Adenomas of the Pituitary Gland

Tumor Types/Terminology:

Functioning pituitary adenomas are tumors of the pituitary gland that secrete either a single or plueri-hormonal type (Prl, GH, ACTH, TSH). Non-functioning pituitary adenomas, otherwise called endocrine inactive, non-secreting, or "null-cells", secrete little (if any) meaningful amounts of hormones. Although these types of tumors are considered clinically silent, they can still cause deleterious effects on normal pituitary and down-stream organ function. Another way to classify adenomas is by their size (See Figure 1). Macro-adenomas are tumors that appear to be 10mm or larger on an MRI scan whereas tumors that appear to be less than 10mm are graded as micro-adenomas.[1] There are 4 major categories of pituitary adenomas, most of which relate to a specific hormone that is synthesized and/or distributed by the pituitary gland. These 4 types of tumors consist of prolactinomas, growth hormone secreting adenomas, adrenocorticotropic secreting adenomas, and non-functioning adenomas. Prolactin is made in the anterior portion of pituitary gland by a type of cell called mammotropes. Too much of this hormone can cause galactoria, amenorrea, and libido.[2] Growth hormone is also produced in the anterior portion of the pituitary gland by a type of cell called somatropes. Too much of this hormone in children and adolescents causes an illness called gigantism while too much of this hormone in full grown adults causes acromegaly. ACTH (also synthesized in the anterior pituitary gland) is made by cells called corticotropes. Too much of this hormone causes an illness called Cushing's syndrome which is more apparent in women than men. The final main category of pituitary adenomas are the non-functioning or endocrine-inactive tumors. Because of their lack of any meaningful amounts of hormone, they are typically found incidentally or because of increasing size and pressure within the sella turcica.[3] If left alone, many of these tumors can affect the optic chiasm (Shown in Figures 2 & 5) and cause significant dysfunction of the eyes.

Diagnosis:

Diagnosing pituitary adenomas is something that is done more often incidentally than on purpose. This means that these types of tumors generally go unnoticed for years. With that being said, it is essential to diagnose pituitary tumors as early as possible so that the treatment can be most effective.[6] The major tests and exams that are used to diagnose pituitary adenomas consists of a medical history and physical examination, blood and urine tests, imaging scans, and diabetes insipidus testing.[7] MRI scans are the preferred diagnostic imaging modality as they use magnetic fields and radio waves to create very detailed picture of the anatomy by rotating hydrogen atoms within the body. A contrast medium (gadolinium) can be injected during the scan to highlight certain anatomy to improve the diagnostic quality of the image.

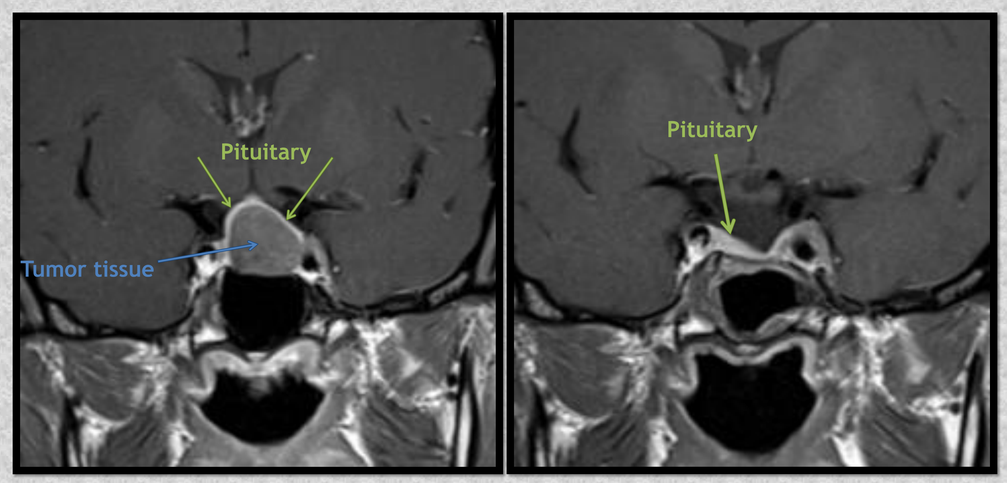

Figure 1. Pituitary macro-adenoma before and after surgery.[4]

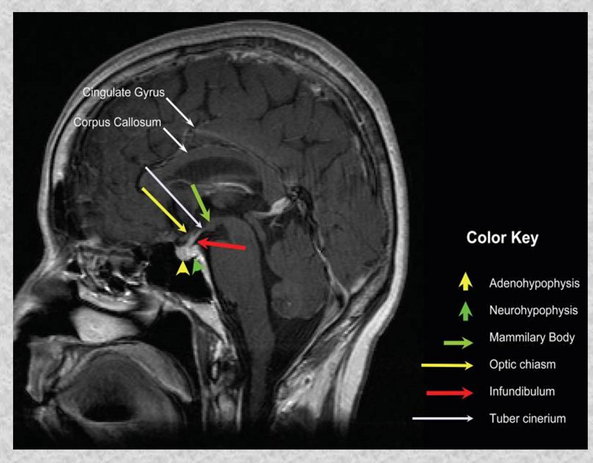

Figure 2. Sagittal post-contrast, T1-weighted MRI, demonstrating normal adult anterior and posterior pituitary gland and sellar region anatomy.[5]

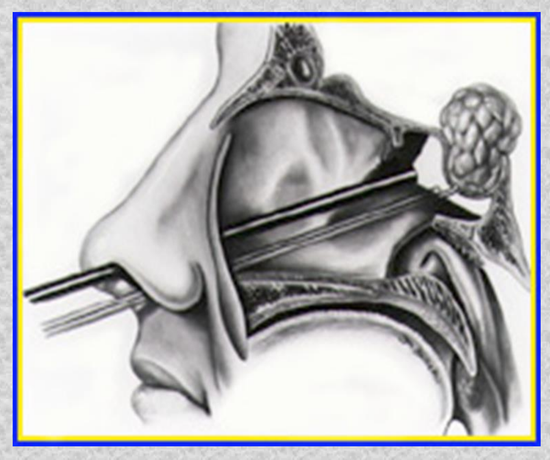

Figure 3. Transphenoidal surgery option.[5]

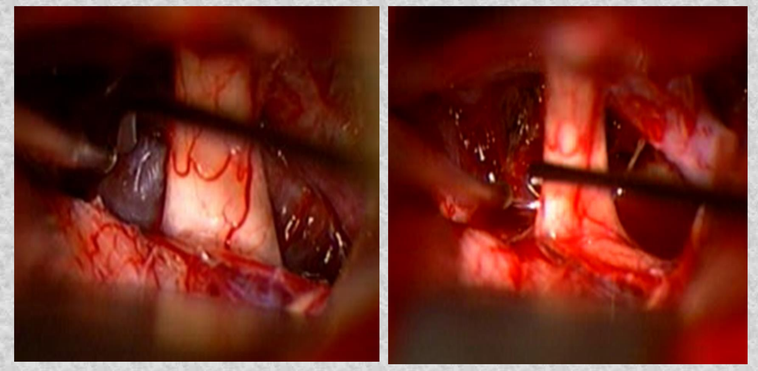

Figure 4. Actual footage of a transphenoidal surgery resection.[5]

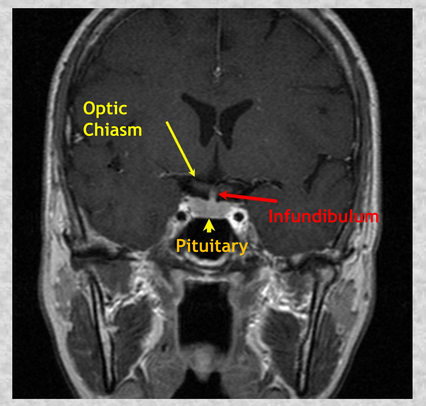

Figure 5. Coronal MRI view, demonstrating normal pituitary gland anatomy.[5]

Treatment: Surgery, Radiation, or Pharmacological Therapy?

Treatment of pituitary adenomas is a multidisciplinary approach.[8] Important factors to keep in mind are what type of hormonal activity the tumor has, the size and location of the tumor, and the age and overall health of the individual who possesses the tumor. The goal with neurosurgery is to remove as much of the tumor as possible while preserving the pituitary gland and all its functioning (See Figures 3 & 4). Pharmacological approaches are considered the safest practice of treatment and require the administration of drugs with idea of correcting the hormonal imbalances that the tumor has caused within the body. Radiation therapy is often used in conjunction with surgery and/or pharmacological therapy and is mainly used on tumors that have either re-grown or have aggressive properties. Unfortunately, studies have shown that extreme loss of pituitary function is inevitable with this type of treatment.

References:

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5. Courtesy of Colorado University Hospital
6. Syro LV, Rotondo F, Ramirez A, et al. Progress in the Diagnosis and Classification of Pituitary Adenomas. Frontiers in Endocrinology. 2015;6(1):97.
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