Vascular endothelial growth factor: the major factor for tumor neovascularization and edema formation in meningioma patients.

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Abstract

BACKGROUND: Peritumoral brain edema (PTBE) may be crucial in the clinical outcome of meningioma patients. The underlying pathogenetic key mechanism has so far not been determined. Sex, age, tumor size, location, involvement of other structures, or the histological appearance was not found to sufficiently explain PTBE formation in meningiomas.

OBJECTIVE: As PTBE formation is widely accepted to be vasogenic, we investigated the role of vascular endothelial growth factor (VEGF) and pial supplying vessels in a series of World Health Organization (WHO) grade I meningiomas.

METHODS: A total of 79 patients with WHO grade I meningiomas were immunohistochemically studied for VEGF and MIB-1. Pre- and postoperative magnetic resonance imaging including 3-dimensional reconstruction of 1.3-mm thick layers, with calculation of tumor and edema volume, was performed. Intraoperatively, the vascular supply and arachnoidal state were noted by the neurosurgeon.

RESULTS: VEGF was found to be exclusively confined to meningioma tumor cells. We identified 4 different patterns. VEGF and supplying pial vessels were found in 14 meningioma patients, pial vascular supply only in 3, VEGF expression only in 46, and neither VEGF expression nor supplying pial vessels in 16. Only the occurrence of both pial vascular supply and tumor VEGF expression was found to be correlated with PTBE formation (P < .002).

CONCLUSION: Our data suggest that VEGF may be crucial in angiogenesis and therefore indirectly in PTBE formation in World Health Organization grade I meningiomas.