Satellite sign

see also Spot sign.

Shimoda et al. reported the satellite sign on non-enhanced CT, defined as a small hematoma separate from the main hematoma on at least one slice, was associated with poor outcome in ICH patients [1].

The presence of high-density starry dots around the intracerebral hemorrhage (ICH), which Shimoda et al. termed as a satellite sign, is occasionally observed in CT. The relationship between ICH with a satellite sign and its functional outcome has not been identified.

A study aimed to determine whether the presence of a satellite sign could be an independent prognostic factor for patients with spontaneous intracerebral hemorrhage (ICH).

Patients with acute spontaneous ICH were retrospectively identified and their initial CT scans were reviewed. A satellite sign was defined as scattered high-density lesions completely separate from the main hemorrhage in at least the single axial slice. Functional outcome was evaluated using the modified Rankin Scale (mRS) at discharge. Poor functional outcome was defined as mRS scores of 3-6. Univariate and multivariate logistic regression analyses were applied to assess the presence of a satellite sign and its association with poor functional outcome.

A total of 241 patients with ICH were enrolled in the study. Of these, 98 (40.7%) had a satellite sign. Patients with a satellite sign had a significantly higher rate of poor functional outcome (95.9%) than those without a satellite sign (55.9%, $p < 0.0001$). Multivariate logistic regression analysis revealed that higher age (OR 1.06; 95% CI 1.03-1.10; $p = 0.00016$), large hemorrhage size (OR 1.06; 95% CI 1.03-1.11; $p = 0.00015$), and ICH with a satellite sign (OR 13.5; 95% CI 4.42-53.4; $p < 0.0001$) were significantly related to poor outcome. A satellite sign was significantly related with higher systolic blood pressure ($p = 0.0014$), higher diastolic blood pressure ($p = 0.0117$), shorter activated partial thromboplastin time ($p = 0.0427$), higher rate of intraventricular bleeding ($p < 0.0001$), and larger main hemorrhage ($p < 0.0001$).

The presence of a satellite sign in the initial CT scan is associated with a significantly worse functional outcome in ICH patients [2].

It is still unclear whether the presence of the satellite sign is related to hematoma expansion.

Initial computed tomography angiography (CTA) was conducted within 6h after ictus. Satellite sign on non-enhanced CT and spot sign on CTA were detected by two independent reviewers. The sensitivity and specificity of both satellite sign and spot sign were calculated. Receiver-operator analysis was conducted to evaluate their predictive accuracy for hematoma expansion.

This study included 153 patients. Satellite sign was detected in 58 (37.91%) patients and spot sign was detected in 38 (24.84%) patients. Among 37 patients with hematoma expansion, 22 (59.46%) had satellite sign and 23 (62.16%) had spot sign. The sensitivity and specificity of satellite sign for prediction of hematoma expansion were 59.46% and 68.97%, respectively. The sensitivity and specificity of spot sign were 62.16% and 87.07%, respectively. The area under the curve (AUC) of satellite sign was 0.642 and the AUC of spot sign was 0.746. (P=0.157)

The results suggest that the satellite sign is an independent predictor for hematoma expansion in

spontaneous ICH. Although spot sign has the higher predictive accuracy, satellite sign is still an acceptable predictor for hematoma expansion when CTA is unavailable

Compared with irregular shape, satellite sign is a simple imaging marker and has been demonstrated to have an acceptable predictive value for hematoma expansion. Further studies are needed to explore the underlying mechanism for association between satellite sign and hematoma expansion [3].

[1] , [2]
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[3]
Yu Z, Zheng J, Ali H, Guo R, Li M, Wang X, Ma L, Li H, You C. Significance of satellite sign and spot sign in predicting hematoma expansion in spontaneous intracerebral hemorrhage. Clin Neurol Neurosurg. 2017 Sep 20;162:67-71. doi: 10.1016/j.clineuro.2017.09.008. [Epub ahead of print] PubMed PMID: 28946021.