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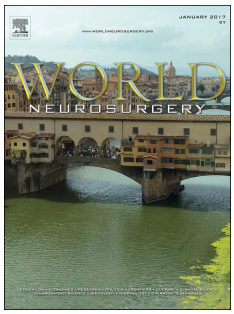

Assessment and treatment of peritumoral cortical veins in parasagittal meningiomas with application of 3D imaging fusion model

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Running head: cortical veins assessment in parasagittal meningiomas

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ABSTRACT

Background: Operation of cortical veins is the keystone of parasagittal meningiomas (PSM) resection. Little is known about pathological changes of the veins and proper treatment. We built three-dimensional (3D) image fusion models by neuronavigation to analyze the features of peritumoral cortical veins for PSM and explore intraoperative treatment options.

Methods: We performed a prospective study of 42 consecutive surgically treated PSM patients who underwent preoperative evaluation of peritumoral cortical veins using a 3D venous-tumor fusion model established by a neuronavigation system. We categorized cortical veins into three types: a) single-end anastomosis, b) tumor-to-end anastomosis, c) end-to-end anastomosis. We present surgical strategies to operate these veins.

Results: Preoperative evaluation demonstrated 39 patients with peritumoral cortical veins. The 3D models show 100% of the veins (95 in total) which were confirmed intraoperation. The postoperative complication rates after vein injury were 60% (Type-a), 16.7% (Type-c), 0 (Type-b). Ten patients (23.8%) had residual tumor due to venous protection (equal to Simpson III). After correlation analysis, Type-b and c cortical veins were positively correlated with tumor volume.

Conclusion: The anastomoses of cortical veins may provide compensation for venous transaction. There may be a time-evolution relationship between different cortical veins(Type a→c→b).Treatment of cortical veins should follow the following principles: single-end veins must be protected, tumor-to-end veins could be transacted directly, and end-to-end veins could be cut selectivity based on the degree of occlusion of the superior sagittal sinus. Detailed preoperative assessment of peritumoral cortical veins is critical for proper treatment.