

## Brainstem/Deep Cavernomas: An Evidence Based Management Algorithm

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### Introduction

The management of brainstem/deep cavernomas remains uncertain.

### Hypothesis

A low to high risk stratified multimodal approach to treatment appears sensible when the natural history and the effects of Stereotactic Radiosurgery (SRX) are uncertain and the risks of Surgery even in experienced hands are undue.

### Methods

A stepwise increase in risk of treatment with Conservative, SRX and Surgery was applied to 18 patients (8F 10M, 14-62 years) with 21 brainstem/deep cavernomas between 2003-2012. The presentations were with a neurological event and/or a hemorrhage on CT/MRI.

### Definitions

Event-Symptoms and/or Signs that correlate to the location of the cavernoma with no evidence of an overt hemorrhage on CT or MRI. No change when compared to a previous scan if available.

Hemorrhage-Symptoms and/or Signs that correlate to the location of the cavernoma with evidence of an overt hemorrhage on CT or MRI. A definite change when compared to a previous scan if available.

### Results

A 1st event was Observed in 1, treated with SRX in 3 and 1 had excision. One had SRX after a 2nd event. All stabilized.

A 1st bleed occurred in 12 patients, 2nd in 8 and a 3rd in 2. A 2nd bleed in 1 was from a de novo cavernoma. One Observed patient died, 3 had SRX and 2 were excised of whom 1 died a year later of an unrelated cause.

After a 2nd bleed 1 was Observed and 1 who had SRX 4Y previously chose Observation, 2 had SRX and 4 were excised of whom 1 had complete excision, 2 in part who then had SRX but one of these had a subclinical 3rd bleed and the 4th had a 3rd bleed on Amphetamine who then had SRX. All improved except the de novo patient who had excision and then stabilized. This patient had SRX to a 3rd cavernoma for an event and a patient who had SRX had an event.

### Conclusions

For Symptomatic (Symptoms+signs correlate with the cavernoma) and Accessible lesions (Surgery did not involve traversing eloquent areas)- Operative excision was the first choice of treatment.

Otherwise, Observation was offered first, then SRX and then Surgery.

For Symptomatic (Symptoms+signs correlate with the cavernoma) and Inaccessible lesions (Surgery involved traversing eloquent areas)-

With an "**Event**":

Event 1-Observe or SRX?

Event 2-SRX

Event 3 or more-ie. Progressive-Surgery

With a "**Hemorrhage**":

Hemorrhage 1-SRX

Hemorrhage 2-SRX or if Progressive-Surgery

Hemorrhage 3 or more-ie. Progressive-Surgery

A graduated approach to treatment did not always result in eradication of the cavernomas but it stabilized them and minimized the risks associated with interventions, thus prolonging the "deficit free interval" and with it improved the quality of life so important when the alternative was a life-long deficit with a cure.

### Learning Objectives

The participants should (1) understand that there is no consensus on the management of brainstem/deep cavernomas, (2) realize that a stepwise low to high risk treatment manoeuvre with all three modalities viz. Observation, SRX and Surgery was assessed in patients with symptomatic cavernomas, (3) appreciate that though this did not always result in their eradication it stabilized the cavernomas and minimized the risks associated with interventions, (4) thus recognize that it prolonged the "deficit free interval" and with it improved the quality of life so important when the alternative is a life-long deficit with a cure (5) and refer to a summary on the management of brainstem/deep cavernomas in the conclusions.

### References

Nagy G, Razak A, Rowe JG, Hodgson TJ, Coley SC, Radatz MWR, Patel UJ, Kemeny AA: Stereotactic Radiosurgery for deep-seated cavernous malformations: a move toward more active, early intervention Clinical Article. J Neurosurgery 113(4):691-9, 2010

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