ACCURACY OF SQUASH OR SMEAR TECHNIQUE IN DIAGNOSIS OF BRAIN GLIOMAS

THESIS

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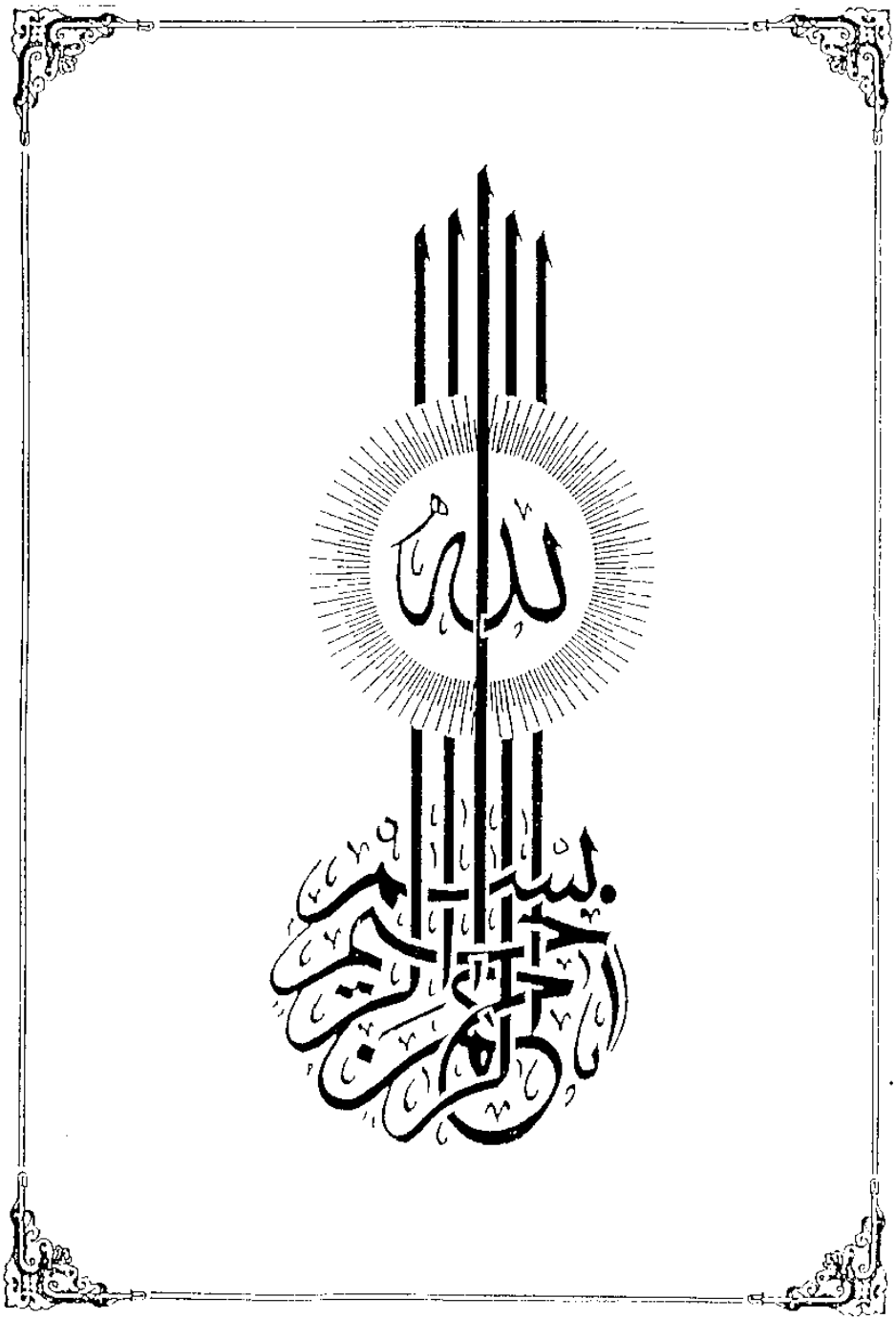
TO
MY PARENTS



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INTRODUCTION AND AIM OF THE WORK

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It is difficult to justify craniotomy for, patients with inoperable tumors if safe and reliable alternative diagnostic technique are available. Not only is craniotomy an expensive means of achieving the result, but if the surgeon is also tempted to undertake a decompression, internal or external for a demented or dysphasic patient, the subsequent prolongation of life could regarded as disadvantages. (Marshall et al., 1974).

Although open brain biopsies are usually accompained by few morbidity and mortality, there is no question that they carry some risk and of course considerable expense. (Kaufman et al., 1985). Needle biopsy is an alternative to tumor excision and may be indicated with deep seated neoplasm such as thalamic or pontine astrocytomas whose excision would be hazardous.

The major drawback to needle biopsy is the difficulty of establishing a histological diagnosis with small tissue samples, if the pathologist familiar with squash preparation and can identify normal brain tissue in these preparation, they may be preferable to frozen section for intraoperative diagnosis of small needle biopsy specimens. (Elis and Youmans, 1990). The smear technique for obtaining a rapid intraoperative diagnosis has been applied in neurosurgical units worldwide (Cahill and Hidvegi, 1985).

This method plays a very important role in the analysis of samples from craniotomies and the small specimens obtained from stereotactic needle biopsies. (Torres and Collaco, 1993).

The aim of this work is to evaluate the squash or smear technique for diagnosis of brain gliomas.

CONTENTS

REVIEW OF LITERATURE

PATHOLOGY OF BRAIN GLIOMAS

1- Classification :

The histogenesis of the tumours arising from the central nervous system has been the subject of very considerable study and many complex concepts have been suggested. From these, elaborate classifications of tumours based on the many stages in the normal development of C.N.S. tissues have been propounded in a profusion of names particularly in respect of tumours of glial cells (Thomson and Cotton, 1976).

In spite of the fact that fibrillary astrocytic neoplasms are so common, there are continuing differences of opinion about their classification. Such differences relate to the number of grades to which lesion can be assigned and to the histologic criteria used to made those assignment (Burger, 1986).

In 1926, Bailey and Cushing classification was based on the cells in the nervous system and their embryonic precusors. They classified glioma into astrocytoma, astroblastoma and spongioblastoma multiforme.

In 1932, Baily revised the original classfication subdividing glial tumours into 10 types which are medulloblastoma, neuroepithelioma, glioblastoma multiforme, pinealoma, spongioblastoma, astrocytoma, astroblastoma, ganglioneuroma, ependymoma and oligodendroglioma.

In 1949, Kernohan and associates categorized them on the basis of increasing pleomorphism and anaplastic characteristics. Astrocytomas

were graded into grades I, II, III, and IV on the basis of increasing anaplasia (Burger, 1985).

In 1979, the World Health Organization (WHO) convened an international group of neuropathologists to develop a unified classification of brain tumours in an attempt to consolidate the diverse systems then in use (Rorke et al, 1985).

WHO Classification (1979).

Tumours of neuroepithelial tissue.

* **Astrocytic tumours:**
  - Astrocytoma : Fibrillary, Protoplasmic and Gemisto cytic.
  - Pilocytic astrocytoma.
  - Subependymal giant cell astrocytomas (ventricular tumours of tuberous sclerosis.
  - Astroblastoma.
  - Anaplastic astrocytoma.

* **Oligodendroglial tumours.**
  - Oligodendroglioma.
  - Mixed oligoastrocytoma.
  - Anaplastic oligodendroglioma.

* **Ependymal and choroid plexus tumours.**
  - Ependymoma.
  - Variants, Myxopapillary ependymoma.
  - Papillary ependymoma and subependymoma.
  - Anaplastic ependymoma.
  - Choroid plexus papilloma.
  - Anaplastic choroid plexus papilloma.

* **Pineal cell tumours.**
  - Pineocytoma, Pineoblastoma.

* **Neuronal tumours.**
  - Gangliocytoma, Ganglioglioma, Neuroblastoma.

* **Poorly differentiated and embryonal tumours.**
  - Glioblastoma, Variants:-
    - Glioblastoma with sarcomatous component.
    - Giant cell glioblastoma.

* **Medulloblastoma variants** : Desmoplastic medulloblastoma.
  - Medulloepithelioma.

* **Primitive polar spongioblastoma.**

* **Gliomatosis cerebri.** (Burger, 1986).

In 1985, revision of WHO classification of brain tumours for childhood brain tumours, classified glial tumours into :

1- Astrocytic tumours :

(a) Astrocytoma. Fibrillary, protoplasmic, gemistocytic, pilocytic and xanthomatous.

(b) Anaplastic astrocytoma.

(c) Subependymal giant cell tumours (tuberous sclerosis).

(d) Gigantocellular glioma.

2- Oligodendroglial tumours :

(a) Oligodendroglioma.

(b) Anaplastic oligodendroglioma.

3- Ependymal tumours :

(a) Ependymoma.

(b) Anaplastic ependymoma.

(c) Myxopapillary ependymoma.

4- Choroid plexus tumous :

(a) Choroid plexus papilloma.

(b) Anaplastic choroid plexus tumour (Carcinoma).

5- Mixed gliomas :

(a) Oligoastrocytoma.

* Anaplastic oligoastrocytoma.

(b) Astroependymoma.

* Anaplastic ependymoastrocytoma.

(c) Oligoastroependymoma.

* Anaplastic oligoastroependymoma.

(d) Oligoependymoma.

* Anaplastic oligoependymoma.

(e) Subependymoma-Subependymal glomerate astrocytoma.

(f) Gliofibroma.

6- Glioblastomatous tumours :

(a) Glioblastoma multiforme.

(b) Giant cell glioblastoma.

(c) Gliosarcoma.

7- Gliomatosis cerebri. (Rorke et al., 1985).

Daumas-Duport classification :

Damaus-Duport et al, proposed a simplified grading system for astrocytic tumours. This is a cumulative numerical grading system that results from a summary score determined from the presence or absence of the following histologic criteria :

1- Nuclear atypia : nuclei show hyperchromasia and obvious variation in size and shape.

2- Mitosis : mitoses were recorded as present or absent.

3- Endothelial proliferation : this is considered as present when vascular lumina are not surrounded by a single layer of endothelial cells or by haphazardly arranged endothelial cells that in themselves demonstrate cytologic atypia.

4- Necrosis : this is recorded as present only when obvious.

The addition of all of the above four cytologic criteria (0 = absent, 1 = present) will result in numerical grade. Thus a tumour having all four criteria present would be a grade 4 tumour, those with only one of the above criteria present would be a grade 1 tumour and so on.

Daumas-Duport and others demonstrated that this method of grading was reproducilbe and predicted survival better than Kernohan grading system. In addition, Daumas-Duport et al, clearly showed that cellular subtype variants, such as microcystic and pilocytic astrocytomas, must be excluded from the usual fibrillary astrocytoma grading system (Daumas-Duport et al, 1988).