# Independent predictors for recurrence of chronic subdural hematoma

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## Introduction

Numerous factors potentially associated with recurrence of chronic subdural hematoma have been reported, but the factors influencing their recurrence have not been sufficiently investigated yet. We evaluated the risk factors of recurrence.

## Methods

We analyzed the data of 420 patients with chronic subdural hematoma treated by a standard surgical procedure for hematoma evacuation in our institution.

## Results

Ninety-two (21.9 %) patients experienced at least one recurrence of chronic subdural hematoma during the study period. The recurrence rate was 7 % for the homogeneous type, 21 % for the laminar type, 38 % for the separated type, and 0 % for the trabecular type. The rate of recurrence was significantly lower in the homogeneous and trabecular type than in the laminar and separated type.

We performed a multivariate logistic regression analysis and found that postoperative midline shifting (OR, 3.6; 95 % CI, 1.618-7.885; p00.001), diabetes mellitus (OR, 2.2; 95 % CI, 1.196-3.856; p=0.010), history of seizure (OR, 2.6; 95 % CI, 1.210-5.430; p=0.014), width of hematoma (OR, 2.1; 95 % CI, 1.287-3.538; p=0.003), and anticoagulant therapy (OR, 2.7; 95 % CI, 1.424-6.960; p=0.005) were independent risk factors for the recurrence of chronic subdural hematoma.

**Table 1 Baseline characteristics**

| | No recurrence group | Recurrence group | *p* value |
|---|---|---|---|
| Total number (*n*) | 328 (78.1 %) | 92 (21.9 %) | |
| Age (year) | 68.37±11.67 | 70.60±11.02 | 0.112* |
| Male/female | 264/64 | 70/22 | 0.381* |
| Hypertension | 98/328 (29.9 %) | 28/92 (30.4 %) | 0.918* |
| Diabetes mellitus | 47/328 (14.3 %) | 26/92 (28.3 %) | 0.002* |
| Liver disease | 28/328 (8.5 %) | 17/92 (18.5 %) | 0.009* |
| Drug history | | | |
| Antiplatelet | 80/328 (24.4 %) | 37/92 (40.2 %) | 0.004* |
| Anticoagulant | 20/328 (6.1 %) | 14/92 (15.2 %) | 0.007* |
| Cause | | | 0.871* |
| Trauma | 184/328 (56.1 %) | 53/92 (57.6 %) | |
| Postoperative | 6/328 (1.8 %) | 1/92 (1.1 %) | |
| Unknown | 138/328 (42.1 %) | 38/92 (41.3 %) | |
| History of seizure | 24/328 (7.3 %) | 14/92 (15.2 %) | 0.024* |
| Hematoma location | | | 0.169* |
| Right side | 126/328 (38.4 %) | 26/92 (28.3 %) | |
| Left side | 149/328 (45.4 %) | 51/92 (55.4 %) | |
| Bilateral | 53/328 (16.2 %) | 15/92 (16.3 %) | |
| Width of hematoma | 20.29±6.48 mm | 22.06±6.41 mm | 0.007* |
| <20 mm | 171/328 (52.1 %) | 33/92 (35.9 %) | |
| ≥20 mm | 159/328 (47.9 %) | 59/92 (64.1 %) | |
| Hematoma density | | | |
| Low density | 41/328 (12.5 %) | 6/92 (6.5 %) | |
| Iso density | 143/328 (43.6 %) | 35/92 (38.0 %) | |
| High density | 19/328 (5.8 %) | 1/92 (1.1 %) | |
| Mixed density | 125/328 (38.1 %) | 49/92 (53.4 %) | |
| Internal architectures | | | |
| Homogeneous type | 144/328 (43.9 %) | 11/92 (12.0 %) | |
| Laminar type | 78/328 (23.8 %) | 35/92 (38.0 %) | |
| Separated type | 76/328 (23.2 %) | 46/92 (50.0 %) | |
| Trabecular type | 30/328 (9.1 %) | 0/92 (0.0 %) | |
| Brain atrophy | | | |
| Grade 0 | 176/328 (53.7 %) | 43/92 (46.7 %) | |
| Grade 1 | 123/328 (37.5 %) | 34/92 (37.0 %) | |
| Grade 2 | 29/328 (8.8 %) | 15/92 (16.3 %) | |
| Preoperative midline | (Unilateral lesion) (*n*=353) | | 0.068* |
| <10 mm | 169/276 (61.2 %) | 38/77 (49.4 %) | |
| ≥10 mm | 107/276 (38.8 %) | 39/77 (50.6 %) | |
| Presence of septum | 46/328 (14.3 %) | 19/92 (20.6 %) | 0.142* |
| Postoperative midline | 61/328 (18.6 %) | 34/92 (37.1 %) | 0.001* |
| <5 mm | 312/328 (95.1 %) | 77/92 (83.7 %) | |
| ≥5 mm | 16/328 (4.9 %) | 15/92 (16.3 %) | |

**Table 2: Multivariate logistic regression model**

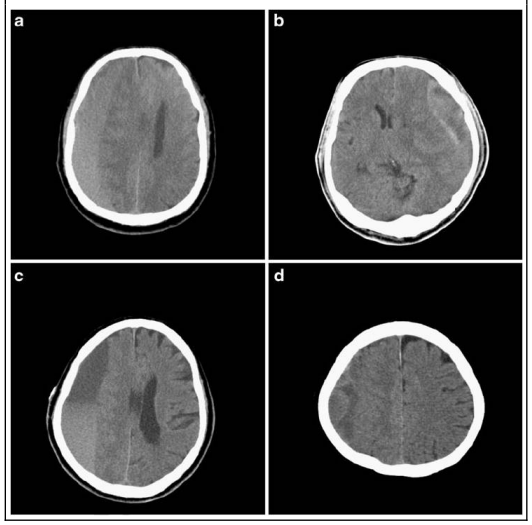
**Table 3** Multivariate logistic regression model

| Factor | OR | 95 % CI | *p* value |
|---|---|---|---|
| DM | 2.148 | 1.196-3.856 | 0.010 |
| Anticoagulant | 3.148 | 1.424-6.960 | 0.005 |
| History of seizure | 2.564 | 1.210-5.430 | 0.014 |
| Width of hematoma | 2.134 | 1.287-3.538 | 0.003 |
| Postoperative midline | 3.572 | 1.618-7.885 | 0.001 |

**Table 3: One-way ANOVA analysis**

| Internal architecture | | NRG | RG | *p* value |
|---|---|---|---|---|
| Homogeneous type | | 144/328 (43.9 %) | 11/92 (12.0 %) | |
| | Laminar type | 78/328 (23.8 %) | 35/92 (38.0 %) | 0.000 |
| | Separated type | 76/328 (23.2 %) | 46/92 (50.0 %) | 0.000 |
| | Trabecular type | 30/328 (9.1 %) | 0/92 (0.0 %) | 0.796 |
| Laminar type | | 78/328 (23.8 %) | 35/92 (38.0 %) | |
| | Homogeneous type | 144/328 (43.9 %) | 11/92 (12.0 %) | 0.000 |
| | Separated type | 76/328 (23.2 %) | 46/92 (50.0 %) | 0.545 |
| | Trabecular type | 30/328 (9.1 %) | 0/92 (0.0 %) | 0.001 |
| Separated type | | 76/328 (23.2 %) | 46/92 (50.0 %) | |
| | Homogeneous type | 144/328 (43.9 %) | 11/92 (12.0 %) | 0.000 |
| | Laminar type | 78/328 (23.8 %) | 35/92 (38.0 %) | 0.545 |
| | Trabecular type | 30/328 (9.1 %) | 0/92 (0.0 %) | 0.000 |
| Trabecular type | | 30/328 (9.1 %) | 0/92 (0.0 %) | |
| | Homogeneous type | 144/328 (43.9 %) | 11/92 (12.0 %) | 0.796 |
| | Laminar type | 78/328 (23.8 %) | 35/92 (38.0 %) | 0.001 |
| | Separated type | 76/328 (23.2 %) | 46/92 (50.0 %) | 0.000 |

**Classification ofCSDHs according to internal architectures**




a: homogeneous type
b: laminar type
c: separated type
d: trabecular type

## Conclusions

We have shown that patients with postoperative midline shifting (> 5mm), diabetes mellitus, preoperative seizure, preoperative width of hematoma (> 20mm), and anticoagulant therapy were an independent predictor for the recurrence of chronic subdural hematoma. According to internal architecture of hematoma, the rate of recurrence was significantly lower in the homogeneous and the trabecular type than the laminar and separated type.

## References

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