COMPUTED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING OF INTRACRANIAL MENINGIOMA

ESSAY
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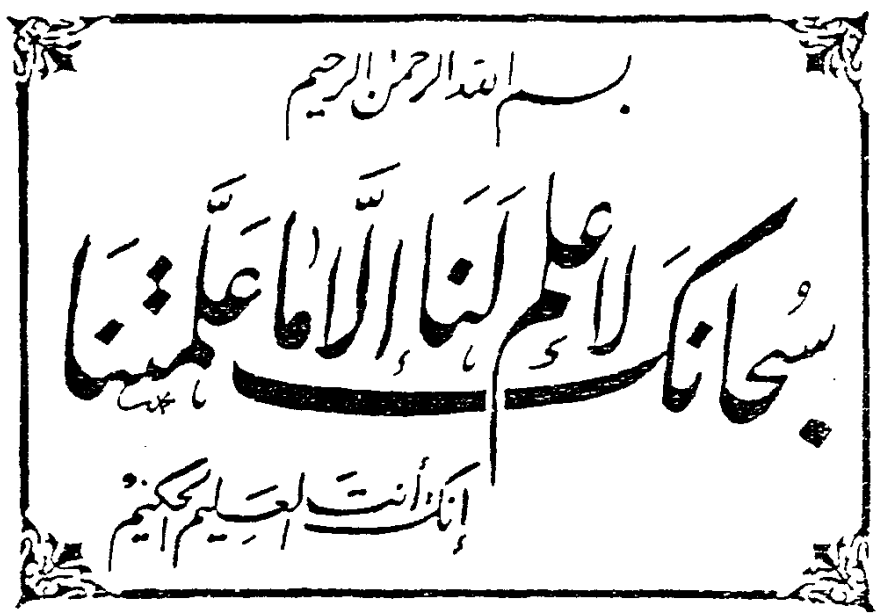
Master Degree of Radiodiagnosis

By
Inas Islam Ibrahim
M.B.,B.Ch.

Supervised by

Prof. Dr. Hoda Ahmed El-Deeb
Professor of Radiodiagnosis
Faculty of Medicine
Ain Shams University

Faculty of Medicine
Ain Shams University
1993



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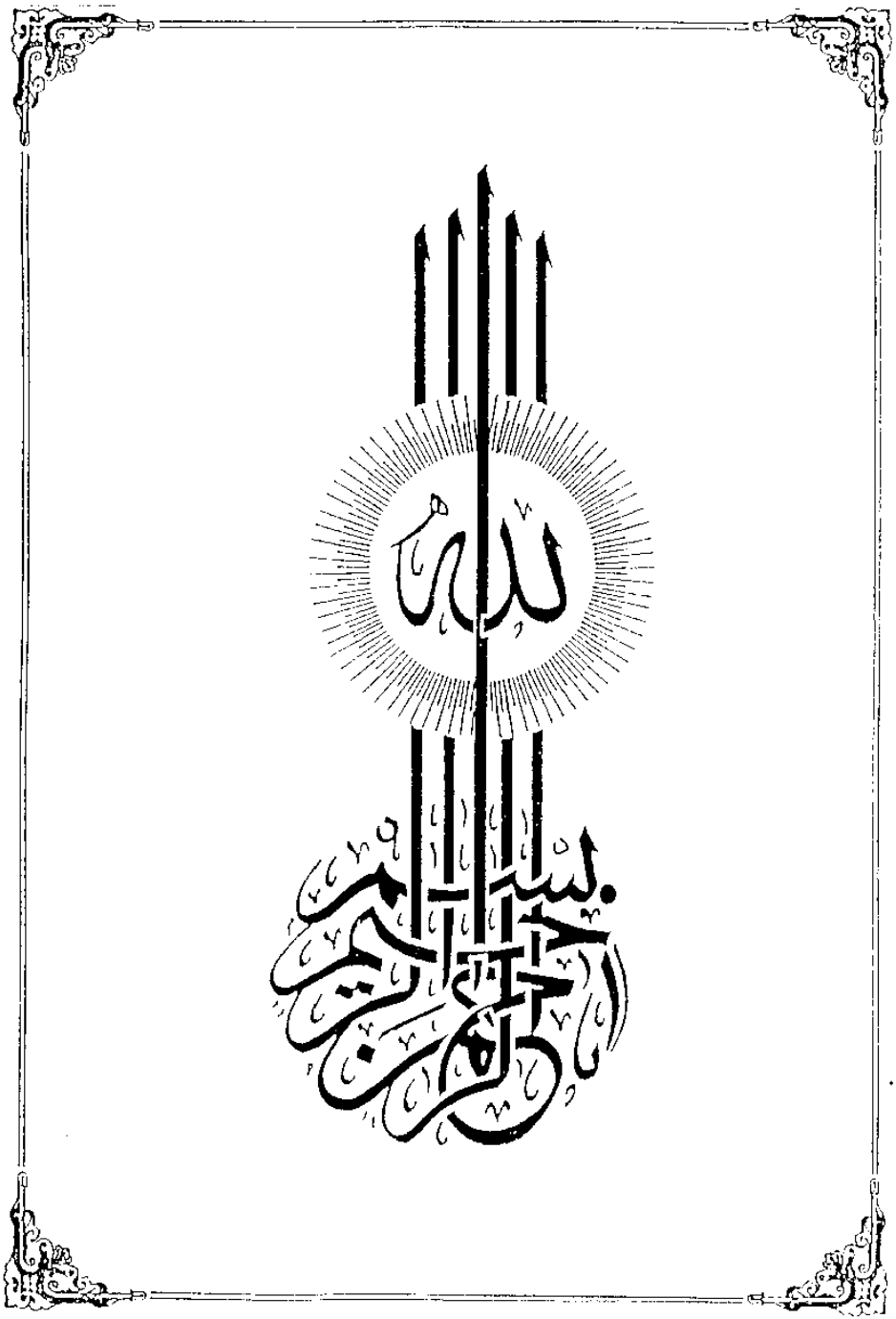

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The Researcher

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Introduction and Aim of the work

Meningiomas are the most common extra-axial neoplasms in adults, accounting for approximately 15% of all intracranial tumors.

They are benign lesions of meningeal origin that have tendency to occur at certain sites within the cranial vault.

CT and MR provide an important role in the diagnosis of meningioma and differentiating it from other intracranial tumors based on many factors such as the location, and its imaging characteristics.

The aim of this study is to review the CT and MR imaging manifestations of intracranial meningioma and to clarify the role of each modality.

PATHOLOGY AND CLINICAL PICTURE

Prevalance of occurrence of Intracranial Meningiomas:

Meningiomas are the most common extra-axial neoplasms in adults, accounting for approximately 15% of all intracranial tumors *(Hicks et al, 1990)*. They are benign lesions of meningeal origin that typically occur in middle aged adults, more commonly in women. *(Schwartz and Mantello, 1992)*.

They may occur at any age, but predominantly in adults with a peak incidence among patients around age 45. They are more common (about 60% of all meningiomas) in women, and are rare in children accounting for 1% of the intracranial tumors in patients younger than 20. In children, meningiomas usually occur in the posterior fossa and intraventricular sites. In adults most intracranial meningiomas are located in the parasagittal-falx region. (see the table).

The convexity of the cerebral hemispheres and the sphenoid ridge are the next most common sites; the olfactory groove, suprasellar, posterior fossa, middle fossa and intraventricular are of lesser frequency. Multiple meningiomas occur in fewer than 1% of cases; they usually occur in relation to the other intracranial tumors or the Von-Recklinghausen's syndrome. *(Fetell and Stein, 1989)*.

However a small proportion can become malignant, usually the vascular angioblastic type. Recurrence after surgery is also not uncommon, particularly with tumors in difficult sites where complete expiration is difficult. *(Sutton, 1993).*

Table of the Anatomic distribution of Meningiomas

Sites of the tumor	%
- Parasagittal and falx.	25
- Convexity.	20
- Sphenoidal ridge.	20
- Olfactory groove.	10
- Suprasellar.	10
- Posterior fossa.	10
- Middle fossa.	3
- Intraventricular.	2
Total	**100**

After Fetell & Stein, 1989.

Pathology of Intracranial Meningioma

Macroscopical picture:

According to the macroscopical characteristics of these tumors, meningiomas are commonly round or nodular and well circumscribed, compressing and displacing adjacent portions of the nervous system. They are usually firm but may be soft or rarely cystic. Occasionally, they form a diffuse sheet *(meningioma en-plaque)*.

The following characteristics are of clinical and surgical importance. They are encapsulated and may be nodular or smooth, they firmly attach to the adjacent dura and may involve bone; Vascularity varies greatly as does the degree of edema around the tumor. Edema may be massive in some cases, although the tumor is small; the blood supply commonly arises from the dura and rarely comes from cerebral arteries. They recur at a rate of 10%.

They arise from the arachnoid cell clusters associated with the arachnoid villi or points of entry and exit of blood vessels and the cranial nerves through the dura. These tumors are discrete; they vary in size from that of a small pea to that of an orange, and are rarely multiple except in patients with Von-Recklinghausen's syndrome.

Meningiomas commonly invade the bony skull and produce a localized hyperostotic reaction, (but rarely violate the pia and invade the cortex. Tumor cells may be present within bone, but there is often no evidence of tumor cells within the hyperostotic area *(Fettel and Stein, 1989)*.

The diagnosis is often suggested by the classic meningioma site e.g. parasagittal or sphenoidal ridge. Originally, the hyperostosis is confined to the inner table but later it may grow through the diploe and outer table and even present as a palpable lump. When protruding externally, the lesion can sometimes show sun-ray spicules. Other radiological evidence of meningioma such as enlarged vascular markings leading to the lesion or signs of raised intracranial pressure, may also be present. If the meningioma grow from the sphenoid ridge into the orbit it can present with proptosis.

With meningiomas arising in the region of the jugum or anterior clinoid, a rare manifestation is local bone expansion with pneumatization, so called "blistering".

Sometimes there is a mixed osteoblastic (causing new bone formation) and osteolytic response. In these cases the appearance may simulate such lesions as fibrous dysplasia or eosinophilic granuloma of the vault. Very occasionally,

meningioma produces a purely osteolytic destructive reaction. In these cases evidence to the true cause of the bone lesion may be provided by other features. Thus in the skull vault enlarged meningeal vascular channels may be seen extending to the lesion and the foramen spinosum may be enlarged on the affected side. Again the characteristic meningioma site i.e. parasagittal or along the sphenoidal ridge may suggest the true cause. *(Sutton, 1993).*

Microscopical picture

The histopathologic classification of meningiomas in widest use today is that proposed by *Courville, 1950*, which was later popularized and modified by *Russel and Rubinstein, 1977.*

This classificatioin scheme subdivides benign meningiomas into four basic subtypes-fibroblastic, transitional, syncytial, and angioblastic. Mixed types are also recognized.

1- Fibroblastic meningiomas: are composed of interlacing bundles of long narrow spindle cells. The distinctive feature of this type is the presence of abundant reticulum and stout collagen fibres between individual cells. Occasionally, psammoma bodies and mild whorl formation are noted.