

Adrenal Diseases

What are the adrenal glands?

The adrenal glands are small organs located above each kidney. A normal adrenal gland is triangular in shape and roughly the size of one's thumb. The function of the adrenal glands is to produce hormones. These hormones are responsible for various functions in the body such as control of blood pressure, levels of various chemicals in the blood, use of water in the body, usage of glucose and the "fight or flight" reaction during times of stress. The hormones produced by the adrenal glands include cortisol, aldosterone, epinephrine and norepinephrine and a small amount of sex hormones estrogen and androgen).

What types of diseases affect the adrenal glands?

Diseases of the adrenal gland are relatively uncommon. The commonest reason for removal of an adrenal gland is a tumor located within the gland producing excess hormone. It is important to realize that majority of these tumors are not cancers. These tumors, which are usually small, are called benign growths and can be usually be removed with laparoscopic surgery. Removal of the adrenal gland may also be required for certain tumors even if they aren't producing excess hormones. For example, tumors larger than 5-cm in size or when there is a suspicion that the tumor could be cancerous need to be removed. Fortunately, malignant adrenal tumors are rare.

What symptoms do adrenal gland problems produce?

Patients with adrenal gland problems may experience a variety of symptoms related to the excess hormone/s produced by the abnormal gland. Some tumors may not produce any symptoms and grow to a large size by the time they are diagnosed.

Cortisol producing tumors: Tumors that produce an excess of hormone cortisol cause a syndrome termed Cushing's syndrome. Patients suffering from Cushing's syndrome develop obesity (especially of the face and the mid-body), high blood sugar, high blood pressure, menstrual irregularities, fragile skin, and prominent stretch marks. Only when the tests indicate that the tumor is situated in the adrenal gland does removal of the adrenal gland become necessary.

Aldosternaomas: These are tumors that produce an excess of hormone called aldosterone. Patients may suffer from a raised blood pressure and often have low levels of potassium in the blood. The low potassium levels can result in symptoms of weakness, fatigue and frequent urination.

Pheochromocytomas: These are tumors that produce excess of hormones called "catecholamines". The patient may experience very episodes of high blood pressure characterized by severe headaches, anxiety, palpitations, excessive sweating and rapid heart rate. These spells may last from a few seconds to several minutes. **Incidentalomas:** An adrenal mass or tumor may sometimes be found when a patient gets an abdominal ultrasound or CT scan for evaluation of another problem. Such tumors are called "incidentalomas". An incidentaloma may be any of the above types of tumors, or may produce no hormones at all. The patient needs to be evaluated to check whether or not the tumor is producing excess hormones. When an incidentaloma causing no symptoms and the tests indicate that it is not producing excess hormones and is benign, it does not need to be removed. Surgical removal of an incidentaloma is required only if:

- The tumor is found to produce excess hormones
- Is more than 4-5 centimeters in diameter
- If, based on the scans, there is a suspicion that the tumor could be cancerous.
- Adrenal gland cancers: These are called adrenocortical cancers and are rare. They are usually very large at the time of diagnosis and require an open operation for their removal.

What tests will I need prior to surgery?

If a patient is suspected to have an adrenal tumor based on his/her symptoms, doctors recommend certain blood and urine tests to check if there is excessive production of hormones. The next step is to carry out tests like a CT scan, MRI scan or MIBG scan to determine the precise location of the tumor. Rarely, a test called selective venous sampling may be necessary.

What surgical options are available for removal of the adrenal gland?

When a patient is found to have an adrenal tumor producing excess hormone/s or is suspected to be cancerous, surgical removal of the tumor is the preferred treatment. Suspected cancerous tumors are removed by open surgery through an 8-10 inch incision in the flank or in the upper part of the abdomen. Most other tumors are ideally removed by laparoscopic surgery.

What preparation is required prior to surgery?

The standard preoperative preparation includes blood tests, chest x-ray and an ECG depending on your age and medical condition.

Before hospitalization

- Patients with Cushing's syndrome need to receive extra doses of cortisone medication on the day of surgery and for a few months afterwards until the other (retained) adrenal gland has resumed normal function.
- Patients with an aldosteronoma may need to have their serum potassium checked and take extra potassium if the level is low. The blood pressure needs to be controlled.
- Patients with a pheochromocytoma will need to be started on special medications several weeks prior to surgery to control their blood pressure and heart rate.

How is laparoscopic adrenalectomy performed?

The surgery is performed under a complete general anesthesia, so that the patient is asleep during the procedure. A cannula (a narrow tube-like instrument) is placed into the abdominal cavity in the upper abdomen or flank just below the ribs. A laparoscope (a tiny telescope) connected to a special camera is inserted through the cannula. This gives the surgeon a magnified view of the patient's internal organs on a television screen. Other cannulas are inserted which allow your surgeon to delicately separate the adrenal gland from its attachments. Once the adrenal gland has been dissected free, it is placed in a small bag and is then removed through one of the incisions. It is almost always necessary to remove the entire adrenal gland in order to safely remove the tumor. After the surgeon removes the adrenal gland, the small incisions are closed.

What is single incision adrenalectomy?

This is a recent technique in which removal of the adrenal gland (usually small tumors) is achieved through one small incision rather than four or five cuts. Dr Bhandarkar specializes in single incision laparoscopic surgery and offers this operation to certain suitable patients.

What happens if the operation cannot be performed by the laparoscopic method?

In a small number of patients the laparoscopic method cannot be performed. In that situation, the operation is converted to an open procedure. Factors that may increase the possibility of choosing or converting to the "open" procedure may include:

- Obesity
- A history of prior abdominal surgery causing dense scar tissue
- Inability to visualize the adrenal gland clearly
- Bleeding problems during the operation
- Large tumor size (over 8 or 10 cm in diameter)

The decision to perform the open procedure is a judgment decision made by your surgeon either before or during the actual operation. When the surgeon feels that it is safest to convert the laparoscopic procedure to an open one, this is not a complication, but rather sound surgical judgment. The decision to convert to an open procedure is strictly based on patient safety.

What happens after the operation?

- After laparoscopic adrenal gland removal, most patients can be cared for on a regular surgical nursing unit. Occasionally, a patient with a pheochromocytoma may require admission to an intensive care unit after surgery to monitor their blood pressure. Most patients can be discharged from the hospital within one or two days after surgery.
- Patients with an aldosterone-producing tumor will need to have their serum potassium level checked after surgery and may need to continue to take medications to control their blood pressure.
- Patients with cortisol-producing tumors and Cushing's syndrome will need to take prednisolone or cortisol pills after surgery. The dose is then tapered over time as the remaining normal adrenal gland resumes adequate production of cortisol hormone.
- Patients are encouraged to engage in light activity while at home after surgery. Patients can remove any dressings and shower the day after the operation.
- Post-operative pain is generally mild and patients may require a pain pill or pain medication.
- Most patients can resume normal activities within one week, including driving, walking up stairs, light lifting, and work.

What are the advantages of laparoscopic adrenalectomy?

- The advantages of laparoscopic adrenalectomy are:
- Less pain from the incisions after surgery
- Shorter hospital stay
- Shorter recovery time
- Faster return to normal diet
- Faster return to work or normal activity
- Better cosmetic healing
- Reduced risk of herniation and wound problems, particularly in patients with Cushing's syndrome who have poor healing as a result of increased levels of cortisol

Prepared by
Dr Deepraj Bhandarkar
www.laparoscopyindia.com

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