

Malignant cerebral edema diagnosis

Early identification of patients who are most likely to develop [malignant middle cerebral artery infarction](#) based on clinical, radiographic, anatomic, and laboratory values can aid the clinician in offering [decompressive hemicraniectomy](#) (DHC) early. Previously published predictors of a [National Institute of Health Stroke Scale](#) score of >20, thrombus at the carotid terminus location, presence of nausea and vomiting, elevations of the white blood cell count, early involvement of >50% of the MCA territory on CT, and additional involvement of the [anterior cerebral artery territory](#) and/or posterior cerebral artery territory may be clinical tools to identify high-risk patients ^{1) 2)}.

Involvement of the [anterior choroidal artery](#) can be subtle in the setting of a large infarct, but involvement of the [uncus](#) of the temporal lobe may lead to more rapid herniation ³⁾.

Although clinically easy to use, the positive predictive value of these variables is low.

Serum [S100B](#) is an astroglial protein that is released during neuronal injury and enters the peripheral bloodstream through an incompetent blood-brain barrier. Thresholds of S100B levels can be monitored at time points in the acute period to determine patients most likely to develop malignant edema. Single measurements obtained in the 12- to 24-hour time period may be a useful tool to identify high-risk patients. At 24 hours, a value of 1.03 µg/L has 94% sensitivity and 83% specificity for detection of malignant cerebral edema ⁴⁾.

The availability of MRI in the acute period may allow for more precise volumetric analysis of the infarct. A MRI diffusion-weighted imaging volume of >82 cm³ when performed <6 hours has a high specificity (98%) but low sensitivity (52%) ⁵⁾.

A MRI diffusion-weighted imaging volume of >145 cm³ obtained before 14 hours was associated with 100% sensitivity and 94% specificity in a small cohort of patients ⁶⁾.

The differences in the sensitivities are likely due to the timing of obtaining the MRI. Such volumetric analysis can be complicated by the presence of an arterial occlusion that is yet to be reperfused through intravenous thrombolysis or intra-arterial treatment. Moreover, when such treatments are used and successful reperfusion occurs, there may be concerns of reperfusion injury that may potentially lead to exacerbation of the edema ⁷⁾.

Predictive models of patients who may require DHC are improving through volumetric analysis based on MRI and serum markers to assess for neuronal injury. Although several RCTs have not been completed, DHC is a life-saving surgery that appears to benefit younger patients the most. Further study is required to better elucidate quality-of-life outcome measures, timing of surgery, and treatment of the dominant hemisphere. ⁸⁾.

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