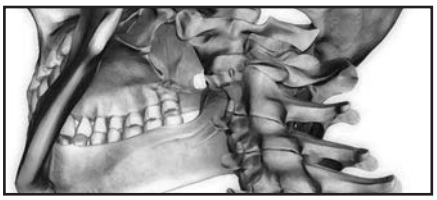


# Dr R E Pope

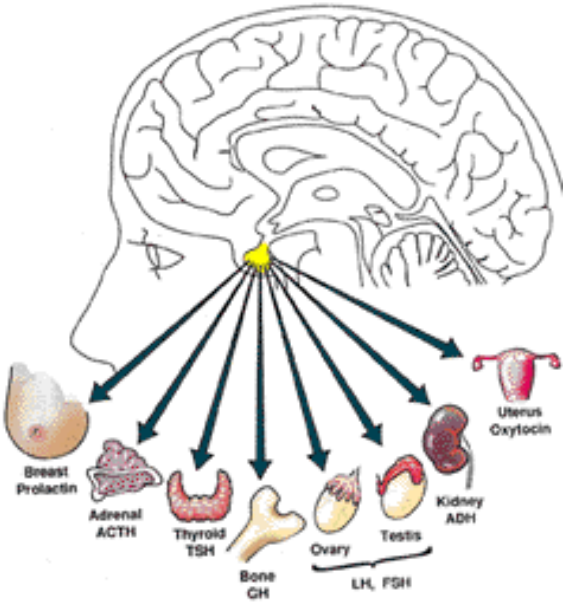
Beneficence and Nonmaleficence
Neurosurgeon and Spine Surgeon

## Pituitary Surgery

**1. I have been told I need surgery for a pituitary adenoma. What does this mean?**

Pituitary adenomas are benign tumors which arise from the pituitary gland itself. They are almost never malignant. Pituitary tumors can be either secretory or non-secretory, referring to whether they overproduce pituitary hormones. Secretory tumors cause disease because of the excess quantities of hormones which they secrete (release) into the bloodstream. The most common type of secretory pituitary tumor is termed a **prolactinoma**. Excess prolactin in the blood may lead to irregular or absent periods in women, decreased libido and erections in men and infertility or milk production in men or women. However, there are excellent medicines available to treat this disorder, so surgery is rarely needed. Most patients with prolactinomas are treated by endocrinologists, who are medical specialists in gland and hormone disorders.

Secretory tumors, which commonly require surgery, include those which cause **Acromegaly** and **Cushing's disease**. Acromegaly (or gigantism if occurring in a child) results from an excess of growth hormone production. Too much adrenocorticotropic hormone (ACTH) leads to overproduction of cortisol by the adrenal glands, giving rise to a disorder called Cushing's disease. Surgical removal of these tumors can restore normal hormone production in many cases. Non-secretory tumors (which are also termed "non-functioning") do not overproduce hormones, but cause problems due to their size and location. This is because they can compress both the normal pituitary gland and the surrounding structures. Hormone deficiencies may result from compression of the normal pituitary gland. Non-secreting tumors can also cause **visual problems** by growing upwards and compressing the optic nerves and chiasm, nerves which are important for vision. This pressure can lead to loss of peripheral vision. Surgery can remove such tumors and relieve the pressure on surrounding structures. Sometimes pituitary tumours can bleed (**Apoplexy**) and expand the area which can cause pressure on the visual structures. This can happen suddenly and patients may present blind or with rapidly deteriorating vision. This constitutes a Neurosurgical emergency and urgent surgery is usually warranted and urgent medical treatment by an Endocrinologist.

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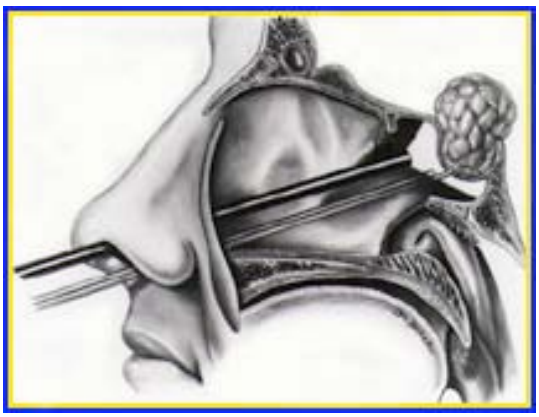
**2. How is this surgery performed?**

Most pituitary tumors can be removed transsphenoidally. The approach is through the sphenoid sinus, one of the facial air spaces behind the nose. Rarely, a craniotomy is required, where the skull is opened to reach the tumor. Many neurosurgeons now use a direct transnasal approach, where an incision is made in the back wall of the nose and the sphenoid sinus is entered directly. It is also possible to make an incision along the front of the nasal septum, and make a tunnel back to the sphenoid sinus. At The Mater Private Hospital we have a team comprising Neurosurgeons, Ear Nose and Throat (ENT) Surgeons, and Endocrinologists.

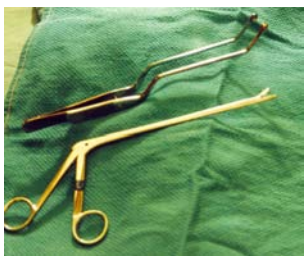


**3. How do you see the tumor?**

The opening through which transsphenoidal surgery is performed is very small, about an inch. Therefore, it is not possible to look with unaided vision at the surgical area or tumor. However, modern technology has developed tools for visualizing the area of the tumor through the small hole. This is done by using a high powered operating microscope, or a fiberoptic endoscope. The operating microscope allows binocular vision with extremely high quality optics. This is very important for tiny tumors, like those responsible for Cushing's disease. The endoscope provides a wider field of view, but usually with monocular images as seen on a television screen. At The Mater Private Hospital, a direct transnasal approach is used, and we utilize the services of an elite rhinology team using the endoscope. With the direct transnasal approach, the need for postoperative nasal packing (bandaging in the nose) is minimized, or not needed at all.

**4. How is the tumor removed?**

The tumor is usually soft and can be removed with small surgical instruments called curettes. In order to remove a large tumor through a small hole, the tumor itself has to be cut into small pieces. As the surgeon cores out the center of the tumor, the peripheral margin of the tumor has to fall into an area that can be reached by the surgeon. Some tumors, which have grown beyond the area of the sella, cannot be completely removed. Tumors that grow sideways into the cavernous sinus, a collection of veins next to the sella, usually cannot be completely removed. This is because that area contains important nerves controlling muscles of the eye and the carotid artery, which supplies the brain. Tumors which have a large amount of supra-sellar extension (up into the brain) can be removed in one operation if they fall downward into the sella during the procedure. Sometimes the removal of large tumors has to be staged into two operations, to allow time for the uppermost portion of the tumor to fall into the sella where it can be reached on a subsequent operation.



**5. Do all pituitary tumors require surgery?**

No. Tumors which secrete high amounts of the hormone prolactin usually respond to medical therapy so that surgery is not required. Small non-secretory tumors, less than one centimeter (termed a "microadenoma"), can sometimes be followed with serial MRIs to monitor for progressive enlargement before proceeding to surgery.

**6. How should I choose a surgeon for my pituitary operation?**

It has been shown that the success of surgery is dependent on the amount of experience the surgeon has at performing pituitary operations. Surgeons with the most experience generally have the highest rates of cure, meaning complete tumor removal. In addition, the rate of complications is lowest among experienced pituitary surgeons. Surgeons at major pituitary centers, such as the Massachusetts General Hospital Neuroendocrine Clinical Center, operate on patients with pituitary tumors every week.

**7. What are the risks of the surgery?**

The most common risk is damage to the normal pituitary gland. For macroadenomas (>1cm) this happens between 5-10% of the time when the operation is performed by an expert pituitary surgeon. This means that new hormone replacement might be required after the surgery, possibly including thyroid hormone, cortisol, growth hormone, estrogen or testosterone. Damage to the posterior, or back portion, of the pituitary gland may produce a condition known as diabetes insipidus, which will lead to frequent urination and excessive thirst, since the kidneys will no longer adequately concentrate the urine. This can be controlled with a nasal spray or pill form of a medication called DDAVP. Permanent diabetes insipidus occurs 1-2% of the time after pituitary surgery.

**8. Are there other more serious complications?**

Yes, but they are very rare. There is a very small chance of damaging the carotid arteries which are located on either side of the pituitary. This is a potentially devastating complication which could lead to stroke or death. It occurs very infrequently, when the operation is performed by an expert pituitary surgeon, with an incidence of less than 1/1000 cases. There could also be post-operative bleeding into any residual tumor or into the sella, which could lead to worsening pressure on the optic nerves or chiasm and possible visual loss. This is also a very rare complication, but might require re-operation to remove the blood clot. A spinal fluid leak sometimes occurs because pituitary tumors are separated from the spinal fluid which bathes the brain by a very thin membrane. In order to prevent a spinal fluid leak, the tumor bed is packed with a small piece of abdominal fat taken from a tiny incision made in the abdominal skin. Despite this, spinal fluid leaks occur with an incidence of about 1%. If this happens, there is a risk of infection, called meningitis. If a spinal fluid leak occurs it may require a second operation to patch the leak. The risk of all complications is higher with less experienced surgeons.

**9. How long does the operation take?**

The procedure itself usually takes about three hours. Patients go to the recovery room for two to three hours after the surgery and are then admitted to the hospital floor. There is no need to stay in an Intensive Care Unit. Most patients are discharged from the hospital in just one or two days.

**10. How will I feel after the surgery?**

You will have a sinus headache and nasal congestion. This will gradually improve over a few weeks. You can take decongestants which will help these symptoms. It is common to feel fatigued for two-three weeks after the surgery and this gradually improves.

**11. How long will I be out of work?**

That depends on what you do. The average would be about two weeks.

**12. How will we know if the entire tumor has been removed?**

For hormone secreting tumors (Cushing's, acromegaly, prolactinomas), blood and urine tests in the days or weeks following surgery provide the answer. For non-secreting tumors, pituitary MRI scans are used to determine this. Endoscopic visualization into the pituitary fossa can directly view any remaining tumour in some cases. Tumor in the cavernous sinus can rarely be removed even with the use of the MRI (as noted in Question 4). A postoperative MRI is obtained about six weeks after the surgery. This helps determine whether further therapy is required. If the tumor is a hormone secreting adenoma (prolactinoma, Cushing's disease or acromegaly), the endocrinologist will follow your hormone levels postoperatively to determine whether you are cured.

**13. What is the chance of being cured?**

It depends upon the type, size and location of the tumor and the expertise of the surgeon. Patients with Cushing's disease usually have small tumors (microadenomas) and are surgically cured about 90% of the time based on data published by expert pituitary surgeons. Patients with acromegaly often have larger, more invasive tumors which are harder to cure surgically. The success rate with growth-hormone secreting macroadenomas is about 60% in the best surgical series. Non-secreting tumors are often macroadenomas as well. Whether a macroadenoma can be completely removed depends upon whether it has grown into the cavernous sinus, bone, or elsewhere. If it has not grown into these areas, a surgical cure can often be achieved. If tumor has grown into an area where it is not possible or safe for the surgeon to operate, it may not be surgically curable. However, such tumors can

often be de-bulked away from the optic nerves and chiasm, in order to protect vision. Radiation therapy may be required to control further growth.

**14. What if tumor is left behind after an attempt at surgical removal. Is radiation always required?**

If there is a substantial amount of a non-secretory tumor remaining after a transsphenoidal operation, radiation therapy can be used to halt further growth of the residual tumor. There are now a number of different forms of radiation treatment available for pituitary tumors. If only a small amount of tumor remains, it can often be followed with serial MRIs and further therapy deferred until there are signs of regrowth, which may not occur for years. If there is residual tumor after surgery for acromegaly, Cushing's disease, or prolactinomas, medical treatments are available to control the excess hormone secretion. These medications, which are typically given under the supervision of an endocrinologist, can sometimes be used instead of, or in addition to, radiation therapy.

**15. Who will take care of me in the hospital?**

At The Mater Private Hospital, you will be managed by a team of physicians. This includes your neurosurgeon, ENT Surgeon, a staff neuroendocrinologist and the residents and fellows who work with them. The team will follow you until you can be returned to the care of your local endocrinologist and primary care physician. Endocrine follow-up is very important, to determine whether replacement of any of the hormones controlled by the pituitary (cortisol, thyroxine, estrogen/testosterone, growth hormone or vasopressin) is needed.