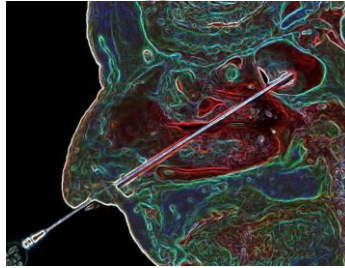
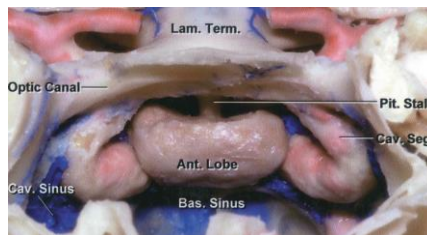


# Pituitary Surgery



## The Pituitary Gland

This small gland, measuring about the size of 2 peas, sits in a bony depression at the base of the skull. It is attached via a stalk to an area of the brain called the hypothalamus. The pituitary works



as a master gland, releasing chemicals that regulate other glands around the body and stimulates the release of hormones that are essential for normal life.

The most important chemicals released by the pituitary are as follows

## Anterior Pituitary

**ACTH**—acts to stimulate release of Cortisol from the adrenal glands. Important in maintaining balance of many of the body's basic metabolic functions

**TSH** - works on the Thyroid gland to stimulate thyroid hormone (T3/T4 release). Involved in energy utilisation, temperature tolerance

**GH** (Growth Hormone) – encourages release of IGF-1 from the liver. These chemicals are important in growth before puberty and may have some role in the maintenance of tissues in adulthood.

**FSH/LH** - act on ovaries / testicles for the production of sex hormones - Oestrogen / Testosterone

**Prolactin** – Involved in breast milk secretion

## Posterior Pituitary

**Antidiuretic Hormone** (ADH) - essential for controlling water reabsorption from the kidneys and maintaining the fluid balance (esp. Sodium:Water) in the body

## Pituitary Tumours

These are usually slow growing, benign tumours. They rarely spread around the body but can invade into the covering structures around the pituitary fossa.

Divided into 2 main groups

## Functioning tumours

Produce their effects by producing an excess of 1 or 2 pituitary hormones. Can lead to

conditions like

Cushing's Syndrome (ACTH excess)

Acromegaly / Gigantism (GH excess) Hyperprolactinaemia (Prolactin excess)

Hyperthyroidism (T3/T4 excess)

### **Non Functioning tumours**

Most common

Cause symptoms due to growth upwards with pressure put on the visual nerve fibres as well as compression of the surrounding gland.

This can lead to -

Visual loss – esp. in bi-temporal location (the outer half of the visual field of each eye) as a consequence of compression of the optic chiasm or optic nerves

Hypopituitarism - inadequate production of the hormones needed for normal body functions. The levels of these can be tested for and replaced with oral tablets (and nasal spray) if necessary

### **Common investigations**

**Blood tests** including studies of hormones levels e.g

Cortisol, Thyroid hormones, Prolactin, Testosterone, GH, Electrolytes

**Eye specialist** review including visual field tests

**MRI scan gives precise detail of the pituitary and surrounding regions. Allows identification of tumours and anatomy needed for surgery as well as monitoring the tumour bed after surgery. It is ESSENTIAL that you bring your own scans to the hospital prior to surgery.**

### **Treatment**

#### **Medications**

Most tumours require surgery to remove their bulk and take pressure off the surrounding structures. The exception to this are prolactinomas—these tumours can, in most cases, be effectively managed by medications e.g. Bromocriptine or Cabergoline, which lead to shrinkage of the tumour.

In functioning tumours, the goal is to provide a biochemical cure i.e. return the hormone levels and chemical balance back to normal. Sometimes this means that further surgery, medications or radiotherapy will be required to achieve this. After surgery, your Endocrinologist is essential and will monitor your progress.

About a third of patients will need hormone replacement either as a result of the tumour or after surgery. These can include Hydrocortisone, Thyroxine, Testosterone, GH or Oestrogen and occasionally ADH. Your endocrinologist will work out your ongoing requirements after surgery.

## Surgery

### *Functioning Tumours*

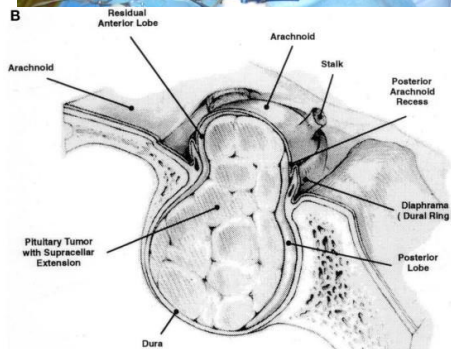
These produce hormone excess that is dependent on the cell type from which the tumour grows. The goal of surgery is to remove your tumour and “cure” you by returning your hormone levels to normal and prevent tumour recurrence. In some cases, this is not possible and although the surgery usually reduces the blood levels of the hormones, they don't return to normal and additional surgery or therapy such as injections of hormone inhibitors or radiotherapy is necessary

### **Non-Functioning Tumours**

These are usually large tumours that extend up to and distort the optic apparatus (vision pathways). These tumours can grow into the canvas like coverings around the pituitary fossa (dura) and into the cavernous sinus making total removal impossible. Surgery is required when visual disturbance is noted and at times when found incidentally to preserve hormone production. Your surgeon will discuss these with you. The goal is to remove as much tumour as possible to decompress the optic nerves

### Endoscopic Trans-sphenoidal Surgery

Surgery on the pituitary is now generally carried out through the nose. At the back of the nose is an air filled cavity called the sphenoid sinus. This lies directly underneath the pituitary fossa. During surgery, the surgeons are assisted by guidance either in the form of X-ray image intensifier or Stealth frameless stereotaxy – systems designed to make sure that the surgery is performed in the correct direction and position.



Surgery is performed using an Endoscope, this is essentially a telescope that has fibres for light and a lens for vision. The top of this is attached to a high quality camera that shows the images on a TV screen. This enables a very clear view of the structures upon which we are operating. Both nostrils are used for the passage of instruments and the endoscope.

There are two components to the surgery, firstly access through the nose to the sphenoid sinus. There are natural drainage holes that connect the nose to the sphenoid sinus, these are identified and enlarged so that a gap is created through the front wall of that cavity. This enables access to the pituitary fossa and the second part of the operation.

The second part of the surgery involves opening the bony floor into pituitary fossa and then removal of the tumour. The tumour is then removed with a series of ring shaped curettes and suction and comes out in a series of small fragments. In smaller tumours (microadenomas), it is often possible to separate the tumour from the remaining gland. In larger tumours (macroadenomas), the remaining gland is reduced to a sliver of residual tissue. If the gland is functioning normally, a proportion of patients will be left with sufficient residual normal

gland to avoid needing long term hormone replacement, but some will end up needing to take medications long term. If the gland is not functioning normally preoperatively, it is unlikely that the surgery will allow recovery of the residual glands functioning.

The roof of the pituitary fossa is a very thin “gladwrap” like membrane called the diaphragma sellae – this separates the pituitary from the pool of cerebrospinal fluid

that surrounds the brain. A small hole in that membrane will then lead to a leak of spinal fluid through the nose and the risk of meningitis (infection around the brain) if it continues. To seal this, a small plug of fat is taken from around the umbilicus (belly button). Achieving a watertight seal can be very difficult and some patients need a return to theatre to stop a leak of fluid through the nose.

### **Risks and possible complications of surgery**

Surgery around the pituitary gland carries its own special kinds of risks. The most serious relate to injury to the carotid arteries on either side of the gland. This can happen and a very small percentage of people can die or have a stroke after surgery. Risks include

Death / Stroke / Bleeding

Cerebrospinal fluid leak & need for fat graft Sinusitis, Headaches

Visual decline, Need for further surgery or other therapy Need for hormonal supplements

### **Postoperative Management**

#### ***In Hospital***

Most people come in the day of surgery or the night before. The night after surgery is spent in the High Dependency Unit – where blood pressure and fluid balance is monitored and checks made for nose bleeding. It is not a terribly painful operation, however adequate pain relief is always available. Fluid balance is closely watched for a further 2-3 days. On discharge, medication requirements will be discussed with you. The most common requirements are Hydrocortisone (to replace Cortisol) and Minrin (DDAVP – to replace ADH). Also any medications started prior to surgery will need to be continued. Changes in medication will then be recommended by your endocrinologist.

A follow-up appointment with your Endocrinologist should be made for 4-6 weeks after surgery, with your Neurosurgeon 6 –8 weeks after surgery and with your Eye Specialist for repeat visual field testing at 3-6 weeks postop (if you had visual problems preoperatively)

Sutures used to close the wound at the umbilicus, if a fat graft was taken, are dissolvable and don't need to be removed. The area needs to be kept clean and dry. Any redness, discharge or signs of infection needs to be reported to your GP. Patients are encouraged to be active in the days after surgery – such as walking twice daily and doing usual light activities at home. Heavy lifting should be avoided.

You are allowed to drive after trans-sphenoidal surgery as soon as you are feeling well enough. However, if you had a preoperative visual problem or notice any worsening in your sight after surgery, you will need to have your optician confirm that your visual fields have expanded enough to satisfy LTSA regulations on driving

If you become unwell after surgery, you need to report promptly to your general practitioner. The

usual causes of problems can include

#### **- Low Sodium in the blood**

Often caused by a condition called SIADH. Here water is drunk faster than the body is excreting it in the urine, and it leads to a dilution of the fluid concentration in the body. If severe enough, it can make you very sick with nausea, vomiting and even seizures. A simple blood test can check for this and you may be advised to restrict your fluid intake for a while. Pituitary surgery makes you particularly susceptible to this. I would suggest that all patients get a routine check blood test for electrolytes (includes sodium) 5 to 7 days after discharge.

#### **- Inadequate cortisol replacement**

This can lead to similar symptoms as to SIADH. You must make sure you are taking your Hydrocortisone medication. Your GP or Endocrinologist can adjust the dose if you are not getting enough. Your Endocrinologist will test you to find out if you need to continue the Hydrocortisone. If you are unwell for any reason, DOUBLE the dose of Hydrocortisone that you are taking until advised otherwise by your doctor.

#### **- Infection**

This occurs very infrequently, and can range from a low grade meningitis, which may necessitate a hospital stay for antibiotics through to sinusitis which can be managed at home with nasal decongestants and oral antibiotics. If you get sinus symptoms, it is worth visiting your GP.

#### **- Nose bleeding**

Occasionally after surgery, you can suffer nose bleeding especially if you exert yourself. The first step is to sit down and try and relax as most bleeding stops in a few minutes. If it continues and is profuse, get to your local medical centre or Doctor and they will consider placing nasal packs to control the bleeding and possibly a hospital visit.

#### **- Cerebrospinal fluid leak**

A profuse leak of watery fluid from the nose esp. when you tip your head forward can signal a leak of spinal fluid. If this continues more than once, you need to contact your GP or Neurosurgery Registrar. Some patients need an extra fat

#### **Early – weeks after surgery**

A small amount of pain relief is sensible in the first few days after discharge and Panadeine (2 tablets up to 4 times a day) is recommended.

We suggest using a nasal washout that you can perform at home. This should be started 5 days after discharge and continued twice daily for 5 days then daily for up to 10 weeks. “Sinus Rinse” is available from Pharmacies.

#### **Ongoing Follow-up**

Patients with functioning tumours will be reviewed by their endocrinologist and tests performed to determine whether they are cured or whether they need additional treatment and investigations.

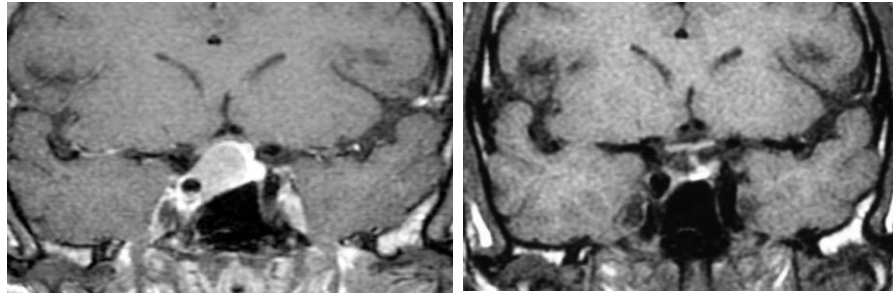
Patients with non–functioning tumours will be reviewed by their neurosurgeon for a postoperative check at around 2-3 months postoperatively. A postoperative MRI is arranged for non-functioning tumours and will show any residual tumour and whether any further therapy is indicated. If, as in most cases, there is a good decompression, then patients are arranged to have yearly / 2 yearly MRIs for a 10 year period. Regular review by your Endocrinologist is also

essential.

**Late – months to years after surgery**

Around 15-30% of Non-functioning tumour patients will need additional therapy—either surgery or radiotherapy at some stage in the 10 year follow-up. Redo surgery tends to be similar to initial surgery and does not carry any significant additional risk.

*MRI Pituitary – Pre and Post surgery*



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*Endoscopic views of a. tumour removal; b. after removal; c. dural repair*

