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Quantitative evaluation of arteriovenous malformation hemodynamic changes after endovascular treatment using parametric color coding: A case series study.

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Abstract

Background: Brain arteriovenous malformations (AVMs) are complex vascular lesions. Endovascular treatment results are usually measured by calculating the volume reduction of the lesions. Nevertheless, vascular flow quantification seems a more physiologically accurate way of measuring endovascular results. We evaluated the use of parametric color coding (PCC) with digital subtraction angiography (DSA), in order to determine the feasibility of PCC to detect and measure the impact of AVM endovascular treatment-induced changes using real-time hemodynamic parameters.

Methods and results: Supratentorial brain AVM treatment was evaluated in 29 patients over the course of 38 sessions. Using regions of interest (ROIs) at the carotid siphon, arterial feeder, drainage vein and venous sinus, we found significant increase in time to peak (TTP) values at the arterial feeder, drainage vein and venous sinus. We compared TTP in four different embolization volume groups: I (0-25%), II (26-50%), III (51-75%) and IV (76-100%). We found significant differences between groups and a moderate correlation between embolization percentages, as well as an increase in TTP at the main vein ROI; but not in the arterial side or sinus.

Conclusions: Brain AVM endovascular treatment results can be quantified in vivo with PCC. PCC is capable of detecting hemodynamic changes after brain AVM endovascular treatment, that may reflect flow drop, and it is correlated with volume embolization.