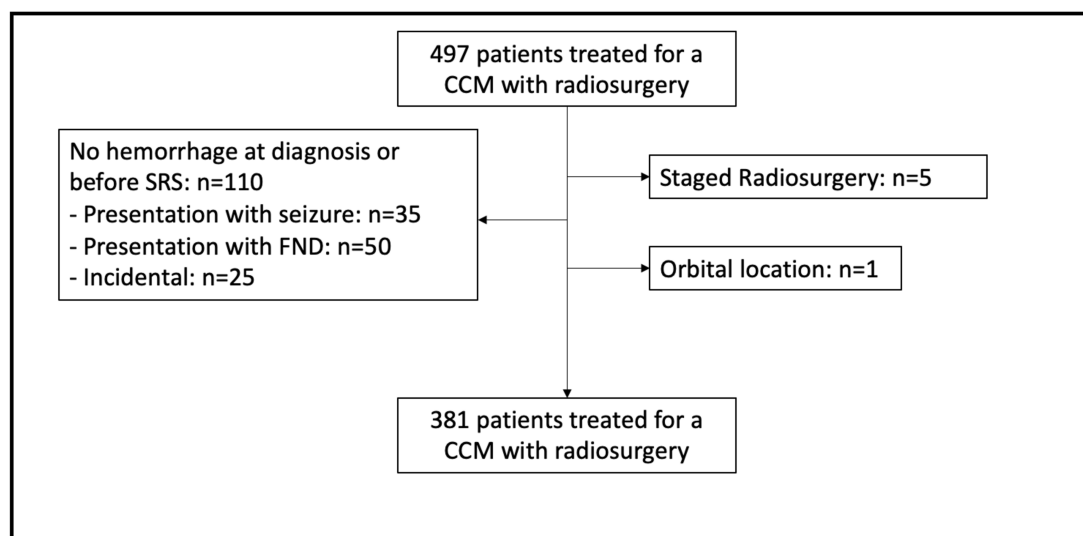


**Supplemental Figure 1:** Flow-chart of the study

CCM: Cerebral cavernous malformation

**Supplemental Table 1:** Outcomes after SRS in 414 CCM

| Outcomes per 414 CCM                     |             |
|--|-------------|
| Adverse radiation effect                 | 46 (11.1%)  |
| New hemorrhage after SRS                 | 41 (9.90%)  |
| 1  | 34 (8.21%)  |
| 2  | 5 (1.2%)    |
| 3  | 2 (0.5%)    |
| CCM volume at last FU                    |             |
| Decreased                                | 171 (41.5%) |
| Stable                                   | 232 (56.3%) |
| Increased                                | 9 (2.2%)    |
| Unknown                                  | 2           |
| Zabramski post SRS                       |             |
| 1  | 30 (7.9%)   |
| 2  | 271 (71.5%) |
| 3  | 63 (16.6%)  |
| 4  | 15 (4.0%)   |
| Unknown                                  | 35          |
| Zabramski evolution before and after SRS |             |
| Unchanged                                | 288 (76.2)  |
| PreSRS=1 to post SRS 2                   | 26 (6.9%)   |
| PreSRS=1 to post SRS 3                   | 7 (1.9%)    |
| PreSRS=1 to post SRS 4                   | 7 (1.9%)    |
| PreSRS=2 to post SRS 1                   | 6 (1.6%)    |
| PreSRS=2 to post SRS 3                   | 36 (15.9%)  |
| PreSRS=2 to post SRS 4                   | 7 (1.9%)    |
| PreSRS=3 to post SRS 2                   | 1 (0.3%)    |
| Unknown                                  | 36          |

| <b>Outcomes for 381 patients</b>               |             |
|--|-------------|
| New patient with seizure post SRS              | 3 (0.8%)    |
| Seizure control at last FU                     |             |
| Seizure free (Engel I)                         | 46 (57.5%)  |
| Rare seizure (Engel II)                        | 11 (13.75%) |
| Significant improvement (Engel III)            | 8 (10%)     |
| No improvement (Engel IV A+B)                  | 12 (15%)    |
| Worse (Engel IV C)                             | 3 (3.75%)   |
| Discontinuation of seizure medication          | 14 (17.5%)  |
| Symptom evolution among patient                |             |
| Neurologic improvement                         | 119 (32.1%) |
| Neurologic stability                           | 83 (22.4%)  |
| Neurological worsening                         | 20 (5.4%)   |
| No symptom prior SRS and no new symptom        | 149 (40.3%) |
| Missing data                                   | 10          |
| New neurological deficit after SRS*            |             |
| Transient                                      | 40 (10.5%)  |
| Permanent                                      | 20 (5.2%)   |
| Deficit due to ARE                             | 19 (5.0%)   |
| Deficit due to a new hemorrhage of treated CCM | 22 (5.8%)   |
| New neurological deficit from other reason     | 19 (5.0%)   |
| Death  | (1.6%)      |

\*Headaches and seizures were not taken into account for this classification

ARE: Adverse radiation effect, CCM: cerebral cavernous malformations, FU: Follow-up, SRS: Stereotactic radiosurgery

**Supplemental Table 2:** Logistic regression for the risk factor associated with an adverse radiation effect occurrence (413 CCM).

| Factor                       | Univariate analysis |                  | Multivariate analysis |                  |
|------------------------------|---------------------|------------------|-----------------------|------------------|
|                              | p                   | OR (95%CI)       | p                     | OR (95%CI)       |
| Gender female                | 0.52                | 0.82(0.44-1.51)  |                       |                  |
| DVA                          | 0.25                | 1.63 (0.67-3.57) |                       |                  |
| Age >65                      | 0.42                | 0.43 (0.02-2.17) |                       |                  |
| Volume >0.7cc                | <0.001              | 6.72 (3.20-15.9) | <0.001                | 5.19 (2.41-12.5) |
| Margin dose >13Gy            | <0.001              | 6.39 (3.23-13.6) | <0.001                | 5.17 (2.55-11.2) |
| Location brainstem vs others | 0.005               | 0.32 (0.13-0.67) | 0.050                 | 0.43 (0.18-0.96) |
| Multiple hemorrhages pre SRS | 0.71                | 1.15 (0.53-2.29) |                       |                  |

CI: Confidence Interval, DVA: Developmental venous anomaly, OR: Odd-ratio, SRS: Stereotactic radiosurgery

