

# Neurosciences Quiz

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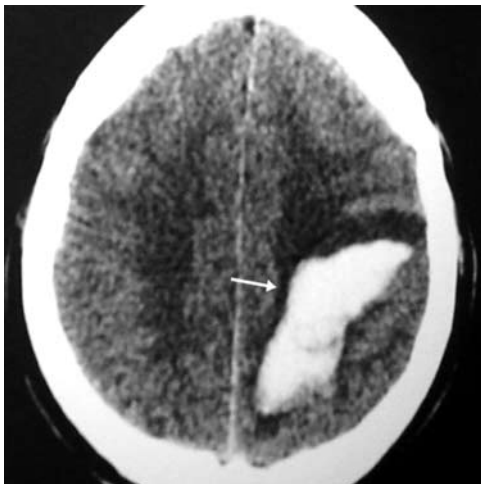
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**Notice:** Authors are encouraged to submit quizzes for possible publication in the Journal. These may be in any field of Clinical Neurosciences, and should approximately follow the format used here. Please address any submissions to the Assistant Editor, Neurosciences Journal, Riyadh Military Hospital, PO Box 7897, Riyadh 11159, Kingdom of Saudi Arabia.  
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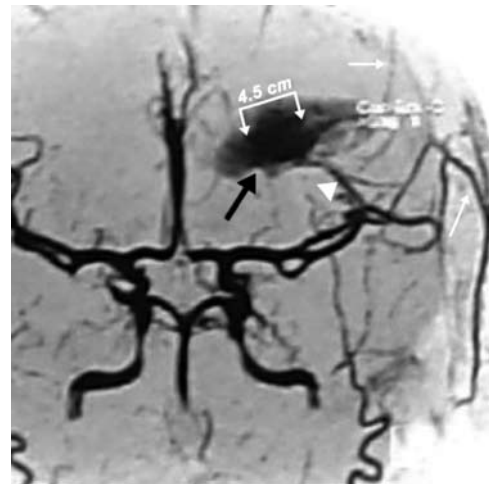
## Acute onset headache and hemiparesis in a young adult

### Clinical Presentation

A 25-year-old man was hospitalized due to acute onset headache, nausea and vomiting, confusion, and right-sided weakness. Past medical and drug histories were unremarkable. On admission, blood pressure was 160/90, he had weakness MRC (Medical Research Council) grade 3 in both upper and lower limbs, and both plantar reflexes were extensor. Funduscopy revealed mild papilledema in both eyes. Urgent brain CT scan was performed (Figure 1) and for further evaluation, brain magnetic resonance angiography (MRA) was also taken (Figure 2).



**Figure 1** - Brain CT scan.



**Figure 2** - Brain magnetic resonance angiography.

### Questions:

1. What are radiologic findings on brain CT scan and brain MRA?
2. What clues on brain CT scan guide us to secondary intracranial hemorrhage (ICH) versus primary ICH?
3. According to Spetzler-Martin grading, what is the arteriovenous malformation (AVM) grading?

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## Answers

1. Brain CT demonstrates left parietal hemorrhage with slight edema. Brain MRA shows an abnormal blood accumulation in the distal area of the left middle cerebral artery due to AVM (black arrow). There are feeding arteries from left MCA (arrowhead) and venous drainage to the left lateral sinus (white arrows).
2. Primary ICHs (ICHs due to primary rupture of brain arteries) are mostly located in subcortical areas, such as putamen, and thalamus. They are homogenous and clinically, there is history of hypertension. Conversely, secondary ICHs (ICHs as a result of pathologies such as brain tumor, arteriovenous malformation, and so forth) are located in cortical areas. There is disproportionate edema (as in brain tumors or metastases), and they are usually non-homogenous.
3. As the greatest size of AVM is 4.5 cm, therefore, we assign 2 points for the size of the lesion; as the AVM is non-eloquent, we assign 0 point for eloquence; and finally, as the AVM does have venous drainage, we assign one point for venous drainage. The grade will be 3 points totally.

## Discussion

Arteriovenous malformations of the brain are a focal anomalous assortment of dilated arteries and veins within cerebral parenchyma;<sup>1</sup> in which one or more primitive direct communications between otherwise, normal arterial and venous channels are preserved.<sup>2</sup> Failure of normal vascular organization at the subarteriolar level and a defective capillary bed creates abnormal arteriovenous shunting.<sup>1</sup> The AVMs occur with the same frequency in men and women. They seldom produce clinical symptoms before the first decade, and usually exhibit in the second and third decades of life.<sup>2</sup> The most prevalent presenting sign of an AVM is ICH, which takes place in 42-72% of clinically apparent AVMs.<sup>1</sup> Other symptoms include seizures, headache, and progressive weakness, or numbness.<sup>2</sup> A bruit on the skull may be auscultated by stethoscope. Treatment depends on the site of the AVM and the age and condition of the patient. Foremost treatment modalities include:<sup>3</sup> Direct surgical resection, endovascular glue embolization, and directed-beam radiation therapy with a linear accelerator or gamma-knife. The long-standing value of these treatments is indistinct.<sup>3</sup> Embolization is a most helpful modality to dwindle the malformation previous to surgery or radiation; however, it is occasionally curative as a single type of treatment.<sup>3</sup> To ease surgical decision making, grading systems are used for predicting the operative risks in patients with different AVMs. In 1986, Spetzler and Martin<sup>4</sup> created a grading system that focuses on size, pattern of venous drainage, and the function of the surrounding brain. For AVMs of size 0-3 cm, one point is assigned; for AVMs of 3.1-6 cm, 2 points are assigned; and for AVMs more than 6 cm, 3 points are assigned. If the location of AVM is eloquent, one point; and if the location is non-eloquent, 0 point is assigned. For venous drainage, one point is assigned also. A summation of points assigned determines the grade of the AVM. There is correlation between grading of AVM and surgical risks.<sup>2</sup>

## References

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