Case Reports

A Young Female with Left Subfrontal AVM Initially Treated by Radiosurgery Presented with Delayed Hemorrhage

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Abstract:

Different modalities of treatment option are available for AVM. Radiosurgery is important form of management of unruptured AVM. Difference between radiosurgery and microsurgery is latency period with related complications. There is risk factor of Intraparenchymal hemorrhage occurring during the latency period including cyst formation residual, recurrent AVM with bleeding. We would present a case of AVM at left subfrontal skull base managed with gamma knife surgery presented to us with post radiosurgery bleeding in latent period after which she was considered for surgical excision.

Keywords: *Radiosurgery, Microsurgery, Residual and recurrent AVM, Frontal skull base, Intraparenchymal hemorrhage.*

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Introduction:

Radiosurgery plays major role in management of AVM. Stereotactic surgery reduces risk of ICH, seizure and neurological deficit [1, 2]. After stereotactic surgery before obliteration of nidus occurs, but there is latency period in which patient can present with intracranial hemorrhage. Complication usually occur during latency period are as follows cyst formation, hemorrhage, residual or new lesion, radiation induced edema and malignancy[1, 3, 4]. Mechanism of SRS is an ill defined process of endothelial or myointimal proliferation and intravascular thrombosis within the vascular structures within the targeted volume leading to eventual obliteration of the nidus. Endothelial damage from the treatment can also predispose to vascular rupture and bleeding. Usually post radiosurgery bleeding occurs due to residual AVM and recurrent AVM due to recanalization of intraluminal organized thrombus and change in hemodynamic. Obliteration requires 1-3 years and bleeding rates. Success rates was ranging from 54% to 92% [1, 5]. Persistent hemorrhage risk is the major drawback of radiosurgery compared with surgical resection. After complete obliteration of nidus on angiography there was small risk of rebleeding[6, 7, 8].

Case history

26 year old young female presented with hematoma in left subfrontal region and evaluated by angiography showed left subfrontal AVM. She was advised for radiosurgery in other hospital in 2003 and underwent first cycle GKS with dosage of 40 Gy . She was regular follow up with MR Images done regularly and asymptomatic till 2007, then she underwent angiography which showed residual AVM for which she underwent again radiosurgery in 2007 with dosage of 48 Gy. In 2013 when she was on follow up with cerebral angiography which did not showed any residual AVM. In 2014 she presented with hemorrhage to our hospital but there was no change in T_2 MR Image. After few days she presented with headache, vomiting and altered speech.

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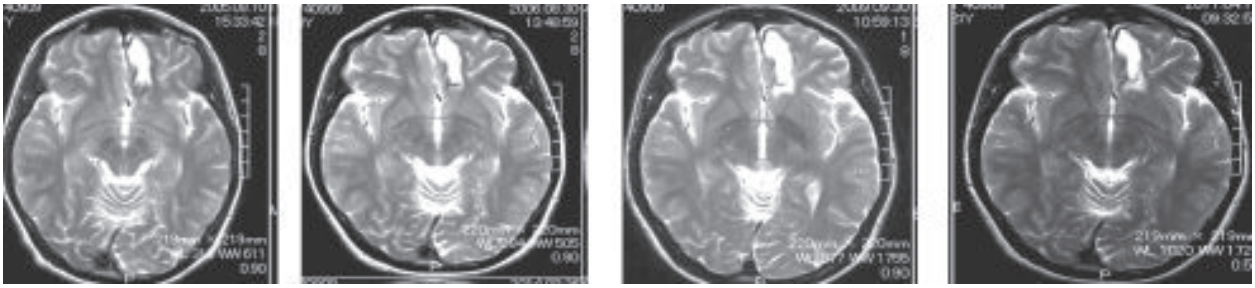

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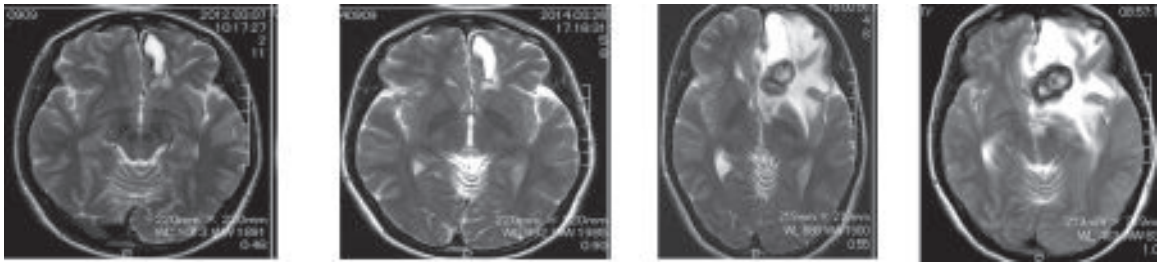

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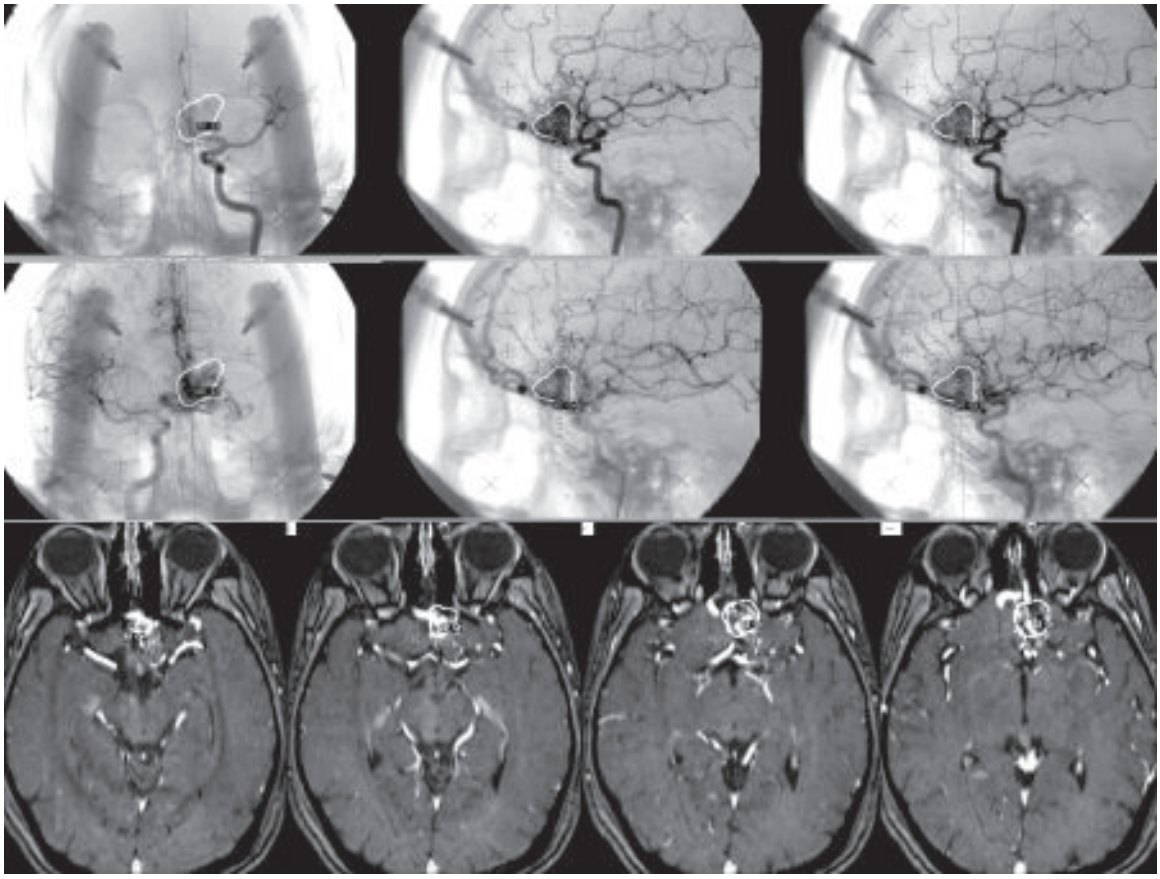
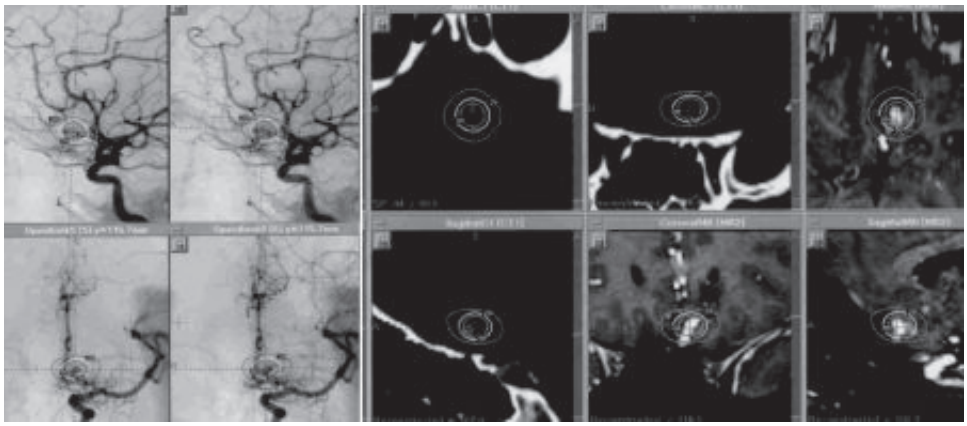
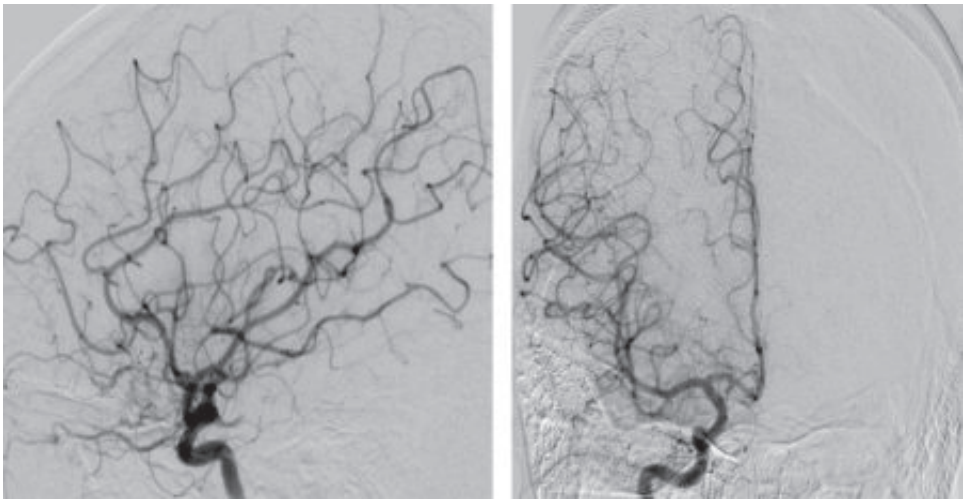
Serial MR Images



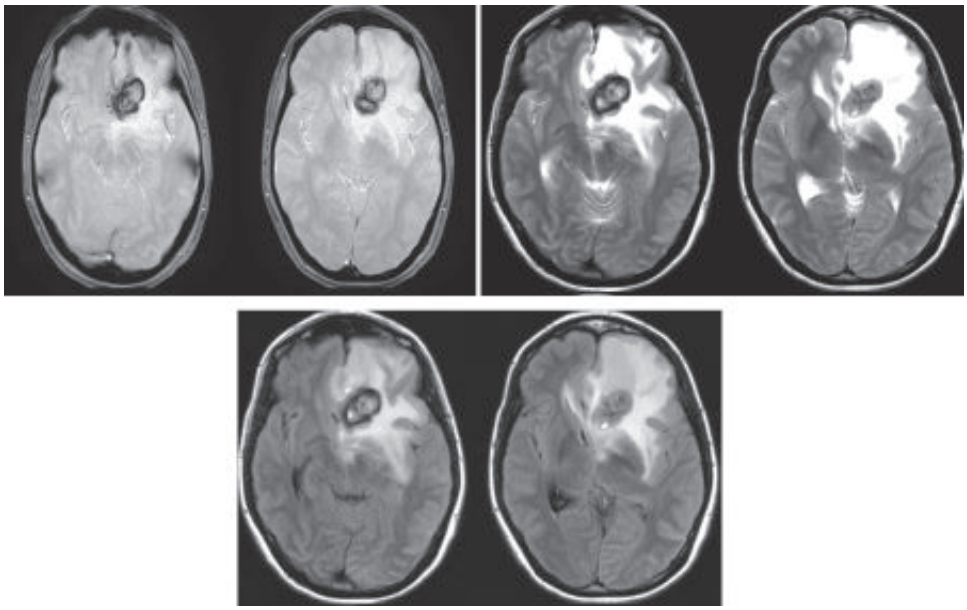
2003 Radiosurgery planning



2007 Radiosurgery planning

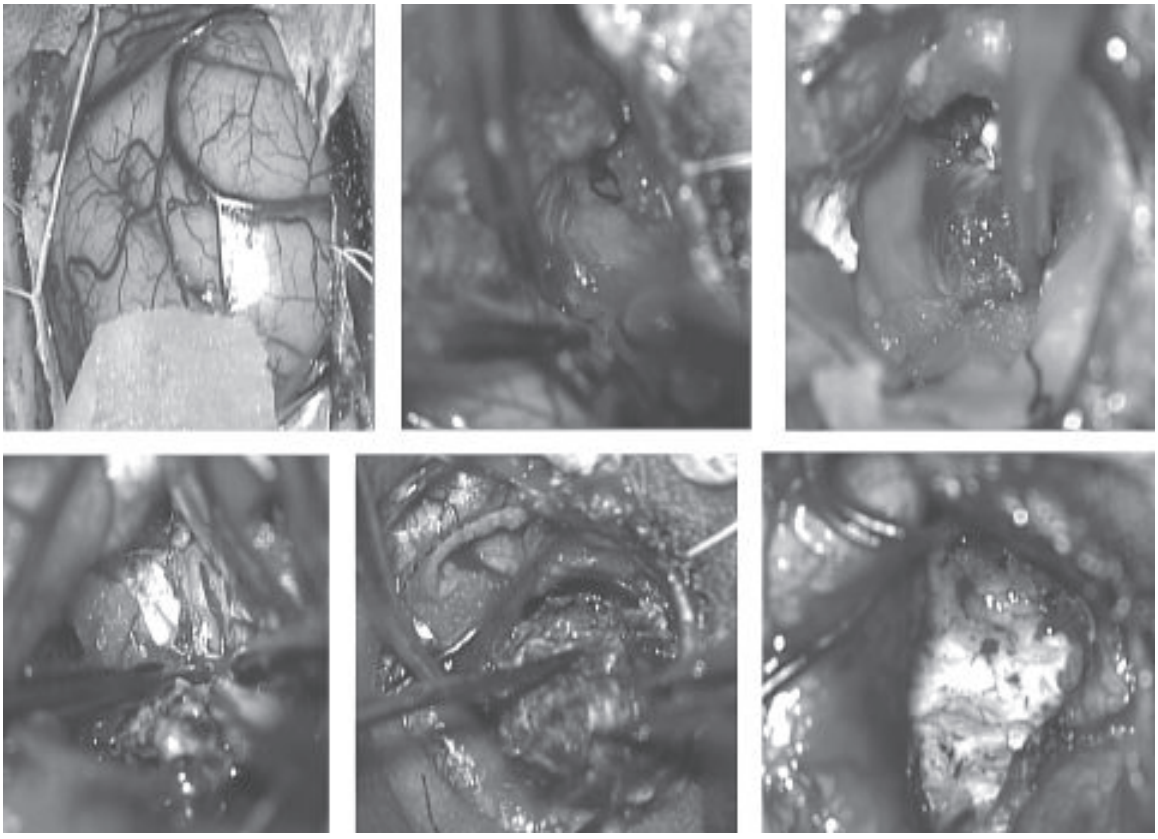


Angiographic findings in 2013

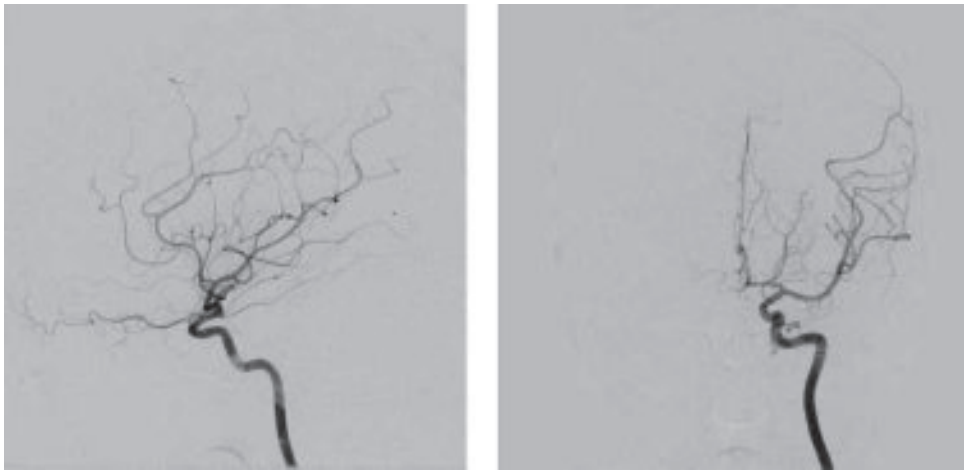


Presenting MR in 2014

After written informed consent, patient planned for surgery and underwent left frontal craniotomy in supine straight position and on Mayfield clamp. Electro physiological studies such as MEP and SEP were used. After opening of dura, by using ultrasound a cyst with hematoma was identified and punctured through transcortical route. Then underwent evacuation of cyst and hematoma, after which AVMexcised completely with draining vein.



Intra operative photograph:- A) . Opening of dura B). Cyst location by transcortical approach. C). Cyst with hematoma decompression. D). Excision of AVM with draining vein. E). Removal of nidus F). Cavity after complete excision of AVM.



Post operative DSA showed no residual lesion

Discussion:

Usually most of AVM are situated in supratentorial region mostly in the frontal area. As per miachel Lawton frontal AVM position are situated as Lateral frontal, Medial frontal, Paramedian frontal, Basal frontal,Sylvian frontal. In our case AVM location was left subfrontal region. Intracerebral hemorrhage in AVM nidus, chronic encapsulated intracerebral hematoma causes gradual clinical onset, forms a capsule with progressive enlargement. The risk of typical hemorrhage after radiosurgery for AVM is approximately 2% to 5% of patients per year of radiosurgery (the latency period) [9,10,11,12]. Maruyama et al. reported that the risk of bleeding from an AVM was significantly decreased after radiosurgery, including both the latency period and after angiographic obliteration; in comparison to the period between diagnosis and radiosurgery, the risk of bleeding decreased 54% during the latency period and 88% after obliteration [13]. In our case as patient received radiosurgical procedure twice after diagnosis of AVM. Latency period in our case after second radiosurgery was 5-6 yrs. Various risk factors involved in bleeding are as follows - AVM include venous ectasia/stenosis/ hypertension, intranidal aneurysm, periventricular location, lower marginal doses of irradiation, large nidus volume, prior hemorrhage, male sex, the presence of deep venous drainage, and an AVM volume less than 10 cm[3][13,14,15]. The risk factors for developing chronic encapsulated intracerebral hematoma are not known uptill now. Hirsh et al. proposed that the hematoma capsule was made of fibroblasts derived from abnormal vessels within occult vascular malformations [3]. Recanalization has been reported after embolization with virtually all agents, although improved obliteration rates have been reported using liquid embolic agents.Patients with AVMs in whom initial SRS fails may become candidates for resection. Sanchez-Mejia et al. reported that radiosurgery facilitated subsequent AVM microsurgery and decreased operative morbidity[12].

In our case intracerebral hematoma with hemosiderin deposit within the specimens suggested recurrent bleeding from the fragile vessels after excision of residual AVM.. In this case post radiosurgery, angiogram showed obliteration of nidus later years than also she presented with delayed bleeding mostly due to some hemodynamic changes which occurred and recanalizationof intravascular thrombus mostly. While Gokcil et al. and Greiner-Perth et al. previously reported self-resolving chronic encapsulated intracerebral hematomas[4,16,17].Our case required extirpation and we believe surgical extirpation is the best wayto treat this type of hematoma to avoid irreversible complications.

Conclusion:

Here we reported a AVM case initially treated with GKS with delayed hemorrhage. So it is important to keep regular follow-up with angiography for avoidance of delayed complication. Surgical treatment is the ultimate option for this type of late complication.

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