Cerebral Perfusion-based Single-photon Emission Computed Tomography (SPECT) Staging Using NeuroGam® in Patients With Moyamoya Disease

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Introduction

Cerebral angiography (CA) is the gold standard for moyamoya disease (MMD) staging and diagnosis, but CA findings are not well-correlated with clinical symptoms. The purpose of this study was to establish novel cerebral perfusion-based staging for MMD that is well-correlated with clinical symptoms.

Methods

From 2010 to 2015, regional cerebrovascular reserve (rCVR) was examined by single-photon emission computed tomography (SPECT) using NeuroGam® (Segamicorp, Houston, TX, USA) in 30 patients (17 women, 13 men; 60 hemispheres; mean 42.0 years old [range: 5-60 years old]) with MMD, which was diagnosed by CA and magnetic resonance angiography (MRA). Brain CT or brain magnetic resonance imaging (MRI) was used to evaluate neurological conditions such as transient ischemic attack (TIA), cerebral hemorrhage, and cerebral infarction. A novel staging system for MMD was developed by combining findings from CA, MRI, and SPECT with NeuroGam®.

Results

Our novel staging system was strongly associated with clinical symptoms. Of the 22 hemispheres classified as stage 1, 3 (13.6 %) exhibited neurological symptoms, whereas 66.7% (16 of 24) of the hemispheres classified as stage 2 and 85.7% (12 of 14) of the hemispheres classified as stage 3 exhibited neurologic symptoms. These findings indicate that cerebral perfusion-based staging is predictive of MMD clinical symptoms.

Conclusions

Perfusion-based SPECT staging correlates well with clinical symptoms and may be a reliable alternative to the Suzuki staging by CA.

Learning Objectives

This perfusion-based SPECT staging should be considered a reliable alternative to conventional staging methods

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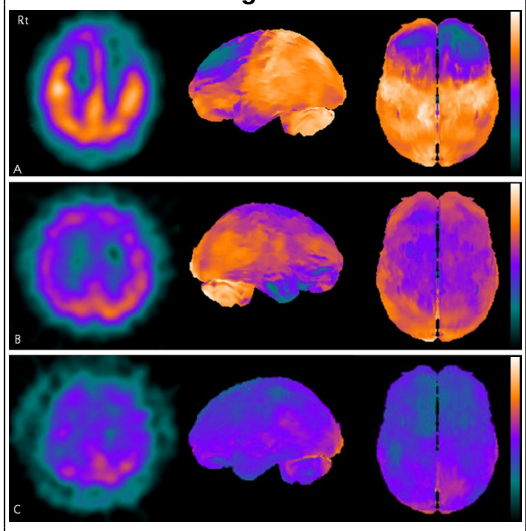
Figure1



Eloquent area scoring using NeuroGam®. A. Eloquent area 1 defect. B. Eloquent area 2 defect. C. Eloquent area 3 defect.