DOI: https://doi.org/10.3329/bjns.v10i1.49177

## Case Report

# Assessment of Quality of Life after Surgery in a Patient with Brainstem Cavernoma

**Md. Moshiur Rahman, S.I.M Khairun Nabi Khan, Robert Ahmed Khan, Md. Rokibul Islam, Mainul Haque Sarker**

*Bang. J Neurosurgery 2020; 10(1): 130-134*

**Conflict of Interest:** There is no potential conflict of interest relevant to this case report.

**Financial Disclosure:** No funding was provided for this case report.

**Patient Consent:** This study obtained patient consent directly from the patient.

**Author's Contributions:** Author's contributions include manuscript preparation and editing. The manuscript has been prepared by the author himself to be submitted and published.



**Received:** 04.12.19
**Accepted:** 16.03.20

### Introduction:

Cerebral cavernomas defects are angiographically mysterious vascular brain malformations. Cavernous malformations occur in 0.4 to 0.8% of the population.[1-6]They constitute 8% to 20% of all vascular malformations. Hemorrhage can result in different degrees of neurological disabilities, depending on the position of the cavernoma (supra-tentorial, brainstem or cerebellar). The rate of hemorrhage can exceed 6% per year. [6,7]Approximately 10% to 35% of cavernomas occur in the brainstem.[6,8,9] Such hazardous vascular abnormalities are characterized by tightly packed, massively expanded immature capillaries without neural tissue intervening. Hyperintense zones can be seen on T2-weighted magnetic resonance imaging (MRI), as well as partial contrast enhancement. The detection rate of deep-seated cavernomas grew rapidly with the advent of the MRI era. Due to the high density inside the brainstem of cranial nerve nuclei and fiber tracts, serious neurological effects may be triggered only by minor hemorrhages, but can also develop as morbidity after surgical procedure. The aim of the surgical procedure is not only to improve the neurological symptoms but also to maintain the quality of life (QoL) of the patient. As patient expectations are rising in terms of postoperative quality of life, this factor is very critical when advising patients on their cavernoma management. However, data regarding long-term quality of life after surgical excision of cavernomas is very sparse. Here, a case presentation of a 27-year-old male with brainstem cavernoma has been presented. And this study aims to assess the quality of life (QoL) after surgical excision of a cerebral cavernoma with special regard to localization after a long-term follow-up.

### Case report

A male patient of 27 years presented with dizziness and diplopia for which he was treated by a physician first and due to the persistence of symptoms, he was advised for an MRI brain and then referred to the neurosurgery department for opinion. Neurological examination revealed diplopia, right-sided oculomotor nerve palsy showing medial rectus palsy and impaired accommodation reflex without ptosis. Pupillary light reflex was sluggish on the right eye. There was no

1. Dr. Md. Moshiur Rahman, Assistant Professor (Current Charge), Neurosurgery, Department, Holy Family Red Crescent Medical College, Dhaka, Bangladesh
2. Dr. S.I.M Khairun Nabi Khan, Assistant Professor, Neurosurgery Department, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
3. Dr. Robert Ahmed Khan, Medical Officer, Neurosurgery Department, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
4. Dr. Md. Rokibul Islam, Medical Officer, Neurosurgery Department, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
5. Prof. Dr. Mainul Haque Sarker, Ex-Professor and Head Neurosurgery Department Dhaka Medical College

**Address of Correspondence:** Dr. Md. Moshiur Rahman, Assistant Professor (CC), Neurosurgery Department, Holy Family Red Crescent Medical College, 1 Eskaton Garden Rd, Dhaka 1000, Email address: dr.tutul@yahoo.com

gait disturbance or ataxia. His clinical condition was deteriorated over a few weeks and was advised for surgery.

MRI Brain showed T1 iso to hyper-intense and T2 hyper to a hypo-intense intra-axial lesion involving the posterior aspect of the pons.

After careful inspection suboccipital craniectomy and telovelar approach were used for microscopic near-complete removal of the lesion from posterior pons. During the procedure there was no neuromonitoring or neuro-navigation was available. Immediately after surgery, the patient developed internuclear ophthalmoplegia which was resolved completely after two months.

The patient was ambulatory and returned to his job after two months.

Quality of life assessment by Karnofsky Performance Scale

This Karnofsky Performance scale allows patients to be arranged as to their functional impairment. This is used here to compare the effectiveness of treatment and to assess the prognosis of the patient. The lower the Karnofsky score, the worse the survival for most serious cases. The preoperative and postoperative neurological state of all patients was arranged by medical practitioners using the Karnofsky Performance Status Scale (KPS). In the KPS, scores range from 0 (dead) to 100 (no proof of disease).

In this study, the preoperative karnofsky score of the patient was 60 and immediately after surgery he deteriorated with score 50. But after 2 months of the surgery, he improved a lot with score 90.

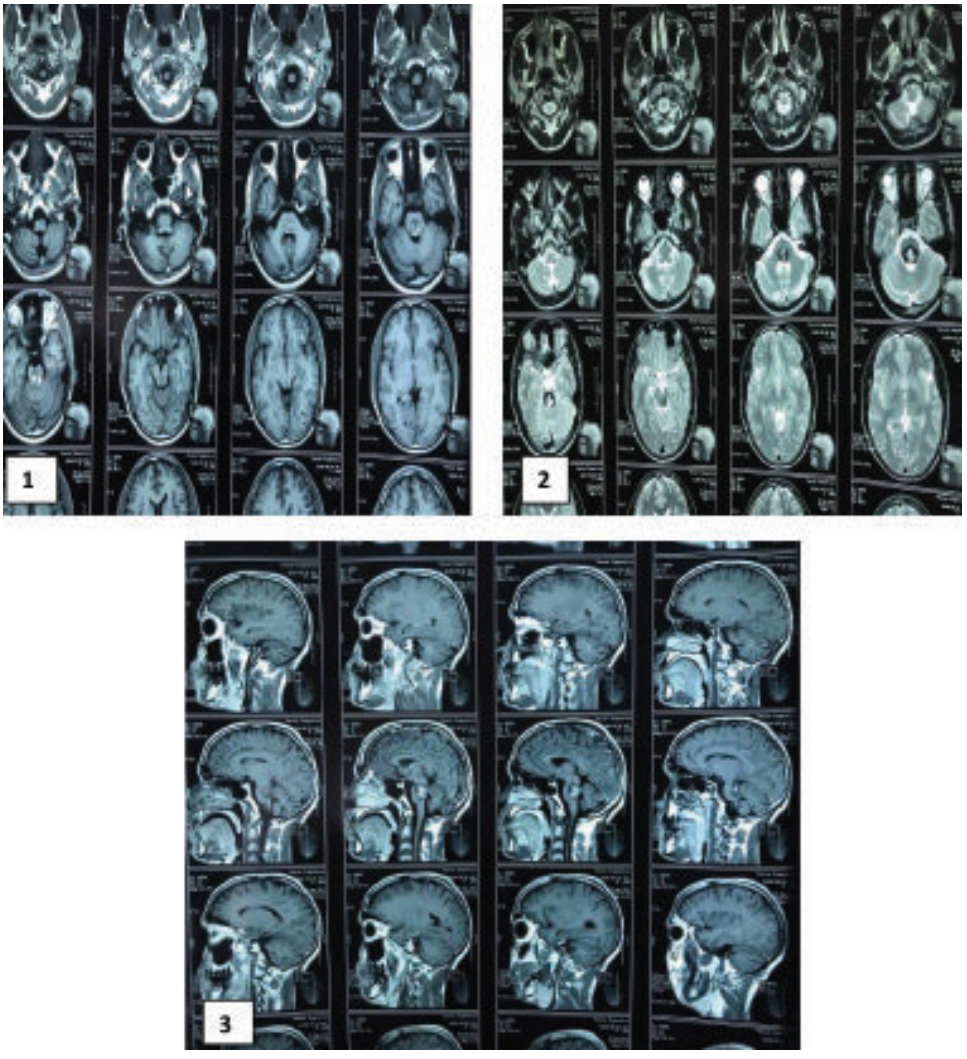
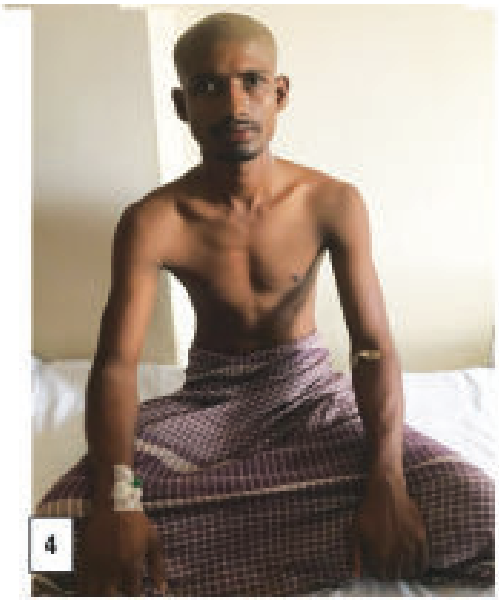
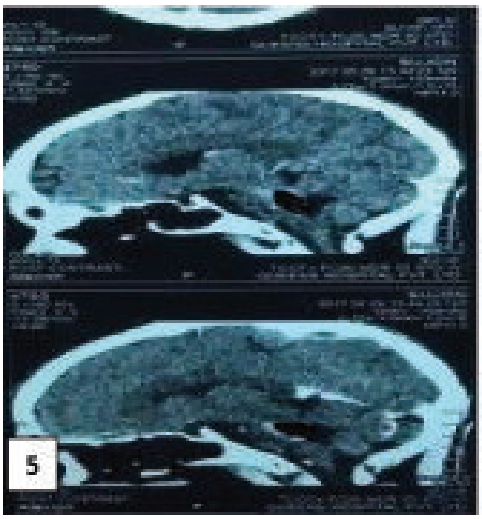



**Fig.-1, 2, 3:** *Preoperative MRI of the brain showing an intrinsic lesion in the posterior aspect of the pons.*



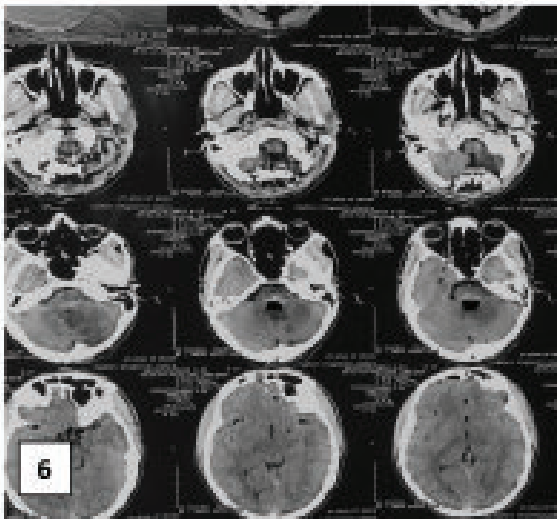
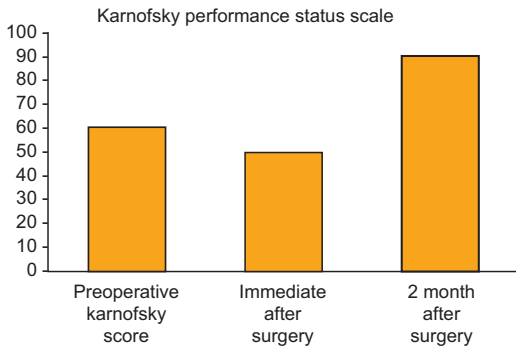




**Fig.-4, 5, 6:** *The postoperative CT scan brain revealed a thin layered clot in the operative area and the picture of the patient.*




**Graph 1:** *Preoperative and postoperative Karnofsky Performance Scale of the patient.*

**Discussion:**

Cavernoma of the brainstem occurs in around 8% to 35% of all symptomatic cavernoma. A report by Spetzler and colleagues based on surgically treated brainstem cavernomas showed a prevalence of 51% after treatment for new neurological defects, which remained permanent at 36%. [10] Compared with many other neurosurgical procedures, the risk of neurological morbidity by surgery appears to be elevated particularly for brainstem cavernomas. Nonetheless, when leaving a cavernoma untreated this must be weighed before the history of a condition of chronic-progressive neurological deterioration.[11-13] In a recent

groundbreaking paper, Horne and colleagues published a major meta-analysis of a pooled population of 1620 patients with untreated cavernomas enabling a differentiated view of the natural history and haemorrhage risk of untreated cavernomas. [12] One big finding was that a bled cavernoma had a 5.6-fold higher risk of re-hemorrhage during a 5-year follow-up compared to another mode of clinical exposure. Secondly, during 5 years of follow-up, brainstem cavernomas had a 4.4-times greater risk of bleeding compared with other sites. In-depth, they found that the 5-year intracerebral haemorrhage risk was around 4%, and 8%, respectively, for non-brainstem and brainstem cavernomas, which had been reported without bleeding. Evaluation of the quality of life on pure neurological outcomes has become comprehensive with around 1400 cavernomas of the brainstem being registered until 2013. [10, 14] However, there is only one study evaluating the quality of life for brainstem cavernoma following surgery. [15]Dukatz and his colleagues reported that microsurgery of brainstem cavernomas yielded positive results in terms of quality of life and, in particular, in terms of mental wellbeing.[15]A positive life outlook after being healed may explain the consistently good mental health scores reported in the Dukatz's studies.[15]Another highly important finding from this study was that long-term follow-up cavernoma patients achieved the same quality of life scores as a standard healthy population. Several reports have shown that patients with cavernoma had suffered a lot from headaches before surgery and were relieved from this pressure while they were operating. Only removing the cavernous malformation will stop repeated bleedings and the gradual neurological deterioration cycle. Throughout the range of 6 to 100 months, the postoperative period to the last follow-up did not correlate with karnofsky ratings. Comparison of the pre- and postoperative scores showed an increase in QoL in a substantial proportion of patients due to surgery and emotional relief after full brainstem lesion removal. Regardless of the position, brainstem cavernoma hemorrhages exert pressure on the underlying cranial nerve nuclei and tracts, resulting in neurological deficits in 60% of patients. [16] Extreme or frequent mild bleedings and/or worsening neurological function are signs of surgery on brainstem cavernomas. [17]It is widely known that patients with accidentally observed cavernous malformations are not treated surgically so long as the lesion does not cause any neurological signs of hemorrhage. Several authors said patients with prior hemorrhage were more likely to suffer recurrent hemorrhage. Porter estimated a re-hemorrhage rate of 30% per person per year and Fritschiet al. estimated an average rebleeding rate of 21% per annum per lesion in their meta-analysis. [18] The annual re-hemorrhage levels were variable and usually high in many surgical studies, ranging from 15% to 60%. Hauck et al. [19], and Pandey et al. [20] respectively reported levels of 45 and 31.5%. Nonetheless, if a first hemorrhage occurs, we agree that surgical treatment should be sought even if there are only mild neurological symptoms because the result differs from the early management. In our situation, following the first hemorrhage, we operated on the patient because this creates a decreased risk of rebleeding in the immediate future and an increase in patient outcome.

**Conclusion:**

Brainstem cavernomas continue to present a considerable microsurgical challenge with high early postoperative morbidity rates. The patient presented in this study regained the same neurological status as pre-operatively, demonstrated a greater quality of life (QoL) among physical health and a lower rate of incapacity for working. Furthermore, after long-term follow-up, the quality of life of the patient was like normal healthy people. Hence it can be concluded that even in highly eloquent areas, cavernoma surgery will result in favorable outcomes and a high patient satisfaction rate. The findings of this study support the notion that microsurgical removal of a brainstem cavernoma in skilled hands represents an effective treatment and is commonly correlated with good clinical performance, both neurologically and in terms of quality of life.

**References:**

1. Bertalanffy H, Benes L, Miyazawa T, Alberti O, Siegel AM, Sure U. Cerebral cavernomas in the adult. Review of the literature and analysis of 72 surgically treated patients. Neurosurg Rev. 2002; 25(1-2):1-53; discussion 54-55.
2. Haque R, Kellner CP, Solomon RA. Cavernous malformations of the brainstem. Clin Neurosurg. 2008; 55:88-96.
3. Kondziolka D, Lunsford LD, Kestle JR. The natural history of cerebral cavernous malformations. J Neurosurg. 1995; 83(5):820-824.
4. Kupersmith MJ, Kalish H, Epstein F, et al. Natural history of brainstem cavernous malformations. Neurosurgery. 2001; 48(1):47-53; discussion 53-44.

5. Ziyal IM, Ozgen T. Natural history of brainstem cavernous malformations. Neurosurgery. 2001; 49(4):1023-1024.

6. Batra S, Lin D, Recinos PF, Zhang J, Rigamonti D. Cavernous malformations: natural history, diagnosis, and treatment. Nat Rev Neurol. 2009; 5(12):659-670.

7. Cantu C, Murillo-Bonilla L, Arauz A, Higuera J, Padilla J, Barinagarrementeria F. Predictive factors for intracerebral hemorrhage in patients with cavernous angiomas. Neurol Res. 2005; 27(3):314-3

8. Gross BA, Batjer HH, Awad IA, Bendok BR. Brainstem cavernous malformations. Neurosurgery. 2009; 64(5):E805-E818; discussion E818.

9. Moriarity JL, Clatterbuck RE, Rigamonti D. The natural history of cavernous malformations. Neurosurg Clin N Am. 1999; 10(3):411-417.

10. Abla AA, Lekovic GP, Turner JD, et al. Advances in the treatment and outcome of brainstem cavernous malformation surgery: a single-center case series of 300 surgically treated patients. Neurosurgery 2011; 68(2):403-14; discussion 14-5.

11. Mouchtouris N, Chalouhi N, Chitale A, et al. Management of cerebral cavernous malformations: from diagnosis to treatment. TheScientificWorldJournal 2015; 2015:808314.

12. Horne MA, Flemming KD, Su IC, et al. Clinical course of untreated cerebral cavernous malformations: a meta-analysis of individual patient data. The Lancet Neurology 2015.

13. Bruneau M, Bijlenga P, Reverdin A, et al. Early surgery for brainstem cavernomas. Acta neurosurgery 2006; 148(4):405-14.

14. Gross BA, Batjer HH, Awad IA, et al. Brainstem cavernous malformations: 1390 surgical cases from the literature. World neurosurgery 2013; 80(1-2):89-93.

15. Dukatz T, Sarnthein J, Sitter H, et al. Quality of life after brainstem cavernoma surgery in 71 patients. Neurosurgery 2011; 69(3):689-95.

16. Mizoi K, Yoshimoto T, Suzuki J. Clinical analysis of ten cases with surgically treated brain stem cavernous angiomas. Tohoku J Exp Med. 1992; 166(2): 259–267.

17. Wang CC, Liu A, Zhang JT, Sun B, Zhao YL. Surgical management of brain-stem cavernous malformations: report of 137 cases. Surg Neurol. 2003; 59(6): 444 – 454.

18. Fritschi JA, Reulen HJ, Spetzler RF, Zabramski JM. Cavernous malformations of the brain stem. A review of 139 cases. Acta Neurochir (Wien). 1994; 130(1-4): 35–46.

19. Hauck EF, Barnett SL, White JA, Samson D. Symptomatic brainstem cavernomas. Neurosurgery. 2009; 64(1): 61–70; discussion 70-1. DOI: 10.1227/01. NEU. 0000335158.11692.53.

20. Pandey P, Westbroek EM, Gooderham PA, Steinberg GK. Cavernous malformation of brainstem, thalamus, and basal ganglia: a series of 176 patients. Neurosurgery. 2013; 72(4): 573–589; discussion 588–589. DOI: 10.1227/NEU.0b013e318283c9c2.