Perfusion MR Imaging : Selection Method of Arterial Input Function

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Purpose: To assess the efficacy of selection method of arterial input function(AIF) in perfusion MR imaging.

Materials and Method: Fifteen children with moyamoya disease underwent MR imaging after bolus injection of a single dose of gadolinium(0.1mMol/kg) for perfusion study. Images were acquired using FID-EPI sequences(TR/TE:1200/42msec, 128x128). Forty consecutive scans were done in two to five axial sections every 2 secs. To evaluate the first concentration, gamma-variate function was fitted to the time-signal course of each pixel. The most suitable AIF was estimated from pixel covering the middle cerebral artery in an automated manner. To make the regional cerebral blood volume(rCBV) maps, measured tissue concentration-time curves were deconvoluted with the AIF using Fourier transformation. The other rCBV map was processed without selection of AIF(non-AIF). These two maps were compared in terms of quality of maps(good, fair, poor), and extents of ischemic areas, which were determined by two observers.

Results: Two methods (rCBV maps with AIF and non-AIF) successfully demonstrated the CBV maps in all patients. For quality of maps of CBV map, good quality of maps was 13 and none; fair quality was 2 and 5; poor quality was none and 10, in AIF method and in non-AIF method, respectively. In rCBV maps with AIF method, extents of ischemic lesions was larger in four patients, and almost equal in 11 patients.

Conclusion: For perfusion MR imaging, selection method of AIF in processing CBV maps is highly recommended due to better image quality and optimal hemodynamic information.