CRANIOTOMY VERSUS TRANSSPHENOIDAL ROUTE IN SURGERY OF THE SELLAR REGION: THE VALUE OF TUMOR SITE AND NATURE IN GUIDING THE OPERATIVE APPROACH

THESIS

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بسم الله الرحمن الرحيم

سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلا مَا عَلَّمْتَنَا
إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

(سورة البقرة : آية ٣٢)

دار الصداقة

بسم الله الرحمن الرحيم

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INTRODUCTION

One of four of all intracranial tumors is said to arise in the region of the sella. Neurosurgeons are familiar with the syndrome of parasellar tumors in which there is admixture of hypothalamic-hypophyseal malfunction and visual abnormality. Many lesions might be considered under this topic, but the three most common tumors are pituitary adenoma, craniopharyngioma, and meningioma.

The goals of surgical intervention in the treatment of sellar tumors are to remove the tumor, abolish its effects, eliminate its endocrinological dysfunction, and to prevent recurrence. Within the sella, the ability to completely remove a tumor is more difficult to determine preoperatively, and may be limited by the desire to preserve normal endocrine function and the anatomical restrictions of resection.

Transsphenoidal approach is now probably the most widely used for sellar tumors both with and without suprasellar extention. It is certainly the method of choice for small, secreting adenomas where total tumor removal with preservation of the pituitary gland can be accomplished. When there is suprasellar extention the transsphenoidal route is also valuable if the extention remains central and the tumor is not too large. This procedure, in conjuction with the transethmoidal approach, represents one distinct anatomic pathway to the sellar region. In cases when the tumor is very large, has extended beyond the boundaries of direct vision into the anterior, middle, or posterior fossae, or has a "dumbble" shape, suggesting a small opening in the diaphragma, an intracranial approach is recommended. Through this route, the intrasellar and intrasphenoidal portions of the tumor are difficult to reach.

The intracranial and the transsphenoidal approaches do not realy compete with each other; rather, they are complementary; and most neurosurgeons agree that an initial transsphenoidal approach is usually the procedure of choice, even for very large tumors. Except in unusual instances, sellar tumors can be managed either with transsphenoidal or intracranial operation alone or with operation combined with radiation. However, some tumors are difficult to remove, not only by the transsphenoidal approach but also by the transcranial opproach. Therefore, a planned simultaneous supra-& infrasellar approach may be indicated and may be uniquely effective. And still, sellar tumors represent challenging problems of surgical management, rendering the selection of surgical approach for a mass lesion involving the sella turcica continues to be an area of interest and concern.

AIM OF THE WORK

The aim of this work is to clarify the indications of the different approaches for the sellar tumors with/without extrasellar extension in the hope to select the most convinient one in each case. The preoperative diagnostic study is essential to determine a specific pathology entity before planning therapy. Transsphenoidal and transcranial approaches were evaluated regarding their surgical outcome.

REVIEW OF LITERATURE

SURGICAL AND MICROSURGICAL ANATOMY OF THE SELLAR REGION

Much has been written about the anatomy and normal morphological appearance of the sella turcica.

Increasing use of surgical magnification for surgery of the sellar region has created a need for more detailed anatomical studies of the area.

Sphenoid Bone

The sphenoid bone lies in the center of the base of the skull in front of the temporal bones and the basilar part of the occipital bone (Fig. 1). Some part of it is exposed in transcranial operations through the anterior, middle, and posterior cranial fossae; and in subcranial approaches through the nose and orbit *(Rhoton, 1987)*. It consists of the central body, the two greater wings (alae magnae), the two lesser wings (alae parvae), and the pterygoid processes *(Warwick and Williams, 1973)*.

The sphenoid bone is joined to 12 other bones: four single - the vomer, ethmoid, frontal, and occipital; and four paired - the parietal, temporal, zygomatic, and palatine. It also sometimes articulates with the tuberosity of the maxilla. From its position

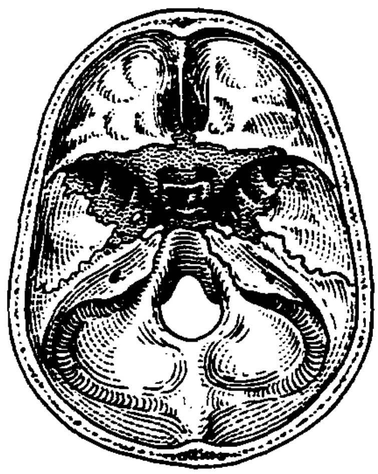

Fig. (I) Sphenoid bone, relations to base of skull.

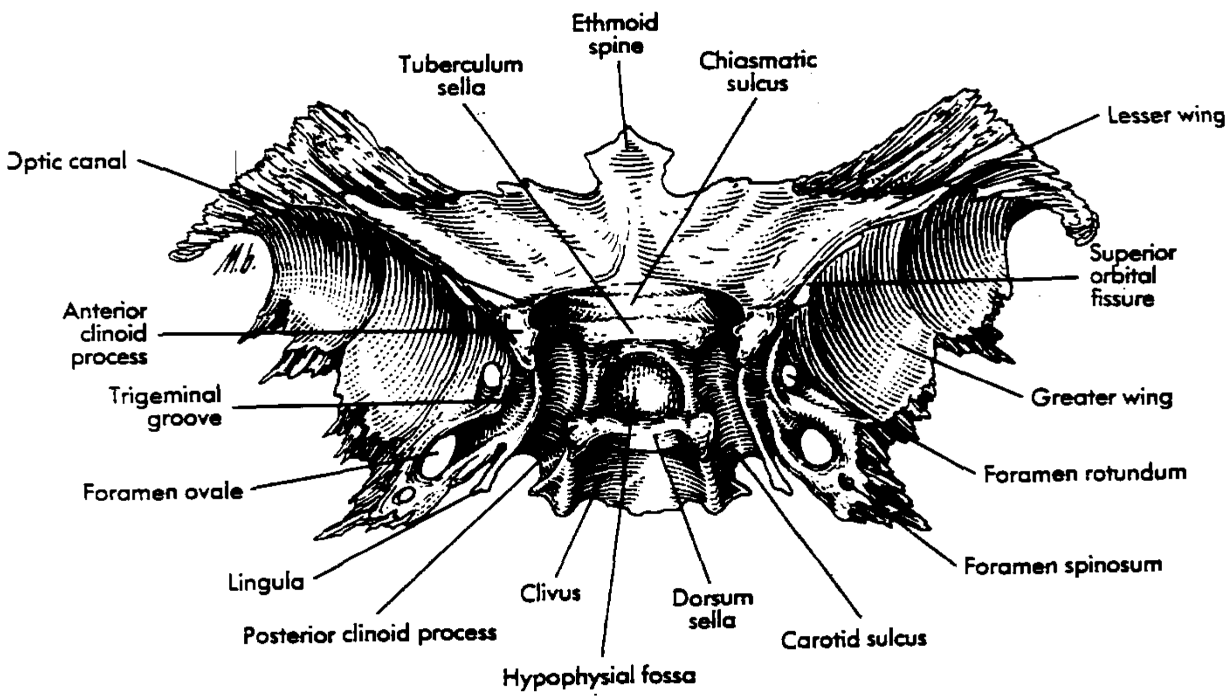

Fig. (2) Sphenoid bone, superior aspect.

and relationship to so many important structures, it is the centerpiece of the base of the skull *(Tindall and Barrow, 1986).* The neural relationships of the sphenoid bone are among the most complex of any bone: the olfactory tracts, gyrus rectus, and posterior part of the frontal lobe rest against the smooth upper surface of the lesser wing; the pons and mesencephalon lie posterior to the clival portion; the optic chiasm lies posterior to the chiasmtic sulcus; and the second through sixth cranial nerves are intimately related to the sphenoid bone. All exit the skull through the optic canal, superior orbital fissure, foramen rotundum, or foramen ovale, all foramina located in the sphenoid bone. The sphenoid bone has many important arterial and venous relationships; the carotid arteries groove each side of the sphenoid bone and may bulge into the sphenoid sinus; the basilar artery rests against its posterior surface; the circle of willis is located above its central portion; and the middle cerebral artery courses parallel to the sphenoid ridge of the lesser wing. The cavernous sinuses rest against the sphenoid bone, and the intercavernous venous connections line the walls of the sella turcica and dorsum sellae *(Rhoton et al., 1979).*

The superior surface of the sphenoid bone (Fig. 2), presents the ethmoid spine rostrally, which articulates with the cribriform plate of the ethmoid. Behind this is a smooth surface, the planum sphenoidale; slightly raised in the midline, and grooved on either side for the olfactory lobes of the brain

(Rhoton, 1987). Posteriorly it extends laterally to form the roof of the optic canals and blend with the anterior clinoid processes. The anterior clinoid processes are the posteromedial extensions of the lesser wings of the sphenoid, and form the anterior and lateral borders of the carotid sulcus. Their appearance, shape, and thickness vary considerably *(Pribram and Du Boulay, 1971)*. Sometimes they are voluminous and partly or completely pneumatized, and at other times they are extremely thin in normal persons *(Taveras and Wood, 1976)*. They vary in thickness and length, and may be seen normally as short blunt structures with their extremities anterior to the anterior border of the sella, or as elongated narrow processes extending posteriorly toward the posterior clinoid processes with which they occasionally unite *(Camp, 1924)*. The limbus sphenoidale marks the posterior boundary of the planum sphenoidale. The appearance of the limbus varies with the chiasmtic sulcus, when the sulcus is concave, the limbus sphenoidale is prominant *(Pribram and Du Boulay, 1971)*. Continuing posteriorly, one next encounters the chiasmtic sulcus, which ends on either side in the optic canal. The latter canal, or foramen, transmits the optic nerve and opthalmic artery into the orbit. The tuberculum sellae is posterior to the chiasmtic sulcus and immediately rostral to the sella turcica, which contains the pituitary gland and is covered by the diaphragma sellae *(Tindall and Barrow, 1986)*.