lvy sign

The ivy sign refers to the MRI appearance of patients with moya moya disease or moya moya syndrome. Prominent leptomeningeal collaterals result in vivid contrast enhancement and high signal on FLAIR due to slow flow. The appearance is reminiscent of the brain having been covered with ivy.

Differential diagnosis

leptomeningeal metastases

haemorrhage

meningitis

high oxygen tension or hyperbaric O2 (100% O2).

Transient neurological symptoms are frequently observed during the early postoperative period after direct bypass surgery for moyamoya disease. Abnormal signal changes in the cerebral cortex can be seen in postoperative MR images.

The purpose of a study was to reveal the radiological features of the "cortical hyperintensity belt (CHB) sign" in postoperative FLAIR images and to verify its relationship to transient neurological events (TNEs) and regional cerebral blood flow (rCBF).

A total of 141 hemispheres in 107 consecutive patients with moyamoya disease who had undergone direct bypass surgery were analyzed. In all cases, FLAIR images were obtained during postoperative days (PODs) 1-3 and during the chronic period $(3.2 \pm 1.13 \text{ months after surgery})$. The CHB sign was defined as an intraparenchymal high-intensity signal within the cortex of the surgically treated hemisphere with no infarction or hemorrhage present. The territory of the middle cerebral artery was divided into anterior and posterior parts, with the extent of the CHB sign in each part scored as 0 for none; 1 for presence in less than half of the part; and 2 for presence in more than half of the part. The sum of these scores provided the CHB score (0-4). TNEs were defined as reversible neurological deficits detected both objectively and subjectively. The rCBF was measured with SPECT using N-isopropyl-p-[123I]iodoamphetamine before surgery and during PODs 1-3. The rCBF increase ratio was calculated by comparing the pre- and postoperative count activity.

Cortical hyperintensity belt signs were detected in 112 cases (79.4%) and all disappeared during the chronic period. Although all bypass grafts were anastomosed to the anterior part of the middle cerebral artery territory, CHB signs were much more pronounced in the posterior part (p < 0.0001). TNEs were observed in 86 cases (61.0%). Patients with TNEs showed significantly higher CHB scores than those without (2.31 ± 0.13 vs 1.24 ± 0.16, p < 0.0001). The CHB score, on the other hand, showed no relationship with the rCBF increase ratio (p = 0.775). In addition, the rCBF increase ratio did not differ between those patients with TNEs and those without (1.15 ± 0.033 vs 1.16 ± 0.037, p = 0.978).

The findings strongly suggest that the presence of the CHB sign during PODs 1-3 can be a predictor of TNEs after bypass surgery for moyamoya disease. On the other hand, presence of this sign appears to have no direct relationship with the postoperative local hyperperfusion phenomenon. Vasogenic

edema can be hypothesized as the pathophysiology of the CHB sign, because the sign was transient and never accompanied by infarction in the present series $^{1)}$.

Lee et al., evaluated the ivy sign on MR fluid attenuated inversion recovery (FLAIR) images in adult patients with moyamoya disease and compared it with result of SPECT and MR perfusion images.

They enrolled twelve patients (thirteen cases) who were diagnosed with moyamoya disease and underwent STA-MCA anastomosis at our medical institution during a period ranging from September of 2010 to December of 2012. The presence of the ivy sign on MR FLAIR images was classified as Negative (0), Minimal (1), and Positive (2). Regions were classified into four territories: the anterior cerebral artery (ACA), the anterior MCA, the posterior MCA and the posterior cerebral artery.

Ivy signs on preoperative and postoperative MR FLAIR were improved (8 and 4 in the ACA regions, 13 and 4 in the anterior MCA regions and 19 and 9 in the posterior MCA regions). Like this result, the cerebrovascular reserve (CVR) on SPECT was significantly increased in the sum of CVR in same regions after STA-MCA anastomosis.

After STA-MCA anastomosis, ivy signs were decreased in the cerebral hemisphere. As compared with conventional diagnostic modalities such as SPECT and MR perfusion images, the ivy sign on MR FLAIR is considered as a useful indicator in detecting brain hemodynamic changes between preoperatively and postoperatively in adult moyamoya patients².

1)

Hamano E, Kataoka H, Morita N, Maruyama D, Satow T, lihara K, Takahashi JC. Clinical implications of the cortical hyperintensity belt sign in fluid-attenuated inversion recovery images after bypass surgery for moyamoya disease. J Neurosurg. 2016 Feb 19:1-7. [Epub ahead of print] PubMed PMID: 26894456.

Lee JK, Yoon BH, Chung SY, Park MS, Kim SM, Lee DS. The usefulness of the ivy sign on fluidattenuated intensity recovery images in improved brain hemodynamic changes after superficial temporal artery-middle cerebral artery anastomosis in adult patients with moyamoya disease. J Korean Neurosurg Soc. 2013 Oct;54(4):302-8. doi: 10.3340/jkns.2013.54.4.302. PubMed PMID: 24294453; PubMed Central PMCID: PMC3841272.

From: https://neurosurgerywiki.com/wiki/ - Neurosurgery Wiki

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=ivy_sign

Last update: 2024/06/07 02:57

