

THE ROLE OF MRI TO DIAGNOSTIC OF GLIOMA TUMER

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ABSTRACT

Gliomas are primary brain tumors originating from different supportive glial cells of the brain. According to the histological origin of the tumor cells gliomas can be mainly divided into Oligodendrogliomas, Oligoastrocytomas and Astrocytomas. Malignant Astrocytomas are called Glioblastoma multiforme and represent the second most common primary brain tumor in adults. Several studies investigating the incidence of gliomas by anatomic location reported the frontal and temporal lobe as the preferential sites. In general, these studies assigned gliomas to topographic locations according to the 10th version of the International Classification of Diseases (ICD-10) which includes the frontal, temporal, parietal and occipital lobes as well as ventricles and brainstem. An exact topographic localization of gliomas is mandatory for neurosurgeons as it determines resectability and therefore prognosis (Berger, Duffau,...). Previous studies and the ICD-10 classification only include 4 lobes and do not distinguish central, insular and limbic as separate locations that are important for neurosurgeons due to their eloquent function and common site of gliomas. This concept of the 7 lobes in addition with the deep seated nuclei and the corpus callosum will constitute the anatomical background of this thesis.

KEYWORDS: MRI role, glioma, head tumors.

INTRODUCTION

Brain cancer is a life threatening neurological disorder in which malignant cells, grow, proliferate and invade the original cerebral structures of the host, hampering seriously adequate brain function. Malignant cells generate eventually a dedifferentiated tumoral mass that interferes with vital brain functions as sensory and motor activations, memory and perception and neuroendocrine regulation, among others. The fully developed tumoral mass consumes a significant part of cerebral volume resulting in cerebral compression and serious neurological impairments, such as vision or hearing disturbances and eventually lethal cerebrovascular complications. Most brain tumors remain asymptomatic during early development, revealing their symptoms and lethal nature only at later stages. Therapy is facilitated many times by an early finding, a circumstance making the neuroimaging approaches particularly useful in the detection and handling of these lesions.

In the last decades, Magnetic Resonance Imaging (MRI) approaches have evolved into the most powerful and versatile imaging tool for brain tumor diagnosis, prognosis, therapy evaluation, monitoring of disease progression and planning of neurosurgical strategies. MRI methods enable the non invasive assessment of glioma morphology and functionality providing a point of likeness into histopathological grading of the tumor and

helping in this way a more successful patient management. This impressive evolution is based not only for the high resolution and quality of the anatomical images obtained, but on the additional possibilities to achieve quantitative functional information on tumoral physiopathology and its repercussions in the sensorial, motor and integrative functions through the brain.

The use of conventional paramagnetic or super - paramagnetic contrast media allows for the identification of areas with blood-brain barrier (BBB) disruption and the recent molecular imaging approaches enable researchers to visualize molecular events associated to tumor proliferation and invasion, bringing the potentials of diagnostic imaging to the cellular and molecular aspects of tumor biology. Moreover, functional MRI approaches as performed in the clinic are endowed with the potential to detect and characterize the earliest neoangiogenic, metabolic and hemodynamic alterations induced by the neoplasm.

Several advanced magnetic resonance (MR) methodologies have been proposed in the last years to assess the functional competence in healthy and pathologic brain tissue. Diffusion and perfusion MRI are probably the two main approaches that have reached a relevant clinical role in brain oncology, particularly in neovascular imaging (Calli, Kitis et al. 2006). The

diffusion approaches investigate the thermally induced random molecular motions of water molecules in tissues. The perfusion phenomenon describes and quantifies the microvascular blood flow which feeds a volume element of an organ or tissue. At a first glance these two phenomena seem to be very different, however a closer look identifies they both concerned with underlying molecular motions. Moreover, the random distribution of capillaries in tissues such as brain, provides tissue perfusion with some of the characteristic features of diffusive motion.

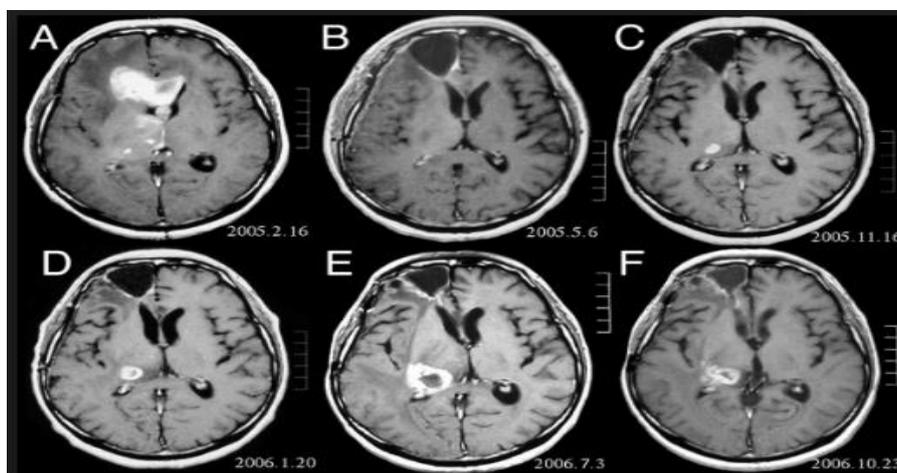
Indentations And Equations

Patients operated for glioma at the Department of radiology in Al Husien hospital between 2010 and July 2018 were retrospectively scanned. Then the following inclusion criteria were applied:

- Age ≥ 18 ,
- No previous neurosurgical procedure,
- Supratentorial lesion,
- For low-grade gliomas: availability of T2-weighted or FLAIR MR images,
- For high-grade gliomas: availability of T1-weighted MR images with contrast enhancement.

We expect to include about 700 patients in the study cohort.

The demographic data of the patients, karnofsky index (KI), type of surgery, histopathological results, extent of resection (EOR), adjuvant therapy, survival time (ST) and progression-free-survival (PFS) are obtained from patient's records or interview.



Figures and Tables.

CONCLUSION

Changes in the current teaching-learning model have become necessary because of the increasing information availability and fast technological development in the latest years. The hierarchical organization of the knowledge acquisition process with essential programmatic contents allows an appropriate education of the future specialist.

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