شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

INTRODUCTION

Pituitary adenomas are one of the most common intracranial tumors and constitute 10% to 20% of all primary brain tumors. They are generally classified as either "functioning" or "nonfunctioning," with functioning adenomas representing approximately 70% of all pituitary tumors[68].

Epidemiological studies have demonstrated that nearly 10-20% of the general population harbor pituitary adenomas. They may present with symptoms of mass effect such as headaches, visual disturbance, or diplopia, or of apoplexy or of inappropriate hormone secretion. The overall goal of treatment for these lesions is to reverse hormone imbalance, preserve normally-functioning gland, and to reduce tumor mass[60].

Surgery is one of a number of treatment options, along with close observation, medical therapy and radiotherapy, and is usually indicated when medical therapy fails to control symptoms, or if there is evidence of local mass effect. When tumors achieve a diameter 4 cm, and in some series 3 cm, they are labeled ''giant'' and represent a considerable surgical challenge[93].

Surgical resection is often difficult not only due to the large size of these lesions, their proximity to anterior skull base nerves and vessels, but also their tendency to invade into the cavernous sinus. Some authors still advocate a standard

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Evaluation of Pure Endoscopic Endonasal Approach in Management of Giant Pituitary Adenoma

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microscope-based transsphenoidal surgery to achieve these goals for large or giant adenomas. However, visualization into the suprasellar cistern is limited. For this reason, some authors have recommended transcranial or combined transcranial-transsphenoidal approaches which carry a higher risk of optic nerve and vascular injury as well as panhypopituitarism[50].

These open approaches generally utilize a corridor which passes directly around cranial nerves and vascular structures, which lie between the surgeon and the tumor, in order to reach the pathology. In contrast, transsphenoidal, midline approaches avoid these structures by approaching the tumor from below, with compressed neurovascular structures lying beyond the tumor from the surgeon's trajectory. These approaches have been associated with lower morbidity than open transcranial surgery for intrasellar and subdiaphragmatic lesions[20].

Similarly, for lesions with suprasellar extension, transsphenoidal microscopic techniques have been used, though the longer working distance and distant illumination can make complete and safe resection difficult through the narrow corridor provided by the Hardy retractor[9].

The endoscope offers a larger field of view, with the potential for visualization of the more lateral components of the tumor, and may be used either on its own or as an adjunct to the microscope. Furthermore, the expanded endonasal endoscopic approaches involve the removal of a larger area of the bony

cranial base which further serves to not only increase visualization and the surgeon's ability to remove more tumor but also increase the safety of surgery[55].

AIM OF THE WORK

Evaluation of efficacy and safety of endoscopic pure endonasal approach for giant pituitary adenoma management.

REVIEW OF LITERATURE

Anatomy of the Pituitary gland, Sella, and Parasellar Region

- **Bone anatomy of the nasal cavities**

Each of the nasal cavities is compared to a transversely flattened channel, larger at the bottom and narrowing as it proceeds upward. It has four walls and two openings.

The inferior wall is formed by the maxillary palatine process at the front and the horizontal lamella of the palatine bone at the back. The superior wall is made up of the nasal bone, frontal bone, cribriform plate of the ethmoid, and anterior surface of the sphenoid bone from anterior to posterior[12] (Figure 1).

The medial nasal wall (or the nasal septum) is made up of the perpendicular plate of the ethmoid bone above, and, of the Vomer below. The other part of the wall is filled up with cartilage anterior to the bony wall, the septal cartilage plays a crucial role in the formation of the nasal septum. The latter rarely follow the median plane; most of it deviates either to the left or right[11].

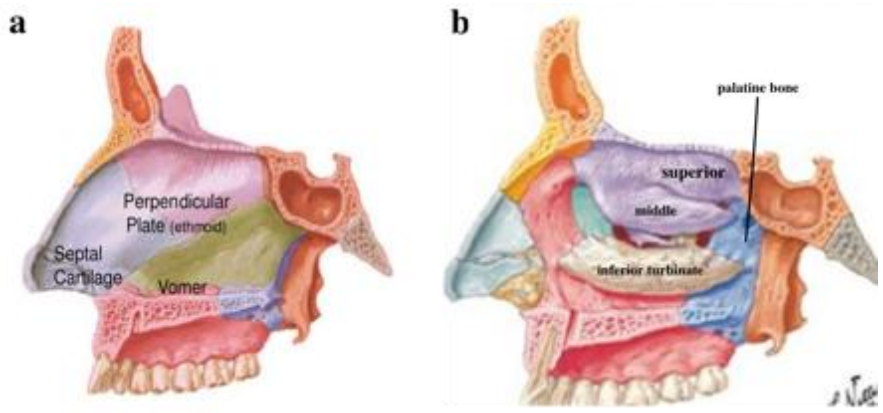

Figure (1): Bony anatomy of nasal wall. (a) medial nasal wall. (b) lateral nasal wall[11].

The lateral nasal wall is tilted downwards in a mediolateral direction and is made up of six bones: the maxillary, lacrimal, ethmoid, and sphenoid bone, the vertical portion of the palatine bone and the inferior nasal turbinate. The surface is highly irregular and is covered with depressions and orifices that place the nasal cavities in communication with the various facial and paranasal sinuses. The superior and middle turbinates form a single body with the ethmoid, while the inferior turbinate is a separate, totally independent bone. Each of these has a convex medial surface, a concave lateral surface, an upper adherent edge and a lower free edge facing the nasal cavity. The spaces lying between the turbinates and the corresponding portion of the lateral nasal fossa wall constitutes the three meati (upper, middle, lower)[12] (Figure 2).

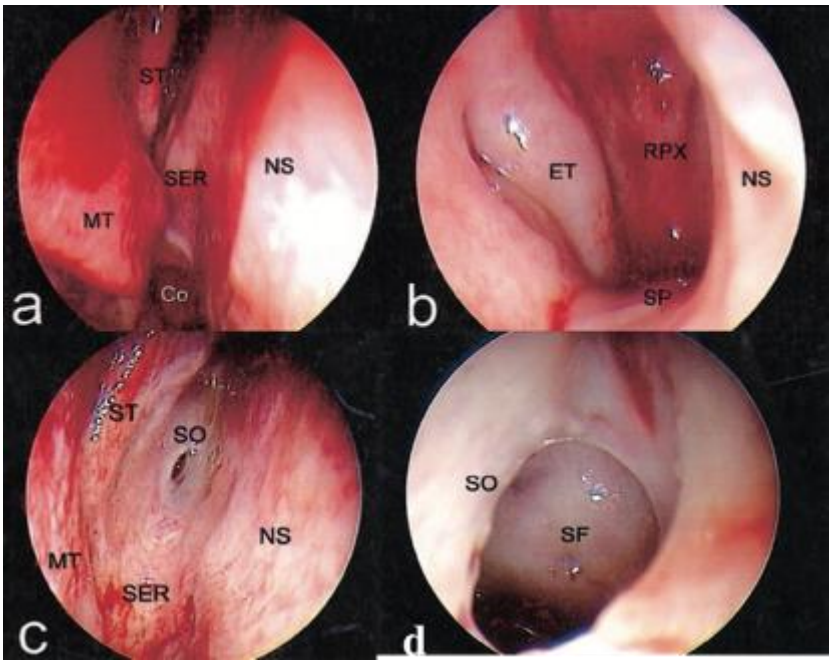

Figure (2): Endoscopic views of the sphenoid ostium. (a) visualization of the middle and superior turbinate, and the sphenoethmoidal recess. (b)anterior view of the choana, the nasopharynx and the Eustachian tube. (c, d) visualization of the sellar floor through the sphenoid ostium. NS, *nasal septum;* MT, *middle turbinate;* SER, *sphenoethmoid recess;* Co, *choana;* ST, *superior turbinate;* ET, *eustachian tube;* RPX, *rhinopharynx;* SP, *soft palate,* SO, *sphenoid ostium*[12].

▪ The sphenoid sinus

The sphenoid sinus, contained within the central part of sphenoid bone, is considered the gateway to the pituitary gland and the parasellar region. It is a large paranasal sinus located posterior to the ethmoid sinuses.

The sphenoid sinus is variably pneumatized and is characterized by the position of the sinus in relationship to the sella turcica. Pneumatization is classified into sellar (which is the majority), presellar, and the rare conchal types (Figure 3). A

sellar sphenoid sinus has extensive pneumatization anteriorly and inferiorly to the sellar bulge, making identification of anatomical landmarks easier during endoscopic transsphenoidal surgery. A presellar pneumatization pattern has pneumatization anteriorly, making the sellar bulge and other landmarks slightly more difficult to identify. Finally, no pneumatization exists for the conchal type of sphenoid sinus, common in children younger than 12 years of age, which poses a challenging anatomical dissection. And image guidance is critical for a transsphenoidal approach through a conchal sphenoid sinus to avoid going laterally while drilling and injuring the surrounding critical vascular structures. One additional pattern of pneumatization that has been described is called the postsellar sphenoid sinus, where, in addition to a sellar pattern, pneumatization exists posterior to the sellar prominence[37,96].

The Onodi cell, when present, represents pneumatization of a posterior ethmoid cell into the sphenoid sinus and may distort identification of the true sphenoid sinus. It is present in 7 to 25% of patients and must be recognized radiographically and endoscopically in any endonasal approach. This is important because of the passage of the optic nerve in the lateral wall of the cell[37].

The sphenoid sinus is typically divided into two unequal halves by a single vertical septation. However, it is not uncommon to find multiple complete and incomplete septations dividing the sinus into several cells. The major vertical septation usually continues posteriorly to the face of the sella.

However, it is common to localize to either of the carotid siphons, so it's important to have a great care in dissection while removing these septations to avoid damage to the underlying vascular structures[89].

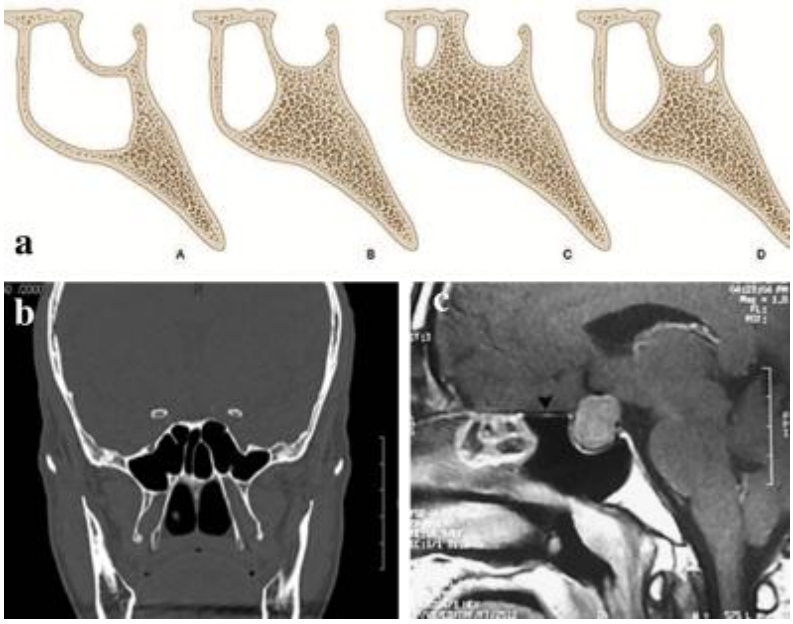

Figure (3): (a) Four types of sphenoid sinus pneumatization: A) sellar, B) presellar, C) conchal, D) postsellar. **(b)** Computed tomography image of a well-pneumatized sphenoid sinus with multiple vertical and horizontal septations. **(c)** magnetic resonance imaging of the sella, showing a postsellar pneumatization of the sphenoid sinus and a pneumatization of the planum sphenoidale (arrow)[37].

- **Recesses of the sellar wall of the sphenoid sinus** (Figure 4)

Depending on the sphenoid sinus pneumatization, various neurovascular structures can be seen as bulges through the sellar floor. In the sellar type sphenoid, you can see the

planum sphenoidal at the superior part of the roof of the sinus, the upper clival recess on the lower part, both carotids and cavernous sinuses on the sides, and the sellar bulge in the center. Optic nerve impression can be seen in a well pneumatized sinus. Various recesses have been described for better understanding of the anatomy, and better correlation between the endoscopic endonasal view and the corresponding intracranial view of different neurovascular structures[80].

The lateral and medial opticocarotid recesses are important landmarks. The lateral recess is bounded superomedially by the optic canal and inferomedially by the carotid protuberance, inferolaterally by the superior orbital fissure, and laterally by the orbital apex, it is more prominent than the medial opticocarotid recess. It corresponds to the optic strut, and anterior clinoid process intracranially. The oculomotor nerve is also found inferiorly within the confines of this recess[54] (Figure 4).

The medial opticocarotid recess is a teardrop-shaped osseous indentation formed at the medial junction of the paraclinoid carotid canal and the optic canal. intracranially, it corresponds to the lateral tubercular strut, and has been labeled the anatomic keyhole in endonasal skull base surgery[54].

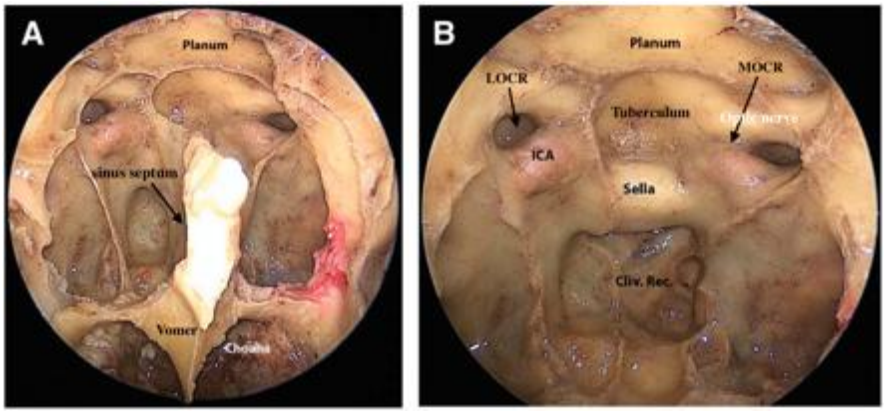

Figure (4): Endoscopic anatomy of the sphenoid sinus and recesses of the sphenoid sinus floor from my lab cadaveric dissection. (A) rostrum of the sphenoid is removed to show the sellar floor and planum sphenoidal. (B) the vomer and the intersphenoid sinus is removed to show the sellar bulge, tuberculum sella, planum, carotid bulge, clival recess, medial and lateral opticocarotid recess.

- **Endoscopic view of the optic canal and optic nerve exploration** (Figure 5)

The optic nerve appears endoscopically like a conical bulge in the superolateral wall of the sphenoid sinus. Its medial wall can appear very thin in 78% of the cases and can even be dehiscent in 3% to 28% of cases[1].

The optic nerve course intracranially can be divided into three segments until it reaches the orbital cavity, the cisternal segment is the first part which starts from its origin from the optic chiasm to the posterior margin of falciform ligament, this segment runs in the subarachnoid suprasellar and chiasmatic cistern. The second segment is the preforaminal segment which is located between the posterior margin and anterior root of the falciform