

C.T. FINDINGS OF MULTIPLE INFLAMMATORY AND
NEOPLASTIC FOCAL LESIONS OF THE CRANIUM.

THESIS

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BY

YASEIR HUSSEIN ABDEL-ALL
M.B.B.CH.
AIN SHAMS UNIVERSITY
MAADI ARMED FORCES HOSPITAL.



SUPERVISORS

PROF. DR. ABDEL MONIUM ABOU SINNA

PROF. OF RADIODIAGNOSIS
AIN SHAMS UNIVERSITY
FACULTY OF MEDICINE

DR. MOHAMED ZAKI

LECTURER OF RADIODIAGNOSIS
AIN SHAMS UNIVERSITY
FACULTY OF MEDICINE.

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INTRODUCTION

CT demonstration of multiple neoplastic and inflammatory lesions suggests many diagnostic possibilities. However, aspiration biopsy, regression under certain lines of treatment and post-operative pathological examination may be resorted to for further confirmation. Multiple lesions have much less incidence and usually carry more poor prognosis than single ones, so they need careful study and follow-up. Follow-up CT demonstrates the response to treatment, the post-operative recurrence, and response to radiotherapy and chemotherapy.

AIM OF WORK

The aim of this study is to emphasize the diagnostic capabilities of CT in multiple intracranial focal lesions with a trial to demonstrate important features, which may help in the differential diagnosis.

(2) **CRANIAL CT ANATOMY**

(Mokhator H. Gado 1983)

The human brain consists of well known anatomical structures. Some of them concerned with certain functions.

COMPONENTS OF THE BRAIN:

The brain consists of three major components:

Forebrain: Telencephalon - Diencephalon

Midbrain (Mesencephalon)

Hindbrain : Pons - Medulla - Cerebellum .

The telencephalon:

It consists of the two cerebral hemispheres that occupy most of the cranial cavity . They are separated by the interhemispheric fissure. It contains the falx cerebri. The falx is attached to the anterior part of the bony floor of the cranial cavity. The middle part of the falx has a free edge which hangs over the corpus callosum. The posterior part of the falx is attached to the tentorium cerebelli.

The straight sinus lies at the meeting of the falx and the two leaflets of the tentorium cerebelli.

The superior sagittal sinus lies at the root of the falx , along the inner table of the cranial vault , in the midline. At its posterior end, it meets the posterior end of the straight sinus, at the trochlear foramen. From which, on each side of the midline, a transverse sinus extends against the inner table of the occipital bone, at the line of attachment of the tentorium. (FIG.1)

Each cerebral hemisphere consists of an outer gray substance called the cerebral cortex , an underlying white substance called the centrum semiovale , and a small group of internally located masses of central gray substance called the basal ganglia.

The diencephalon consists of several structures that lie around the third ventricle : the thalami, the geniculate bodies , the epithalamus, the subthalamus, and the hypothalamus.

Each foramen of Monro communicates between the lateral ventricle of one side and third ventricle.

The hindbrain:

It consists of two parts. The anterior part is the medulla oblongata inferiorly, and the pons superiorly. The posterior part is the cerebellum. Between the anterior and the posterior parts of the hindbrain, there is a cavity, the fourth ventricle.

The cerebellum occupies the greater part of the posterior cranial fossa. It is located on the dorsal aspect of the pons and medulla, separated from the two structures by the cavity of the fourth ventricle. The upper surface of the cerebellum is separated from the occipital lobes by the tentorium cerebelli. The cerebellum consists of a narrow medial portion, the vermis, and two hemispheres which extend laterally and posteriorly. The high point of the cerebellum is in the midline anteriorly. The leaflets of the tentorium are sloping upwards toward the midline.

The surfaces of the cerebral hemispheres contain numerous sulci that separate cerebral gyri. Four major sulci divide each cerebral hemisphere to five lobes. The lateral sulcus (Sylvian fissure) on lateral surface separates the greater part of temporal lobe from frontal lobe and the anterior part of parietal lobe. The central sulcus (rolandic fissure) runs on the lateral surface of hemisphere downward and forward. The parietooccipital sulcus starts at the superior margin 5cm. from the occipital pole and extends downward and forward where it meets the calcarian sulcus. The calcarian sulcus extends on the medial surface of the occipital lobe and ends at the occipital pole.

The frontal lobe is limited posteriorly by the central sulcus, and inferiorly by the lateral sulcus.

The occipital lobe is limited anteriorly by the parietooccipital sulcus. The parietal lobe lies between the frontal lobe and the occipital lobe. The insula (central lobe) is hidden in the depth of the lateral sulcus. The lips of this sulcus are parts of the frontal, parietal, and temporal lobes. They are called the opercula.

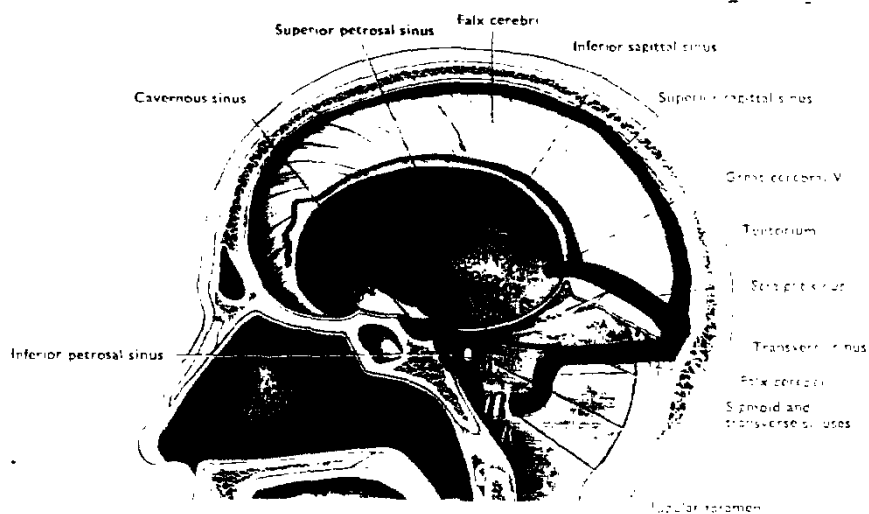


FIG. 1. Sagittal section through the skull to the left of the falx cerebri. The brain has been removed to show the folds of dura mater which incompletely partition the cranial cavity.

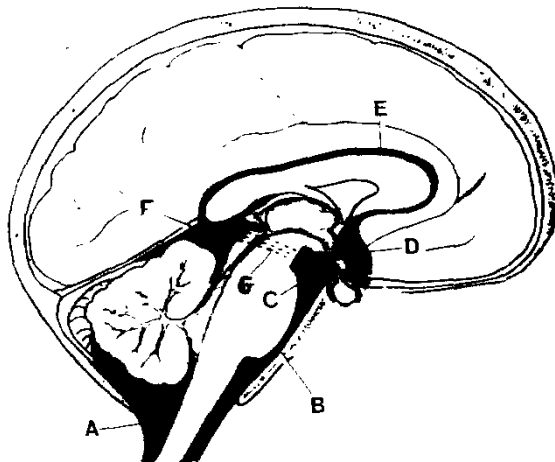
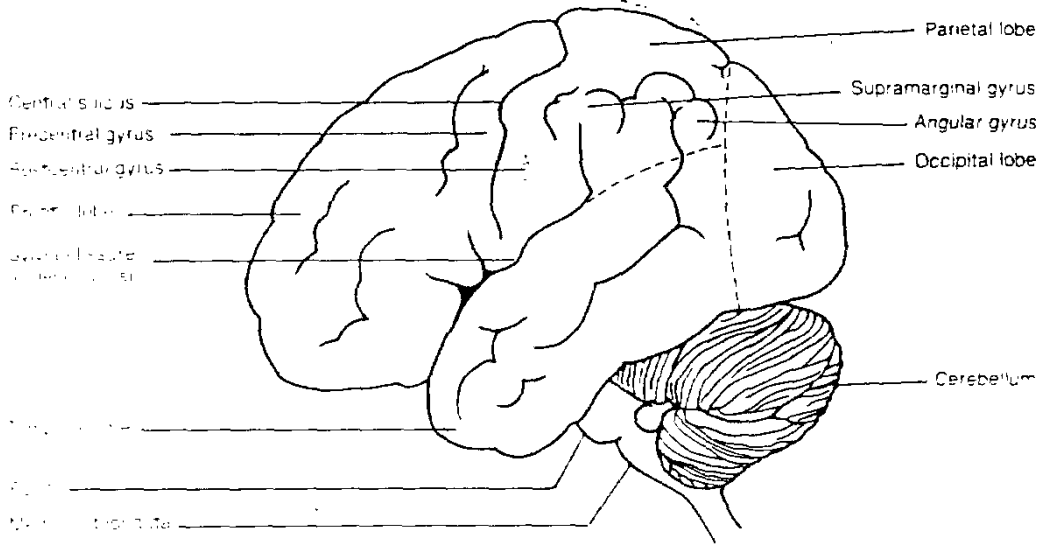


FIG.2 The subarachnoid cisterns : (Sutton 1987)

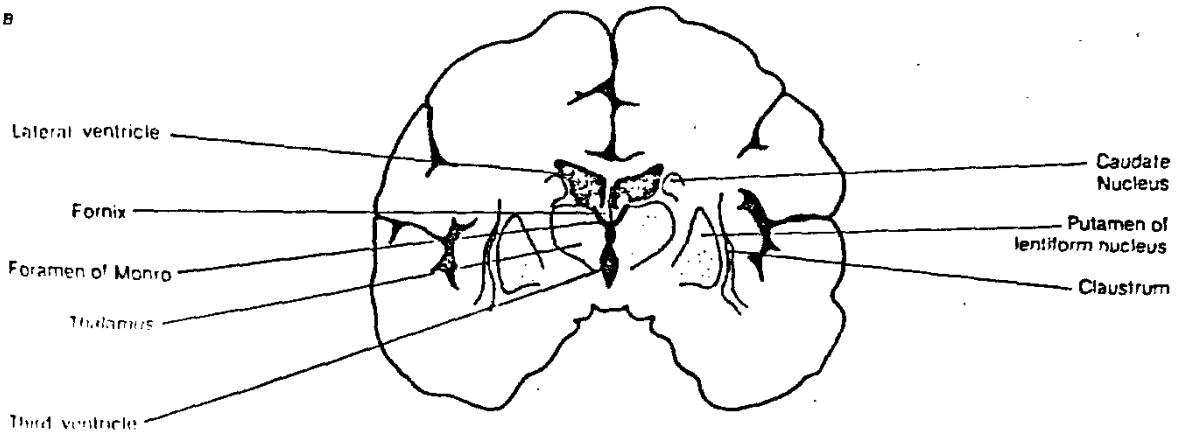
- A. Cisterna magna
- B. Cisterna pontis
- C. Cisterna interpeduncularis (crural cistern)
- D. Suprasellar cisterns
- E. Pericallosal cistern
- F. Quadrigeminal cistern (cisterna venae magna)
- G. Ambient cisterns.

The ventricular system consists of an interconnected series of cavities lying within these three major components. The lateral ventricles lie within the forebrain. The third ventricle is surrounded by the structures of the diencephalon. The aqueduct of Sylvius is surrounded by the midbrain. The fourth ventricle lies within the hindbrain.

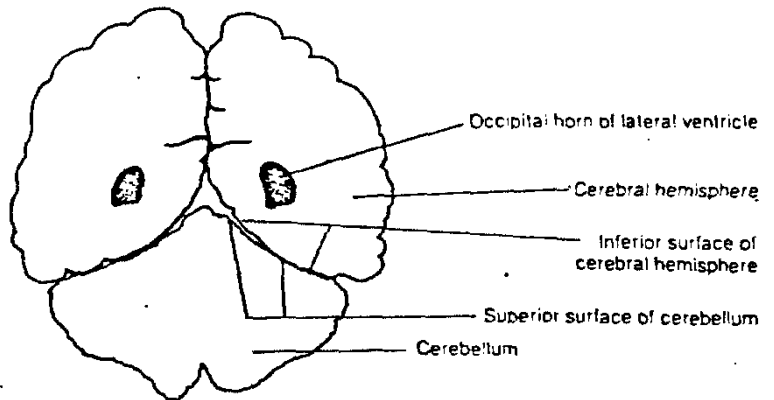
FIG.3
A



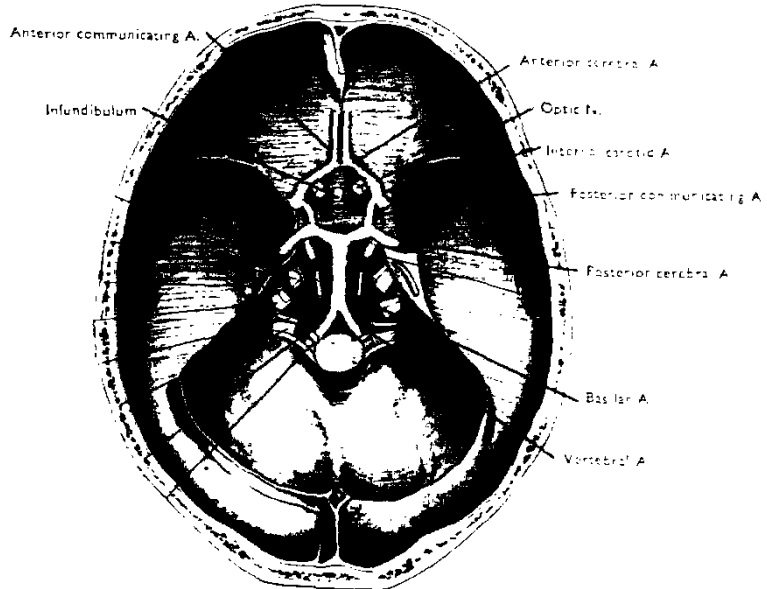
B



C



Circulus arteriosus is composed of the posterior cerebral, posterior communicating, anterior cerebral, and anterior communicating arteries. It forms a route through which blood entering by either internal carotid or basilar arteries, may be distributed to any part of the cerebral hemispheres. (Romans 1975)



The floor of the cranial cavity after removal of the brain, but with the arteries at the base of the brain shown.

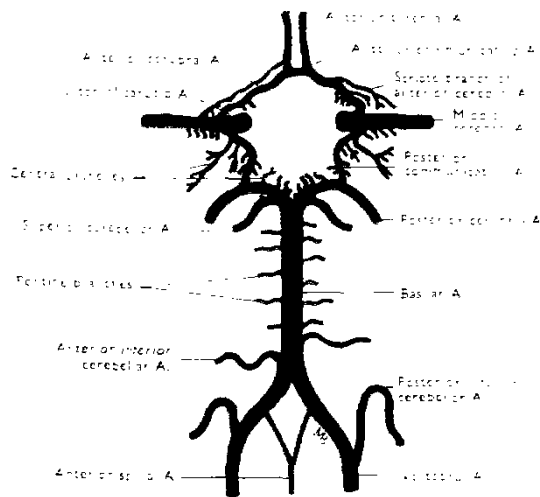


Diagram of the arteries on the base of the brain, illustrating the circulus arteriosus.

(3) The components of cranial CT images: (Gado 1983)

The infraventricular series:

The posterior fossa is delineated by petrous and occipital bones. The fourth ventricle separates the cerebellum from the brainstem. The lateral border of the suprasellar cistern is formed by the uncus of the temporal lobe. This cistern has two distinct lateral extensions, the sylvian cisterns. These cisterns separate the temporal lobes from the frontal lobes. The interhemispheric fissure separates the frontal lobes.

The low ventricular series : (FIG.6 A,B)

These slices lie above the level of the petrous bones and therefore, are bounded peripherally by the occipital, temporal, parietal, and frontal bones. They include parts of the frontal horns, trigones, and inferior horns as well as posterior horns of the lateral ventricles. They also include the midbrain, thalamus and basal ganglia. The quadrigeminal cistern is curved, with the concavity anterior, and it caps the posterior aspect of the tectal plate of the midbrain. The insula is buried underneath the surface of the cerebral hemisphere. Deep to the insula, the lentiform and caudate nuclei are visualized by their higher density compared with the surrounding white matter.

The frontal horns have concave lateral borders, and straight medial borders, with septum pellucidum in between.

The third ventricle lies in the midline, starting at the posterior end of the frontal horns. Behind it, the quadrigeminal cisterns has a rhomboid configuration, with four extensions: anterior, posterior, and two lateral extensions.

The trigones of the lateral ventricles are situated away from the midline.

The posterior third of the slice is occupied by the temporal and occipital lobes, with component of the cerebellum toward the centre.

The high ventricular series: (FIG.6 C,D,E)

The main distinctive feature of these slices is the presence of the bodies of the lateral ventricles.

In the lower slice, they lie close to the midline. Posteriorly, they diverge away from the midline and join the trigone.

The gap between the two lateral ventricles is occupied by the corpus callosum and cingulate gyrus.

The higher the slice, the more clearly seen the sulci. They extend farther toward the central part of the hemisphere.

