



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

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MEASUREMENT OF NORMAL
PITUITARY GLAND ON MAGNETIC
RESONANCE IMAGING (MRI)

THESIS

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INTRODUCTION

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EMBRYOLOGY

The nasal cavities and the anterosuperior part of the oral cavity are developed from the stomodaeum. This ectodermal pit leads to the buccopharyngeal membrane, which separates it from the endodermal pharynx in the earliest stage.

Initially the anterior end of the neural tube lies on the roof of the stomodaeum, and these ectodermal derivatives remain in contact immediately in front of the buccopharyngeal membrane, even after the ingrowth of mesoderm separates them elsewhere.

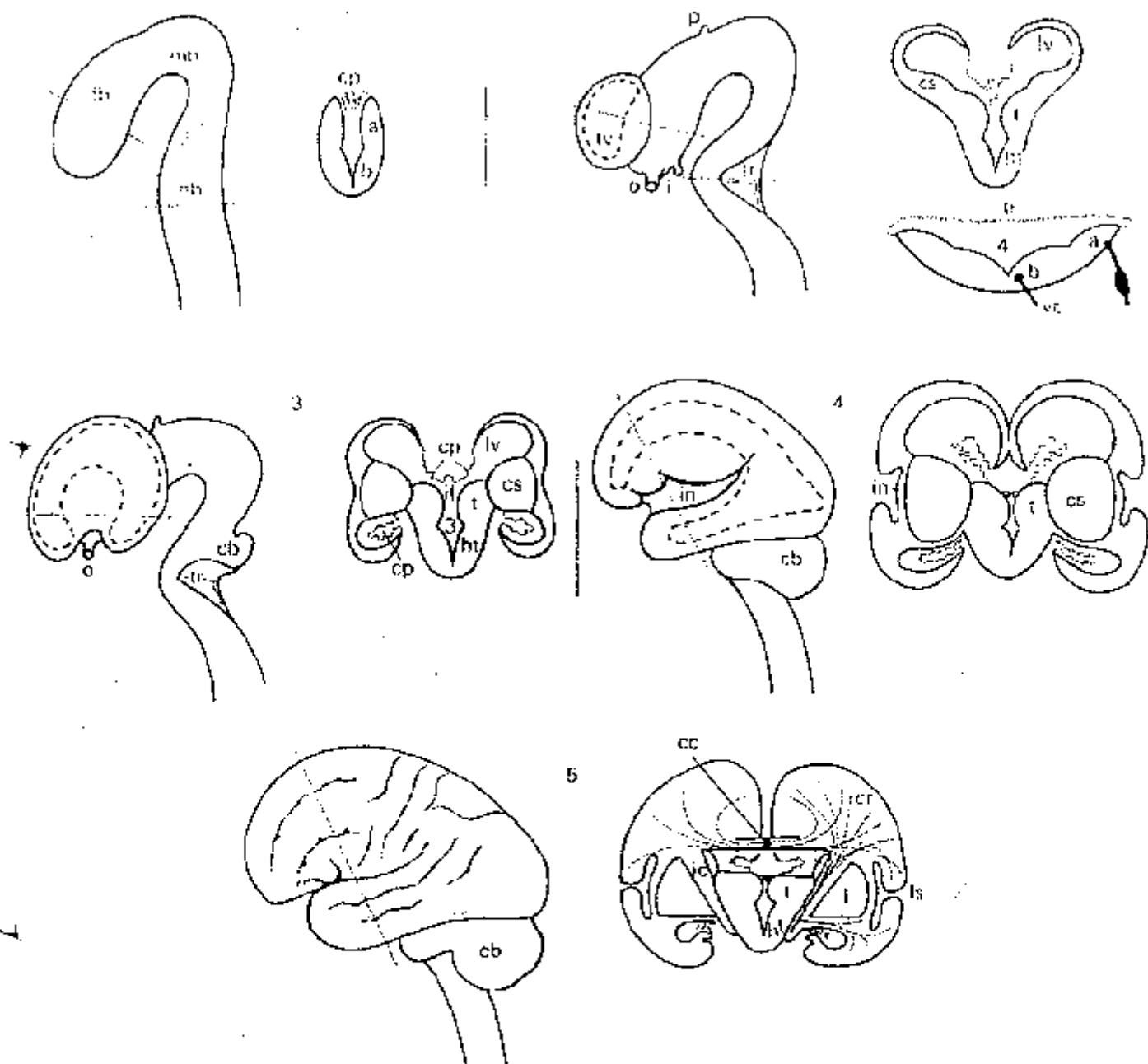
As a result, the contact area of the stomodaeal roof is pulled upwards to form a pocket (Rathke's pouch) which subsequently separates from the stomodaeum and forms the anterior and intermediate parts of the hypophysis.⁽¹⁾

The anterior lobe, or adenohypophysis which originates from a superior invagination of Rathke's pouch loses all

connection to the nasopharynx and develops into a true endocrine organ.

The posterior lobe or neurohypophysis, arises from the hypothalamus as a downgrowth into the sella turcica.

The posterior lobe retains its connection to the hypothalamus throughout life via the pituitary stalk (the hypothalamo-hypophyseal tract) and functions as a reservoir for hormones synthesized in the hypothalamus and transported to it down the axons of the pituitary stalk.⁽²⁾ Fig. (1)



10 Diagrams of stages in the development of the brain, not to scale. Each diagram contains a lateral view of the brain and transverse section(s) corresponding to the line(s) drawn on the lateral view. a. Alar lamina. b. Basal ganglia. c. Caudate nucleus. ch. Cerebellum. cc. Corpus callosum. cp. Choroid plexus. cr. Corona radiata. cs. Caudate striatum. fb. Forebrain. hb. Hindbrain. ht. Hypothalamus. i. Infundibulum. ic. Internal capsule. if. Interventricular foramen. in. Insula. l. Lentiform nucleus. lc. Lateral cranial nerve. ls. Lateral sulcus. lv. Lateral ventricle. mb. Midbrain. o. Optic outgrowth (tent). p. pineal body. t. Thalamus. tr. tentorium of fourth ventricle. tv. telencephalic vesicle. ve. Ventral cranial nerve. 3. Third ventricle. 4. Fourth ventricle.

ANATOMY

The pituitary gland is a small gland located in the sella turcica which is a depression in the superior surface of the sphenoid bone. The sphenoid sinus is inferior and anterior to the sella turcica.

The paired cavernous sinuses are lateral, the suprasellar cistern and its contents are superior, & the basilar artery and brainstem are posterior. The pituitary gland is the only structure of significance within the sella turcica.^(3,4)

The pituitary gland has anterior, intermediate and posterior lobes. The intermediate lobe is vestigial in humans and serves no physiologic purposes.

The anterior and posterior lobes are distinct organs functionally and embryologically.⁽⁵⁾ Although functionally distinct, the anterior and posterior lobes are anatomically closely related.

Apposed to one another within the confines of the sella turcica. The later is the much smaller of the two lobes and occupies only 10% -20% of the volume of the sella turcica,

almost always in the midline and directly applied to the dorsum sella.

The anterior lobe fills the central portion of the sella turcica, and has two lateral wings that extend posterior, often to the dorsum sella. Fig (2)

On rare occasions the lateral wings of the anterior lobe completely envelop the posterior lobe so that the posterior lobe assumes a central location within the gland.

The pituitary gland receives its blood supply principally from the hypophyseal portal venous system.⁽⁶⁾

Small branches of the internal carotid artery, the inferior and superior hypophyseal arteries, do provide some direct arterial supply: the inferior hypophyseal artery to the posterior lobe and the lateral surfaces of the anterior lobe.

The superior hypophyseal artery to the pituitary stalk and the superior surface of the gland. This combination of arterial and portal venous blood supply explains the differential rates of enhancements of the pituitary gland on dynamic scans after bolus administration of intravenous contrast agents.^(7,8)

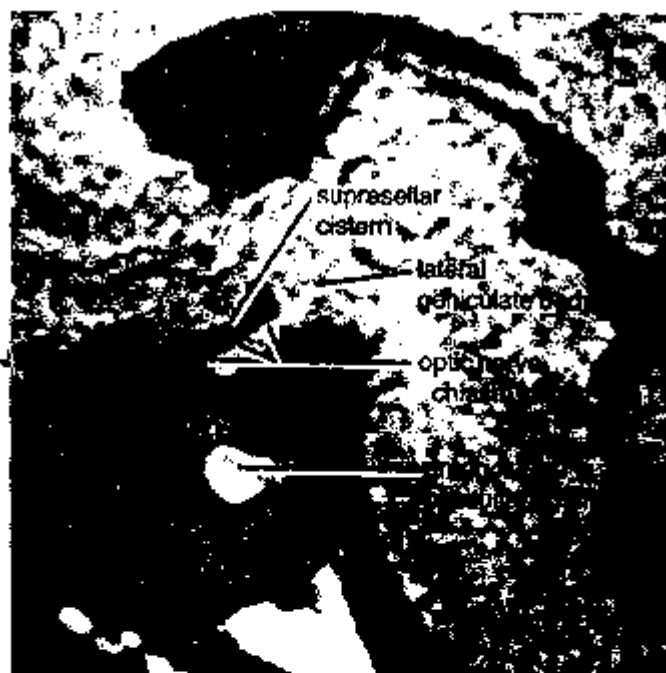
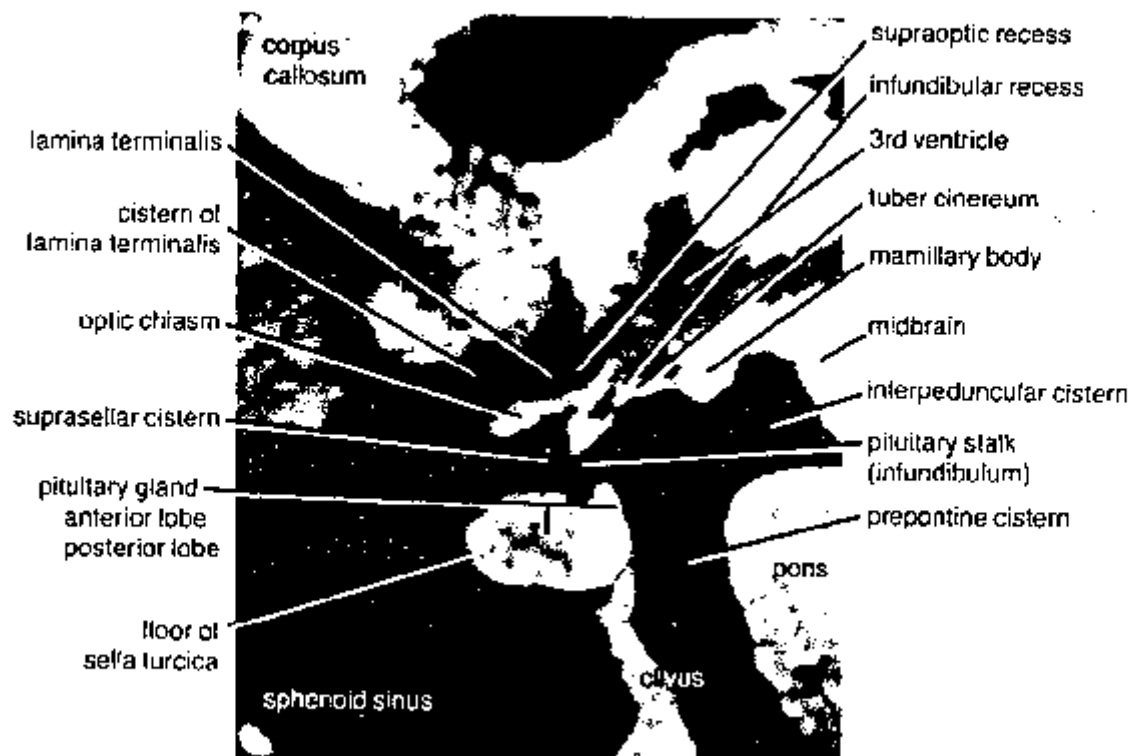


Fig. 2: The anatomy of the sella turcica and para sellar region-sagittal plans using T1 weighted images

Within the gland, the vascular pattern is one of the loosely organized network of capillaries.

The capillaries are lined by fenestrated endothelium which is a characteristic feature of endocrine organs and one that is clearly visible the pituitary gland.⁽⁹⁾

The sella turcica and the pituitary gland contained therein are completely covered by the fibrous diaphragma sellae except for a small opening, the diaphragmatic hiatus, which allows passage of the pituitary stalk.⁽²⁾

The diaphragma sellae is defined as a small circular horizontal fold of dura matter, which forms a roof for the sella turcica and almost completely covers the hypophysis; a small central opening in its center transmits the infundibulum.

The diaphragma is usually thinner around the infundibulum and somewhat thicker at the periphery.⁽¹⁰⁾

Above the diaphragma sellae lies the suprasellar cistern. In axial cross section the cistern resembles a six-pointed star, the interhemispheric fissure is anterior, the interpeduncular cistern is posterior, the paired sylvian fissures are anterolateral, and the ambient cisterns are posterolateral.⁽²⁾