27 cases (2.2%) had ICH. Takayanagi *et al.* reported the results of an analysis of 388 cases with head injury who visited their medical facilities by foot [2]. Among them, there were 1.3% cases of ICH and 0.3% of cases requiring emergency operation. We observed a greater incidence of ICH among head injury patients who arrived on foot in the present study than in their previous study. This may be due to our telephone triage system, in which patients are occasionally redirected from Numazu City Hospital to night and holiday medical clinics.

There are many indications for necessary or potentially necessary CT among patients with minor

head injury [4-9]. The representative indications are a decrease in the consciousness level, convulsions, repeated vomiting, a high age and coagulopathy. Senile patients in particular require careful management, as they may have significant intracranial lesions despite a clear consciousness [10,11]. All seven of the present cases met at least one of these indications for a CT examination. This study further revealed the importance of the family's judgment regarding differences in behavior, as they are familiar with the usual behavior of the patient, similar to PECARN's rule for children [4].

There are several limitations associated with this study, including its retrospective design and the small number of cases. We also excluded cases of minor head wounds among patients redirected to other medical clinics by telephone triage. Therefore, future prospective studies involving a greater accumulation of patients are needed to further examine this issue.

CONCLUSION

In this study, the rate of ICH among the patients who visited the acute critical care center by foot or in a private car was 7%. If family members sense something about a patient is different from usual, then head CT should be performed to evaluate the presence of intracranial lesions.

Conflicts of interest

No benefits were received from any commercial parties related directly or indirectly to the study.

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