Motor area arteriovenous malformation

Case selection for the surgical treatment of intracranial arteriovenous malformations (AVMs) of the eloquent motor area remains challenging.

Surgical resection of AVMs in eloquent motor areas can be considered a safe option for selected cases when performed in conjunction with a detailed functional assessment [1].

Nidus involving the corticospinal tract CST and the level of the CST involved, rather than cortical reorganization, may be associated with surgical outcomes in patients with motor cortical AVM [2].

Case series

Lin et al retrospectively studied 48 consecutive patients with AVMs involving motor cortex and/or the descending pathway. All patients had undergone preoperative functional MRI (fMRI) and diffusion tensor imaging (DTI), followed by resection. Both functional and angioarchitectural factors were analyzed with respect to the change in muscle strength. Functional factors included lesion-to-corticospinal tract distance (LCD) on DTI and lesion-to-activation area distance (LAD) and cortical reorganization on fMRI. Based on preoperative muscle strength, the changes in muscle strength at 1 week and 6 months after surgery were defined as short-term and long-term surgical outcomes, respectively. Statistical analysis was performed using the statistical package SPSS (version 20.0.0, IBM Corp.).

Twenty-one patients (43.8%) had worsened muscle strength 1 week after surgery. However, only 10 patients (20.8%) suffered from muscle strength worsening 6 months after surgery. The LCD was significantly correlated with short-term ($p < 0.001$) and long-term ($p < 0.001$) surgical outcomes. For long-term outcomes, patients in the 5 mm ≥ LCD > 0 mm ($p = 0.009$) and LCD > 5 mm ($p < 0.001$) categories were significantly associated with a lower risk of permanent motor worsening in comparison with patients in the LCD = 0 mm group. No significant difference was found between patients in the 5 mm ≥ LCD > 0 mm group and LCD > 5 mm group ($p = 0.116$). Nidus size was the other significant predictor of short-term ($p = 0.021$) and long-term ($p = 0.016$) outcomes. For long-term outcomes, the area under the ROC curve (AUC) was 0.728, and the cutoff point was 3.6 cm. Spetzler-Martin grade was not associated with short-term surgical outcomes (0.143), although it was correlated with long-term outcomes (0.038).

An AVM with a nidus in contact with tracked eloquent fibers (LCD = 0) and having a large size is more likely to be associated with worsened muscle strength after surgery in patients with eloquent motor area AVMs. Surgical treatment in these patients should be carefully considered. In patients with an LCD > 5 mm, radical resection may be considered to eliminate the risk of hemorrhage [3].

1)
Lepski G, Honegger J, Liebsch M, Sória MG, Narischat P, Ramina KF, Nägele T, Ernemann U, Tatagiba M. Safe resection of arteriovenous malformations in eloquent motor areas aided by functional imaging and intraoperative monitoring. Neurosurgery. 2012 Jun;70(2 Suppl Operative):276-88; discussion 288-9. doi: 10.1227/NEU.0b013e318237aac5. Review. PubMed PMID: 21946511.
2)
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3)

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