Perfusion computed tomography indications

The techniques used for identification of microcirculatory changes are xenon CT scanning, positron emission tomography, single-photon emission computed tomography, MRI perfusion imaging, and CT perfusion (CTP) with CTP being in advantage because of its low cost, rapid imaging, high spatial resolution, and ease of performance [1].

Endovascular therapy (ET) is typically not considered for patients with large baseline ischemic cores (irreversibly injured tissue). Computed tomographic perfusion (CTP) imaging may identify a subset of patients with large ischemic cores who remain at risk for significant infarct expansion and thus could still benefit from reperfusion to reduce their degree of disability [2].

Perfusion computed tomography (CT) is a technique that allows rapid qualitative and quantitative evaluation of cerebral perfusion by generating maps of cerebral blood flow (CBF), cerebral blood volume (CBV), and mean transit time (MTT). The technique is based on the central volume principle (CBF = CBV/MTT) and requires the use of commercially available software employing complex deconvolution algorithms to produce the perfusion maps. Some controversies exist regarding this technique, including which artery to use as input vessel, the accuracy of quantitative results, and the reproducibility of results. Despite these controversies, perfusion CT has been found to be useful for noninvasive diagnosis of cerebral ischemia and infarction and for evaluation of vasospasm after subarachnoid hemorrhage. Perfusion CT has also been used for assessment of cerebrovascular reserve by using acetazolamide challenge in patients with intracranial vascular stenoses who are potential candidates for bypass surgery or neuroendovascular treatment, for the evaluation of patients undergoing temporary balloon occlusion to assess collateral flow and cerebrovascular reserve, and for the assessment of microvascular permeability in patients with intracranial neoplasms.

Wole brain PCT is useful to identify patients with TIA or minor ischemic stroke at high risk of functional impairment at 3-month follow-up [3].

Perfusion computed tomography for ischemic stroke

Perfusion computed tomography for ischemic stroke.

Perfusion computed tomography for delayed cerebral ischemia diagnosis

Perfusion computed tomography for delayed cerebral ischemia diagnosis.

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Zhang H, Zhang B, Li S, Liang C, Xu K, Li S. Whole brain CT perfusion combined with CT angiography in patients with sub- arachnoid haemorrhage and cerebral vasospasm. Clin Neurol Neurosurg. 2013;115:2496–501.

2)

Rebello LC, Bouslama M, Haussen DC, Dehkharghani S, Grossberg JA, Belagaje S, Frankel MR, Nogueira RG. Endovascular Treatment for Patients With Acute Stroke Who Have a Large Ischemic Core and Large Mismatch Imaging Profile. JAMA Neurol. 2016 Nov 7. doi: 10.1001/jamaneurol.2016.3954. [Epub ahead of print] PubMed PMID: 27820620.

3)

van den Wijngaard IR, Algra A, Lycklama À Nijeholt GJ, Boiten J, Wermer MJ, van Walderveen MA. Value of Whole Brain Computed Tomography Perfusion for Predicting Outcome After TIA or Minor Ischemic Stroke. J Stroke Cerebrovasc Dis. 2015 Jul 1. pii: S1052-3057(15)00249-9. doi: 10.1016/j.jstrokecerebrovasdis.2015.05.004. [Epub ahead of print] PubMed PMID: 26143414.