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Circle of Willis collateral flow in carotid artery occlusion is depicted by 4D-CTA

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Abbreviation list

ICA	-	internal carotid artery
MCA	-	middle cerebral artery
ACA	-	anterior cerebral artery
PCA	-	posterior cerebral artery

Abstract

Background

In case of carotid artery occlusion, the risk and extent of ischemic cerebral damage is highly dependent on the pathways of collateral flow, including the anatomy of the circle of Willis. In this report, cases are presented to illustrate that 4D-CTA can be considered as a non-invasive alternative to DSA for the evaluation of circle of Willis collateral flow.

Case Description

Five patients with unilateral internal carotid artery (ICA) occlusion underwent 4D-CTA for the evaluation of intracranial hemodynamics. Next to a visual evaluation of 4D-CTA, temporal information was visualized using a normalized color scale on the cerebral vasculature, which enabled quantification of the contrast bolus arrival time. In these patients, 4D-CTA demonstrated dominant MCA blood supply on the side of ICA occlusion originating either from the contralateral ICA or from the posterior circulation via the communicating arteries.

Conclusions

Temporal dynamics of collateral flow in the circle of Willis can be depicted with 4D-CTA in patients with a unilateral carotid artery occlusion.

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