Variations of S-100B in early phases of head trauma

Study design A prospective database data analysis.

Inclusion criteria Patients with SAH admitted from the 1st to the 12th day after bleeding.

Data analyzed Age, sex, clinical grade according to WFNS classification, outcome according to Glasgow Outcome Scale (GOS), FC accomplished with the first computerised tomography scan, and vasospasm confirmed by angiography.

Statistical analysis Positive predictive value, negative predictive value, sensitivity, specificity, likelihood ratio for a positive test result and likelihood ratio for a negative test result.

Results From 1 October 1990 to 1 October 2001, 1090 patients were admitted to ENERI. Among these 443 completed the inclusion criteria. The mean age was 48 ± 13 years, 33% were male, 26% were in WFNS grade 1, 23% in grade 2, 24% in grade 3, 21% in grade 4 and 6% in grade 5. The outcome was: GOS 1: 9%, GOS 2: 1%, GOS 3: 6%, GOS 4: 9%, GOS 5: 74%. Among the aneurysms, 359 belong to the anterior circulation (AC) and 89 to the posterior circulation (PC). Regarding vasospasm, it was developed in 46% of the patients, 48% in the AC group and 40% in the PC group.

Conclusion FC is not a good predictor of vasospasm development in SAH patients treated with endovascular procedures.

Table 1

	Fisher data (spasm)	Our series (spasm)
Fisher 1	0%	28%
Fisher 2	9%	41%
Fisher 3	95%	51%
Fisher 4	23%	50%

Table 2

Positive predictive value	37%
Negative predictive value	59%
Sensitivity	51%
Specificity	56%
Likelihood ratio for a positive test	0.84
Likelihood ratio for a negative test	0.87

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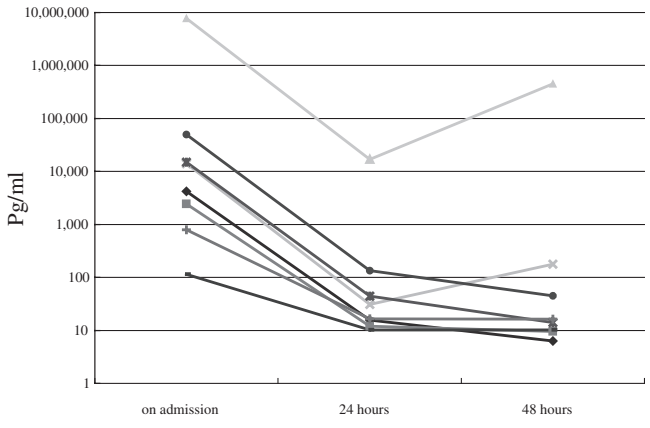
Background S-100 protein is an acidic calcium-binding protein found in astroglia and Schwann cells. Recently, there have been several reports on the relation of the severity of head injury and serum S-100B protein levels in trauma patients, but there are few reports about time course of S-100B protein in the early phase of head injury. In many previous reports, S-100B was reported in units of μg/l. Lately, a new device (YK-150) was developed that can measure serum S-100B protein in pg/ml units.

Objective We showed the course of the concentration of serum S-100B in the acute phase of head injury using the YK-150.

Patients and methods S-100B serum levels were determined in 10 patients (eight men, two women; mean ± SD, 50.1 ± 20.2 years). There were two cases of severe head injuries (Glasgow Coma Scale [GCS] <9). Blood samples were taken on admission, 24 and 48 hours after the traumas. Serum S-100B protein concentrations (pg/ml) were measured by ELISA (Yanaihara Industry, Tokyo, Japan).

Results Initial serum S-100B concentrations were elevated (minimum, 790 pg/ml; maximum, 7,749,669 pg/ml; mean, 979,666 pg/ml). All patients whose serum S-100B concentrations compared with the first-time value decreased at the second point, 24 hours after injury (minimum, 10.1 pg/ml; maximum, 16,990 pg/ml; mean, 5994 pg/ml). After 48 hours, only two patients showed an increase of serum S-100B concentrations and one of these showed the highest level of serum S-100B and died on day 28 (Fig. 1).

Figure 1



Discussion and conclusion Many studies have been done on S-100B that have shown the relation between initial data and poor prognosis. We have also shown patients with slight head injuries who were conscious (GCS >8) and whose elevated serum S-100B concentrations decreased in the next 24 hours. We suspect it was only the cerebral cell damage that caused the initial increase of serum S-100B concentrations in these head injuries. If there is no secondary brain damage, serum S-100B concentrations will immediately decrease. The YK-150 (Human S-100B ELISA kit) can measure serum S-100B concentrations in 22 ± 4 hours. Using the YK-150, if we can detect a slight variation in early-phase secondary brain damage, we can accurately predict what changes will take place in the patient; and if so, YK-150's efficacy will spread even further.