The Egyptian Journal of Radiology and Nuclear Medicine (2014) **45**, 1233–1240

Egyptian Society of Radiology and Nuclear Medicine

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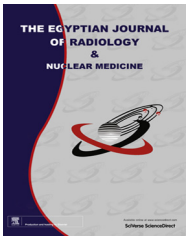

ORIGINAL ARTICLE

Role of magnetic resonance spectroscopy in differentiation between recurrence of glioma and post radiation injury

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Received 11 June 2014; accepted 18 August 2014
Available online 17 September 2014

KEYWORDS

Magnetic resonance spectroscopy;
Recurrent glioma;
Post radiation injury

Abstract *Purpose:* This study aims to evaluate the role of MR spectroscopy in the detection of recurrent glioma and differentiation from post radiation injury.
Patients and methods: 32 patients (20 males and 12 females) complaining of different neurological symptoms were enrolled prospectively in this study between September 2011 and December 2013. These patients were selected on the basis that they were known patients with pathologically proved glioma who underwent radiotherapy. All patients underwent standard MRI examination and MR spectroscopy.
Results: This study included 32 patients, twenty four patients (75%) proved histologically to be of recurrent glioma (group I) and 8 cases (25%) diagnosed as post radiation injury (group II). Peri-tumoral infiltration was present in 18 cases (56.25%) of recurrent glioma. Significantly increased Cho/Cr and Cho/NAA ratios were observed in neoplastic ($n = 24$) compared with non-neoplastic lesions ($n = 8$). Presence of lactate and lipid yielded correct classification as neoplastic and non-neoplastic lesions.
Conclusion: Magnetic resonance spectroscopy is a useful tool for the detection of recurrent glioma and differentiation from post radiation injury.

1. Introduction

Distinguishing between radiation necrosis and tumoral recurrence represents a difficult diagnostic challenge. Radionecrosis at tumor bed may mimic recurrent glioma, while any radiation-induced lesions detected distant to the primary tumor site may be misinterpreted as multifocal glioma (1).

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Peer review under responsibility of Egyptian Society of Radiology and Nuclear Medicine.

http://dx.doi.org/10.1016/j.ejrnm.2014.08.007

Table 1 Histopathological diagnosis of 32 patients suspected of recurrent glioma.

Final diagnosis	No. of patients	%
Recurrent glioma (group I)	24	75
-Glioblastoma multiformis	16	
-Anaplastic astrocytoma	7	
-Low grade glioma	1	
Post radiation injury (group II)	8	25
Total	32	100

Increasingly aggressive radiation treatment protocols are being used in the hope of improving patient survival rates. These regimens can lead to overlap between effective and neurotoxic doses of radiation (2).

MR spectroscopy is providing biochemical information about proliferative tumor activity and has been proposed as alternative modality for differentiating recurrent tumor from radiation injury (3,4).

Magnetic resonance spectroscopy (MRS) can be used to serially monitor biochemical changes in tumors, stroke, epilepsy, metabolic disorders, infections, and neurodegenerative diseases. To get an accurate assessment of the tumor chemistry, avoiding areas of necrosis, hemorrhage, calcification, cysts or bone is mandatory (5,6).

MR spectroscopy can be performed within 8–10 min and can be added on to conventional MR imaging protocols (7).

2. Aim of the work

The aim of the work is to evaluate the role of MR spectroscopy in the detection of recurrent glioma and differentiation from post radiation injury in the whole area of signal alteration within irradiated region.

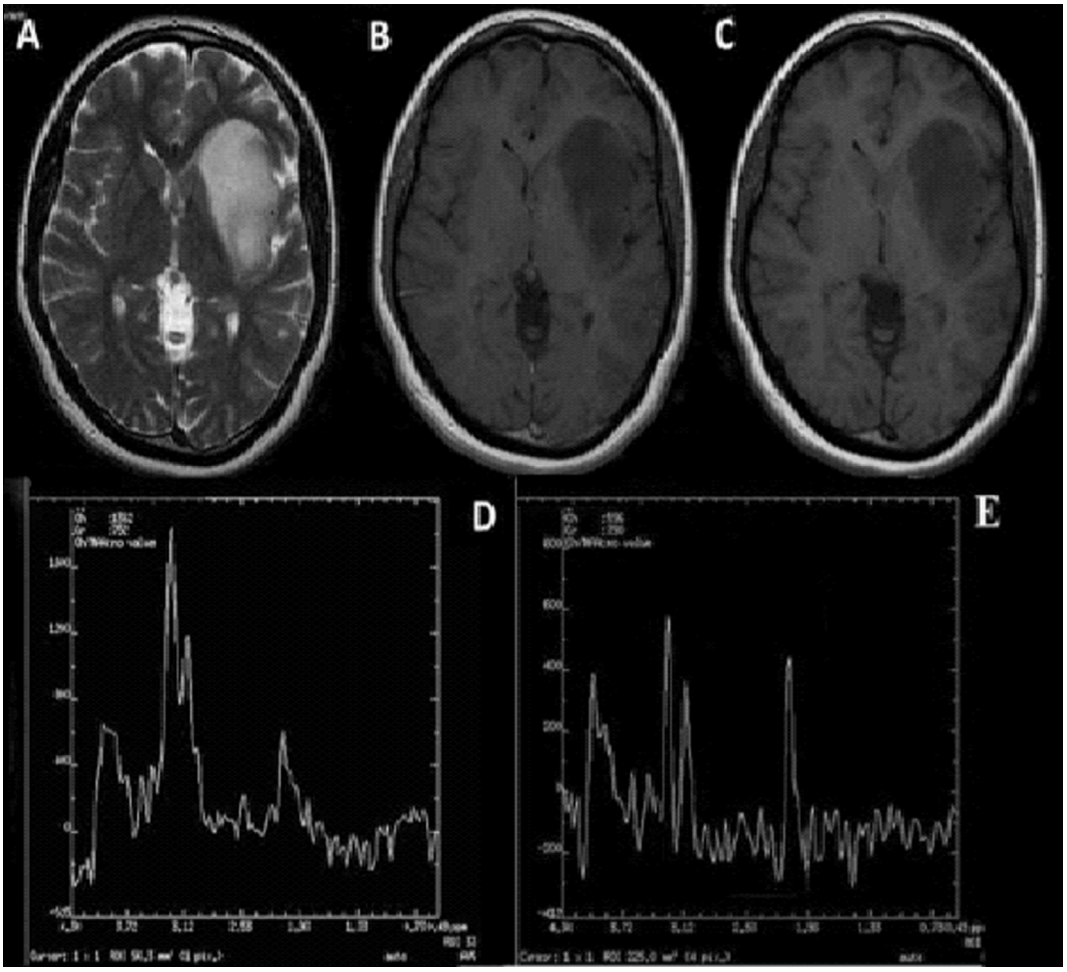

Fig. 1 Recurrent glioma. A fifty year old female with a history of left temporoparietal space occupying lesion, proved by biopsy to be of low grade astrocytoma managed by radiotherapy. After one year she presented with severe headache with vomiting and right hemiparesis. (A) Axial T2 WI of the brain revealed abnormal hyperintense signal intensity at the left temporo-parietal region with mild peri-focal edema. (B) Axial T1 WI of the brain revealed abnormal hypo intense signal intensity at the left temporo-parietal region with mass effect. (C) Post contrast T1 WI of the brain showed no significant enhancement of the previously noted lesion. (D) MRS done with long TE and single voxel technique showing increased Cho peak and decreased Cr and NAA peaks with elevated Cho/NAA ratio (2.2) and elevated Cho/Cr ratio (1.9) with, prominent lactate doublet and no significant increase in lipid peak. (E) Peri-lesional MRS using long TE revealed Cho/Cr ratio about 1.3, suggesting no infiltration in the peri-lesional area.