

Glioblastoma multiforme or brain abscess

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Abstract: It is not uncommon for brain abscess and glioblastoma multiforme (GBM) to be confused with one another in neuroimaging. Due to preoperative diagnostic dilemma, treatment strategy and prognosis cannot be explained in advance.

In this context, we present a case of 50 year-old male patient with features of raised intracranial pressure (ICP) and left hemiparesis. His computed tomographic (CT) scan and magnetic resonance imaging (MRI) of head showed central cystic lesion with ring enhancement with significant perifocal edema. Provisional diagnosis of GBM was made. Surgery was performed with craniotomy. Intraoperative picture showed a cystic lesion with thick capsule containing pus. Histological report showed plenty of inflammatory cells without any evidence of GBM.

There are various neuroimaging techniques to differentiate brain abscess from GBM. However, in Nepalese context, they are hardly applicable. By this article, we intend to emphasize that brain abscess and GBM are very difficult to differentiate and thus thorough evaluation is needed before surgery is contemplated so as to make an appropriate treatment plan.

Key words: brain abscess, GBM, neuroimaging technique

Introduction

“Brain abscess or malignant brain tumor?” is sometimes a subject of great difficulty to differentiate despite the advancement in the field of neuroimaging. It is more so in a developing country like ours where technology is limited. Distinguishing between these two lesions becomes very difficult by conventional neuroimaging techniques like CT scan and MRI. CT scan often shows central cystic lesion with peripheral ring enhancement with significant perifocal cerebral edema in both the cases and similar features can be appreciated in MRI. However, there are few features such as age of onset, predisposing factors and nature of lesion in neuroimages which help to differentiate them in most instances. Moreover, the margin of the lesion is often irregular in case of GBM in CT scan and MRI whereas that of brain abscess is often regular. Occasionally, it becomes almost impossible to differentiate them by CT scan and

routine MRI. In such circumstances, other advanced techniques such as Diffusion weighted image (DWI),¹ apparent diffusion coefficient (ADC) mapping and magnetic resonance spectroscopy^{2,3} are very helpful. However, there are instances where even such advanced technologies fail to diagnose the lesion. A single neuroimaging technique has so far failed to confirm the diagnosis and thus a combined approach has been recommended for evaluating such lesions.⁴

The main objective of this article is to emphasize the fact that brain abscess is often confused with high grade glioma mainly GBM. It is mandatory as far as possible to differentiate between them before surgery so that proper treatment plan can be made and the family can be explained regarding the prognosis accordingly. In the Nepalese context, though we have technological limitations, we can solve this problem to some extent with the help of DWI.

Case report

A 50 year-old male patient presented to our hospital with chief complaints of headache, vomiting and right hemiparesis suggesting raised ICP probably due to space occupying lesion. There was no fever and no other history suggestive of infection. CT scan of head showed ring enhancing lesion with significant perifocal edema on right frontal region (Fig. 1). Similarly, plain T1W MRI showed

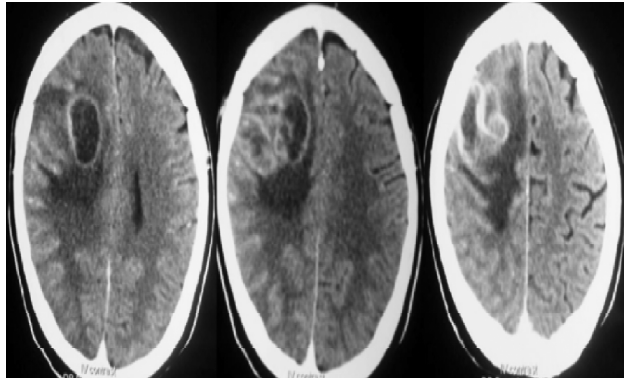


Fig: 1. CT scan of head

hypodense and T2W MRI showed hyperdense lesion (Fig. 2). Unfortunately enhanced T1W MRI was not

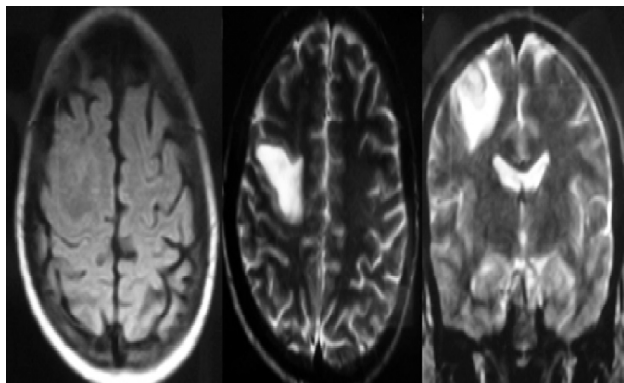


Fig: 2. Plain T1W MRI and T2W MRI

available. Provisional diagnosis of high grade glioma, probably GBM, was made and the patient and the family were explained accordingly. Initially they were reluctant to go for surgery when counseled regarding the poor prognosis irrespective of treatment. Finally, the patient was ready for surgery and underwent craniotomy. Small corticectomy was done and lesion exposed. There was a thick capsule with a clean cleave with surrounding cerebral parenchyma. The lesion appeared benign and a small amount of thick pus was aspirated. The lesion was completely

resected along with the capsule. (Fig. 3) Histology showed the presence of inflammatory cells only.



Fig:3. lesion resected along with the capsule

Discussion

Though routine neuroimaging techniques can often distinguish brain abscess from GBM, occasionally, dilemma still remains before surgery. Regarding the present case, initially they were not willing to undergo surgery and finally it turned out to be an abscess. Had he not undergone surgery, brain abscess itself could have been fatal. If the diagnosis had been made before surgery, there would not have been any confusion regarding the management and prognosis.

Diffusion weighted image (DWI) is a well known MR sequence in the evaluation of ischemic and neoplastic lesions of brain. It can often clearly differentiate the cystic component of malignant brain tumors from that of pyogenic infection as has been mentioned in previous literatures.^{5,6} Cystic component of malignant brain tumor is often seen to be of low intensity on DWI whereas that of brain abscess is of high intensity. Similarly, ADC mapping shows high apparent diffusion coefficient (ADC) value suggesting high diffusivity i.e. unrestricted diffusion in case of malignant brain tumor whereas, ADC value is low suggesting low diffusivity i.e. restricted diffusion in case of brain abscess.^{6,7} Occasionally, even DWI can show restricted water diffusion in case of malignant brain tumors including glioblastoma and metastatic tumors, giving the false diagnosis of brain abscess as had been reported previously.^{8,9} One study showed that (18)F-FET (fluoroethyl-L-tyrosine) PET also has limited specificity in distinguishing these lesions.¹⁰ Similarly, the 201Thalium SPECT also has difficulty in differentiating abscess from brain tumor though thalium uptake of brain abscess was significantly lower than that of GBM.¹¹

Conclusion

Ocasionally, in spite of various neuroimaging techniques, it is difficult to differentiate GBM from brain abscess. It may

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not always be possible to differentiate them without surgery in our context where numerous expensive investigations are not feasible. However, DWI is one of the simpler MRI sequences which may be possible in our context even though it has very low Δ value. With the judicious application of DWI, we may be able to reduce confusion.

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