

# PHEOCHROMOCYTOMA

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• THE FACTS YOU NEED TO KNOW •

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Pheochromocytoma is a part of the pheochromocytoma and paraganglioma group of syndromes. A pheochromocytoma is a tumor arising in the adrenal gland medulla. A paraganglioma grows in the sympathetic or parasympathetic nerves. Therefore, pheochromocytomas are always adrenal tumors and paragangliomas are extra-adrenal tumors. They have the same origin and may have the same symptoms. Pheochromocytomas and some of the abdominal paragangliomas secrete an excessive amount of hormones called catecholamines which result in a specific pheochromocytoma complex of symptoms. Paragangliomas that arise in the head and neck do not secrete catecholamines.

## **What is a pheochromocytoma?**

A pheochromocytoma is a functional catecholamine-secreting tumor of the adrenal gland medulla. Catecholamines include epinephrine, norepinephrine and their derivatives. In normal amounts these hormones are responsible for regulating heart rate and blood pressure, among other functions. Overproduction of catecholamines by pheochromocytomas leads to high blood pressure with potentially serious, life-threatening complications such as heart attack and stroke. Pheochromocytomas are mostly benign, but have a 10 percent rate of being cancerous. Pheochromocytomas occur most frequently in young to middle-aged adults (between the ages of 30 to 60). Approximately 10 percent of these involve both adrenal glands.

## **What causes pheochromocytoma?**

In approximately 35 to 40 percent of cases these tumors are the result of genetic mutations. There are several genetic syndromes that are associated with the development of pheochromocytoma and paraganglioma. The most critical and serious is multiple endocrine neoplasia (MEN type 2A and 2B syndromes), which also includes an aggressive tumor of the thyroid gland, medullary thyroid carcinoma, as well as parathyroid gland tumors (in MEN type 2A syndrome). There are other syndromes that can be associated with pheochromocytoma and an expert endocrinologist can determine what tests to perform in order to find them. The rest of pheochromocytomas are sporadic (about 60 to 65 percent) and have no genetic factors responsible for the development of the tumor.

## **How common is pheochromocytoma?**

Pheochromocytoma is a rare disease with an estimated rate of two to eight per million people per year. An incidentally discovered adrenal mass by CT scan, MRI or ultrasound is called an incidentaloma. Four to five percent of incidentalomas will be diagnosed as a pheochromocytoma by laboratory tests. This is the reason why every patient with an incidentally discovered adrenal mass should be tested for pheochromocytoma. However, in patients simply evaluated for high blood pressure, only 0.2 to 0.6 percent of adults and one percent of children would have pheochromocytoma as a cause.

## **What are the signs and symptoms of pheochromocytoma?**

The most common sign of pheochromocytoma is high blood pressure which is sometimes sudden and extreme. Symptoms may include anxiety or emotional stress, rapid pulse, palpitations, headache, nausea, vomiting and clammy skin. The patient may be perfectly well for some period of time and then have an abrupt recurrence or intensification of symptoms. Significant elevation of blood pressure may lead to a heart attack or stroke. The person may experience abdominal or back pressure, although rarely pain, from the growing tumor. There is a wide variation in symptoms in affected persons.

Pheochromocytoma symptoms may occur as intermittent episodes rather than a persistent progression of the disease. These symptoms can include dramatic elevations of blood pressure that occur spontaneously or could be induced. Direct trauma, mechanical pressure to the tumor or any type of stress can precipitate hypertensive episodes. These may include anesthesia, surgery, exercise, defecation, sexual intercourse, pregnancy, parturition, alcohol consumption, smoking or administration of various medications. Attacks or symptoms could last for minutes or hours.

## **How is pheochromocytoma diagnosed?**

In addition to a complete medical history, physical examination, and family history, diagnostic procedures for pheochromocytoma include:

- Blood and urine tests to measure hormone levels such as 24-hour urinary catecholamines and metanephrines, serum catecholamines, metanephrines and chromogranin A levels.
- CT scan of the abdomen.
- MRI of the abdomen.
- MIBG (iodine-131-meta-iodobenzylguanidine) scan. The MIBG scan is a functional study utilizing a radioisotope that produces an image of the functioning adrenal gland or extra-adrenal paraganglioma.

### **How is pheochromocytoma treated?**

Surgical removal of the adrenal gland(s) with the tumor is the only effective treatment for pheochromocytoma. Prior to surgery your physician has to prescribe medication for several weeks to control high blood pressure. Rarely, pheochromocytoma can be malignant and may metastasize to other organs. This may happen in about 10 percent of patients. Chemotherapy following removal of the primary tumor is the treatment of choice for malignant pheochromocytoma.

### **Is preoperative preparation required?**

The likelihood of complications as a result of the surgery is directly related to the adequacy of the preoperative management. The goal of preoperative therapy is to block catecholamine secretion from the tumor in order to achieve good blood pressure control prior to surgery. One of these medications is an alpha-adrenergic blocker, phenoxybenzamine, which is started approximately three weeks prior to surgery. This medication can cause significant side effects such as tachycardia and fatigue. Because of this, the patient's heart rate and blood pressure should be closely monitored by an expert physician, preferably by an endocrinologist. If tachycardia develops on phenoxybenzamine therapy the physician will add another medication to control the heart rate.

### **What kind of surgery can be performed for pheochromocytoma?**

The procedure of choice for pheochromocytoma is laparoscopic adrenalectomy — removal of the entire adrenal gland with the tumor — through several small incisions using a camera (laparoscopy).

If bilateral adrenal pheochromocytomas are detected, then a partial adrenal gland removal can be attempted leaving a normal part of the adrenal gland behind and taking only the tumor. This is done in order to prevent postoperative adrenal insufficiency.

If malignancy is suspected prior to surgery, then there is a possibility of invasion into nearby organs and an open adrenalectomy should be undertaken. Tumor size is a limiting factor for laparoscopy.

There are two approaches for minimally invasive laparoscopic surgery: anterior or lateral transperitoneal laparoscopic adrenalectomy (laparoscopic surgery through the abdomen) and posterior retroperitoneoscopic adrenalectomy (laparoscopic surgery through the back without

entering into the abdominal cavity). The choice of approach for an individual patient will depend on the pre-operative anatomy.

### **Who should perform a surgery for pheochromocytoma?**

Research has proven that the chance of having a safe and successful surgery depends on the experience of the surgeon. In general, a surgeon should do more than 20 adrenal operations a year to be considered an expert. Usually, this is an endocrine surgeon, a well-trained laparoscopic surgeon or a urologist experienced in laparoscopic procedures. Patients should not be shy or embarrassed to ask how many adrenalectomies a surgeon has done and what their personal complication rate is.

### **What is life like after surgery?**

The removal of only one adrenal gland will have no consequences on quality of life. The removal of both adrenal glands will result in surgical Addison's disease. Individuals will then need lifetime replacement therapy with glucocorticoid (hydrocortisone) and mineralocorticoid (fludrocortisone) hormones.

### **Why consult an endocrinologist?**

Endocrinologists are experienced in the pre-operative and post-operative management of pheochromocytomas and paragangliomas. They can also provide the appropriate testing and treatment for genetic syndromes, including MEN2.

### **Is genetic analysis or counseling needed?**

Thirty-five to 40 percent of pheochromocytomas and paragangliomas are due to genetic mutations. Therefore, genetic analysis has become an important part of the diagnostic workup and management of this condition. An endocrinologist may refer a patient to a genetic counselor to assist in evaluating the patient's family history and to help determine which genetic tests to perform.

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