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_____ To analyze and compare the dose distribution characteristic of two radiosurgery treatment devices of Gamma Knife®(GK) and CyberKnife®(CK), in treating arteriovenous malformations (AVMs) and the influence on their clinical application.

_____ Ten AVM patients treated with CK of prescribed dose of 20 - 25 Gy in single fraction were evaluated. Each treatment plan CT images including the contours of the target and the surrounding critical organs were exported and loaded into the GK treatment planning system. GK treatment plan using the same prescribed radiation dose were generated. Dosimetric comparison of the two treatment devices including the conformity, gradient and heterogeneity index, volume of brain tissue covered by 10 Gy and 12 Gy, maximum dose of brain stem and the beam on time. Paired Samples t-test was used to statistical analyze and compare the conformal and gradient index, the dose coverage volume of 10 Gy and 12 Gy in both plans for significance (p value).

_____ The conformal index was 0.626 ± 0.106 and 0.795 ± 0.087 in GK and CK, respectively ($p = 0.004$). The gradient index was 3.082 ± 0.369 and 6.071 ± 1.698 in GK and CK, respectively ($p = 0.001$). The heterogeneity index was 0.723 ± 0.055 and 0.275 ± 0.045 in GK and CK, respectively. The difference of coverage volume of 10 Gy and 12 Gy were significant ($p = 0.025$ and 0.022, respectively). For the 3 cases with AVM location adjacent to the brainstem, the dose of 1 c.c. and maximum dose of brain stem in GK plan were less than CK. CK had better treatment efficiency due to shorter beam on time.

_____ CyberKnife using inverse treatment planning similar to intensity modulated function had better dose conformity. Gamma Knife should have better normal brain tissue and critical organs protection due to sharp dose fall-off gradient.