CASE REPORT

Gamma Knife Radiosurgery in A Case of Left Superior Quadrantic Hemianopia Caused by Right Occipital Lobe Arteriovenous Malformation: A Case Report

Dr Pankaj Baruah[1], Dr Priyanka Priyadarshini Baishya[2], Dr Shubhra Das[3], Dr Anusa Gupta[4]

1Gauhati Medical College and Hospital, Guwahati
2Gauhati Medical College and Hospital, Guwahati
3Gauhati Medical College and Hospital, Guwahati
4Gauhati Medical College and Hospital, Guwahati

CorrespondingAuthor
Dr Pankaj Baruah
Gauhati Medical College and Hospital, Guwahati

Received: 19June, 2023 Accepted: 04 August, 2023

ABSTRACT
In the present case report we describe a rare case of a 32-year-old female patient with a history of blurring of vision since 1 month. There was history of sudden onset of severe headache. This case report highlights the step wise approach to diagnose a case left superior quadrantic hemianopia in a case of right occipital lobe arteriovenous malformation presenting with severe headache and its management by gamma knife radiation surgery leading to promising results.

Keywords: Hemianopia, occipital, arteriovenous, malformation, gamma knife radiation surgery, case report

INTRODUCTION

Arteriovenous malformations (AVMs) are a developmental anomaly of the vascular system, consisting of tangles of poorly formed blood vessels in which the feeding arteries are directly connected to a venous drainage network without any interposed capillary system.

AVMs can occur anywhere in the body,

However, brain AVMs are of special concern because of the inherent high risk of bleeding of the abnormal blood vessels that can cause neurological damage [1]

Occipital arteriovenous malformations (AVMs) cause a variety of visual disturbances and headaches. Early diagnosis may lead to treatment that reduces the risk of hemorrhages, visual field loss and other neurologic deficits, and death. [2]

Radiosurgery and endovascular embolization are useful alternatives to surgical treatment in patients at high risk for surgical therapy but can also be useful adjuncts to the main surgical management.

Here we discuss a case of Right Occipital Lobe Arteriovenous Malformation presenting as Left Superior Quadrantic Hemianopia and its treatment with gamma knife radiotherapy

CASE PRESENTATION:

A 32-year-old female came with complaints of sudden onset of blurring of vision associated with severe pain in the back of the head. There was

- no history of any systemic illness, no history of ocular trauma and surgery, no similar history of family illness

A thorough general and systemic examination was done and was found to be within normal limits

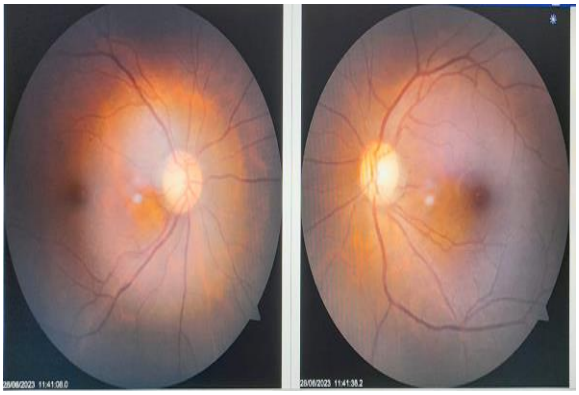
On ocular examination

- Visual acuity was 6/6 B/E and near vision was N6 B/E, Color vision (by Ishihara chart) was normal for B/E, Intra Ocular Pressure by Applanation Tonometry was 18mmhg and 19mmhg for RE and LE respectively, Slit Lamp Examination of anterior segment of both eyes

including pupillary reaction was within normal limits

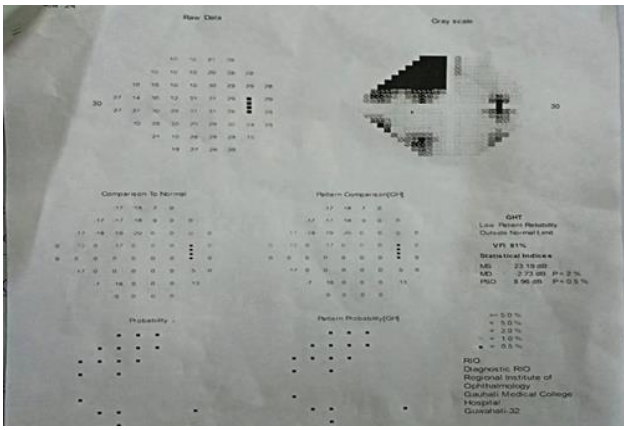
Fundus photographyshowed the fundus to be within normal limits

OD OS



30-2 field test showed left superior quadrantic hemianopia also known as pie in the sky

OS



OD

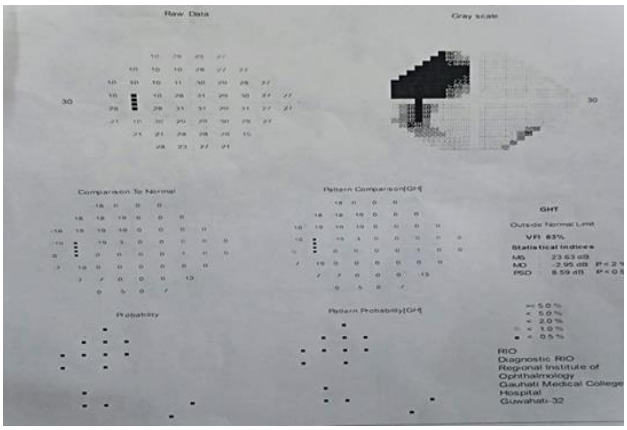


Figure 2- 30-2 field test image of both eyes of patient

MRI Brain showed multiple tortous vessels and hematoma in the right occipital region with adjacent perilesional edema

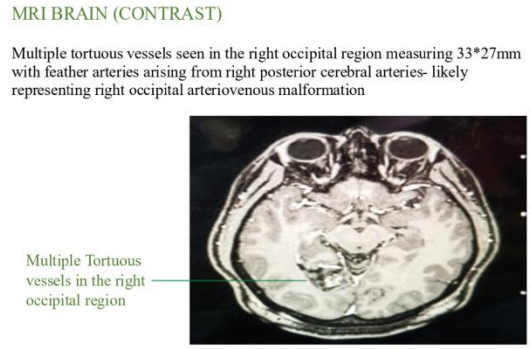


Figure 3- MRI brain (contrast) showing multiple tortuous vessels in rt occipital lobe

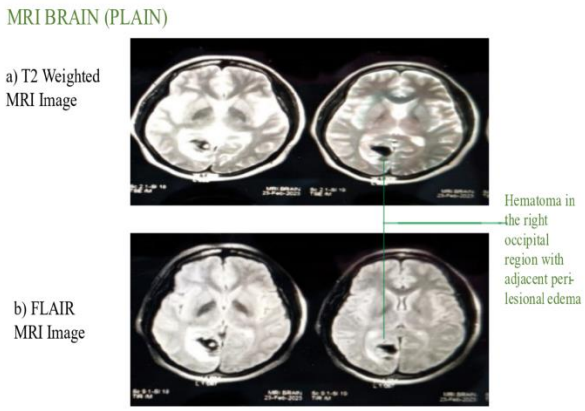


Figure 4- MRI (CONTRAST) showing hematoma in right occipital with adjacent perilesional edema

Cerebral Digital Substraction Angiography (DSA) with 3D Rotional Angiogram confirmed the diagnosis of AVM in Right occipital lobe

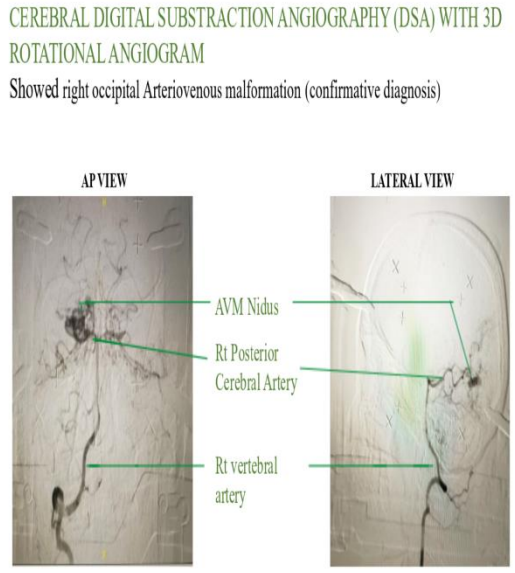


Figure 5-Cerebral Digital Substraction Angiography (DSA) with 3D Rotional Angiogram of the patient

showing AVM in right occipital lobe

Management

1. Since the right occipital lobe AVM was small in size measuring about 33*27 in size and was confined in one location, it was decided to treat the patient with gamma knife radiation surgery, Volume-1.529cc ,Dosage 25 Gy at 52 percent isodose

2. Post-operative medication given were
   - Tab prednisolone 10mg at tapering dose for 4 weeks
   - Tab pantoprazole (40mg) plus domperidone (4mg) for 4 weeks
   - Patient was asked to follow up after 6 months

RESULTS:

The staged approach to diagnose and management of right occipital lobe malformation presenting with left superior quadrantic hemianopia wielded favourable result. The patient experienced a significant reduction in the severity of the headache and was doing well

DISCUSSION:

An arteriovenous malformation (AVM) is a tangle of abnormal blood vessel connections between arteries and veins that disrupt blood flow and distribution of oxygen to nearby tissues. Although surgery is typically curative, AVMs located in deep locations or neighboring critical structures may carry unacceptably high operative risks. In such cases, stereotactic radiosurgery may become a more favorable treatment option.

Stereotactic radiosurgery is a non-invasive treatment option that has been applied to destroy many types of intracranial lesions, such as brain tumors, AVM that are inaccessible or inoperable via open surgery techniques.

Gamma rays (e.g., Gamma Knife): Gamma Knife Radiosurgery is a type of stereotactic radiosurgery where Focused gamma-rays (photons) are delivered to a specified target. Individual beams converge at the target location such that the highest radiation dose is provided to the volume of the lesion or the AVM.

Stereotactic radiosurgery can treat an AVM by damaging the walls of the blood vessels involved and causing it to scar and thicken over time. This eventually occludes the vessels feeding blood to the AVM, effectively removing an AVM from normal circulation.

Complete obliteration rates range from 50 – 90% depending on the size of the AVM yeilding very good results. [2]

CONCLUSION:

The diagnosis and management of brain AVM continues to require a multi-disciplinary approach, and early involvement of other specialities when needed can prevent delays in arranging imaging or treatment. It is not unusual nowadays for treatment to comprise of both surgical and non-surgical aspects in order to remove/shrink as much of the lesion as possible while minimising visual and functional loss. It is important to remain in frequent communication with the patient and/or their parents, as well as colleagues, to ensure a consistent message and plan of action.

In the case of AVMs, stereotactic radiosurgery provides a less invasive alternative to surgery. This can be favorable for AVMs that are deemed too risky to remove by open surgery. Stereotactic radiosurgery offers the highest chance of a cure for smaller AVMs less than 3 cm in diameter with minimal post-operative risks. [2]

Acknowledgments:

We would like to express our gratitude to the patient for their cooperation and trust. We also acknowledge the collaborative efforts of the Dept of interventional radiology team in achieving a successful outcome.

Conflict of interest: Nil

Financial interest: Nil

REFERENCES:

1. Van Essen MJ, Han KS, Lo RTH, Woerdeman P, van der Zwan A, van Doormaal TPC. Functional and educational outcomes after treatment for intracranial arteriovenous malformations in children. Acta Neurochir (Wien). 2018 Nov;160(11):2199-2205.
2. 2.Kupersmith MJ, Vargas ME, Yashar A, et al. Occipital arteriovenous malformations: visual disturbances and presentation. *Neurology*. 1996;46(4):953-957. doi:10.1212/wnl.46.4.953