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Value of Perfusion CT-Guided Recanalization Therapy in Acute Ischemic Stroke Patients

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Arterial recanalization can be associated with brain hemorrhage and poor clinical outcomes in case of initial large ischemic lesions (malignant profile) [1]. The initial brain status (lesion volume and brain perfusion) seems to be a powerful predictor of stroke outcome [2, 3]. Diffusion/perfusion magnetic resonance imaging (MRI) is the best imaging modality but remains of limited availability in emergency settings [3]. Perfusion CT (PCT) is a valuable imaging technique and provides additional information which cannot be predicted by clinical, noncontrast CT, and CT angiography (CTA) data [2, 4].

We report 2 similar cases of anterior circulation stroke with proximal intracranial artery occlusion in which the results of PCT allowed an identification of initial damage and guided recanalization therapeutics.

Case Reports

A 67-year-old woman (patient 1) was admitted for right-sided hemiplegia and aphasia (NIHSS score 18). Noncontrast CT scanning was performed 40 min after symptom onset, which demonstrated a hypodensity of the left insular cortex and cortical swelling with sulcal effacement (ASPECTS score 8). CTA showed intracranial internal carotid artery occlusion. No PCT was performed. Mechanical thrombectomy with a SolitaireTM FR stent was performed because of the contraindication to intravenous thrombolysis. Complete recanalization was obtained 3 h after stroke onset. Brain hemorrhage occurred 9 h after recanalization and death at 3 days (fig. 1a–d).

A 65-year-old woman (patient 2) was also admitted for right-sided hemiplegia (NIHSS score 17). Noncontrast CT scanning was performed 2 h after symptom onset and showed a hypodensity of the lenticular nucleus and caudate head as well as sulcal effacement in the superficial sylvian territory (ASPECTS score 7). CTA and

PCT were performed immediately. CTA showed intracranial internal carotid artery occlusion. PCT displayed a large infarct (mean transit time = 61.05 s, cerebral blood volume = 0.97 ml/100 g, cerebral blood flow = 1.92 ml/100 g/min). No reperfusion therapy was administered. The patient developed a large infarct without hemorrhage (fig. 1e–h).

Discussion

To date, the key determinant of patient selection for reperfusion therapy has been the time since stroke onset [5]. However, the progression of irreversible injury is highly variable between individuals. Some patients may present a malignant profile with a high risk for brain hemorrhage shortly after recanalization therapy [1]. Although MRI is the reference for identifying these patients, a stroke CT workup is frequently achieved. However, noncontrast CT scans often appear normal up to 6 h after the onset of brain ischemia. Conversely, PCT has the potential to improve patient selection, as illustrated by Zhu et al. [2]. In a recent large study, PCT findings seemed to represent independent information which could neither be predicted by clinical, noncontrast CT nor CTA data [2]. Based on this, PCT could be systematically added to noncontrast CT and CTA in order to identify subgroups of patients who are at increased risk for hemorrhage and poor clinical outcomes [4].

Disclosure Statement

There are no conflicts of interest.

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Fig. 1. a–d Patient 1. **a** Noncontrast cerebral CT showing a left insular ribbon sign. **b** CTA demonstrating left intracranial internal carotid artery occlusion. **c** The initial angiogram confirmed the occlusion, and a complete recanalization was obtained after mechanical thrombectomy. **d** CT showing intracranial hemorrhage. **e–h** Patient 2. **e** Noncontrast cerebral CT showing a left insular ribbon sign. **f** CTA demonstrating left intracranial internal carotid artery occlusion. **g** PCT showing a large zone of infarction with no substantial mismatch. **h** CT showing large sylvian infarct.