

# Brainstem cavernous malformation complications

## Hemorrhage

Multivariate Cox regression analysis found age  $\geq 55$  years (hazard ratio (HR) 2.166,  $p = 0.002$ ), Developmental Venous Anomaly (DVA) (HR 1.576,  $p = 0.026$ ), superficial-seated location (HR 1.530,  $p = 0.047$ ), and brainstem hemorrhage on admission (HR 2.419,  $p = 0.026$ ) as independent risk factors for hemorrhage. The 5-year cumulative hazard of hemorrhage was 30.8% for the overall cohort, 47.8% for 60 patients with age  $\geq 55$  years, 43.7% for 146 patients with DVA, and 37.9% for 272 patients with superficial-seated lesions, and 37.2% for 341 patients with hemorrhage on admission. As a stratified analysis, within subcohort of 341 patients with a hemorrhagic presentation, age  $\geq 55$  years (HR 3.005,  $p < 0.001$ ), DVA (HR 1.801,  $p = 0.010$ ), and superficial-seated location (HR 2.276,  $p = 0.001$ ) remained independently significant. The 5-year cumulative hazard of hemorrhage was 52.0% for 119 patients with both DVA and hemorrhagic presentation. The 5-year cumulative hemorrhagic risk was 30.8% and was higher in subgroups if harboring risk factors that helped to predict potential hemorrhagic candidates and were useful for treatment decision-making. Clinical Trial Registration-URL: <http://www.chictr.org.cn> Unique identifier: ChiCTR-POC-17011575 <sup>1)</sup>.

Currently, there is a wide range of reported annual rates of hemorrhage.

A systematic review and meta-analysis of 25 studies show that the incidence of symptomatic hemorrhage or rehemorrhage is higher in brainstem lesions. First symptomatic hemorrhage increases the chance of symptomatic rehemorrhage, which decreases after 2 years <sup>2)</sup>. But reported variance in the literature may also be due to study limitations along with selection, patient and disease-specific; follow-up; and recall bias. An accurate assessment of hemorrhagic risk along with evaluation of patient and lesion-specific characteristics is critical in the decision-making process for potential intervention, as microsurgical intervention can significantly decrease the risk of future hemorrhage, but may be associated with significant complications <sup>3)</sup>.

## Outcome

Brainstem cavernous malformations are associated with a considerable risk of hemorrhage and subsequent morbidity, with significant focal impairment caused by hemorrhages leading to facial nerves damage <sup>4)</sup>.

Favorable surgical outcomes can be predicted in brainstem CM patients with early age at presentation, pontine location of the cavernoma, favorable preoperative mRS and those undergoing early surgery. The outcomes at long-term follow-up were associated with location of the CM in the brainstem, size of the CM and the preoperative mRS <sup>5)</sup>.

Patients who had undergone surgery of symptomatic BSCMs were evaluated pre- and postoperatively

both neurologically and neuroradiologically supplemented by telephone interviews. Additionally, patients were scored according to the Scandinavian Stroke Scale. Multiple uni- and multivariate analyses of possible clinical and radiological prognostic factors were conducted. The study population comprised 35 patients. Mean age at operation was  $39.3 \pm 13.0$  years with microsurgical resection of a total of 37 different BSCMs between 2002 and 2011. Median clinical follow-up was 44.0 months (range 8-116 months). Postoperative MRI showed eventually complete resection of all BSCMs. Postoperative overall outcome revealed complete resolution of neurological symptoms for 5/35 patients, 14/35 improved and 9/35 remained unchanged. 7/35 suffered from a postoperative new and permanent neurological deficit, mostly affecting the facial nerve or hemipareses with mild impairment. Pre- and postoperative Scandinavian Stroke Scale scores were  $11.0 \pm 2.4$  and  $11.4 \pm 2.2$  ( $p = 0.55$ ). None of the analyzed factors were found to significantly correlate with patients' clinical outcome. Complete resection of brainstem cavernous malformations can be achieved with an acceptable risk for long-term morbidity and surgery-related new deficits (~20 %). Neurological outcome is mainly determined within the first 6 months after surgery <sup>6)</sup>.

1)

Kong L, Ma XJ, Xu XY, Liu PP, Wu ZY, Zhang LW, Zhang JT, Wu Z, Wang L, Li D. Five-year symptomatic hemorrhage risk of untreated brainstem cavernous malformations in a prospective cohort. *Neurosurg Rev.* 2022 May 28. doi: 10.1007/s10143-022-01815-2. Epub ahead of print. PMID: 35633420.

2)

Taslimi S, Modabbernia A, Amin-Hanjani S, Barker FG 2nd, Macdonald RL. Natural history of cavernous malformation: Systematic review and meta-analysis of 25 studies. *Neurology.* 2016 Apr 22. pii: 10.1212/WNL.0000000000002701. [Epub ahead of print] PubMed PMID: 27164680.

3)

Starke RM. Do brainstem cavernous malformations have a higher rate of hemorrhage? *Expert Rev Neurother.* 2015 Jul 18:1-3. [Epub ahead of print] PubMed PMID: 26189553.

4)

Sindou M, Yada J, Salord F. Functional results after microsurgical resection of brainstem cavernous malformations (retrospective study of a 12 patient series and review of the recent literature). *Acta Neurochir (Wien).* 2000;142(8):843-52; discussion 852-3.

5)

Chotai S, Qi S, Xu S. Prediction of outcomes for brainstem cavernous malformation. *Clin Neurol Neurosurg.* 2013 Oct;115(10):2117-23. doi: 10.1016/j.clineuro.2013.07.033. Epub 2013 Aug 6. PubMed PMID: 23962756.

6)

Schwartz C, Grillhösl A, Schichor C, Suchorska B, Romagna A, Tonn JC, Zausinger S. Symptomatic cavernous malformations of the brainstem: functional outcome after microsurgical resection. *J Neurol.* 2013 Nov;260(11):2815-22. doi: 10.1007/s00415-013-7071-3. Epub 2013 Aug 22. PubMed PMID: 23974645.

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