

**GRAVES' DISEASE & THYROID FOUNDATION**

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## The Surgical Treatment Options for Graves' Disease by Kyle Zanocco, MD and Cord Sturgeon, MD\*

### What are the surgical treatment options?

The surgical treatment of Graves' disease consists of the removal of a portion or all of the thyroid gland in a surgical procedure known as thyroidectomy. This procedure was the treatment of choice for Graves' disease prior to the 1950's but is now less popular in the United States than radioactive iodine (RAI), which is felt to be lower-risk than surgery. However, major technical advances in the field of thyroid surgery make thyroid surgery a viable and sometimes superior treatment choice for Graves' disease patients.

In brief, the two surgical options are total thyroidectomy (sometimes called near-total), where all the thyroid gland is removed, and subtotal thyroidectomy, where some of the thyroid is left in place. Subtotal thyroidectomy may be

offered in an attempt to remove enough thyroid tissue to cure the hyperthyroidism, but leave just enough to prevent the need for lifelong thyroid hormone medication. Unfortunately, it is not an exact science and it may be difficult to predict how much thyroid tissue to leave in place. Most surgeons agree that it is better to take too much than too little because it would be worse for the patient to still have hyperthyroidism after surgery. The other reason for performing a subtotal thyroidectomy is to minimize the risks of injuring both the recurrent laryngeal nerves and all 4 parathyroid glands. By leaving some thyroid tissue along the recurrent laryngeal nerve and the parathyroid glands, the likelihood of injuring them is theoretically lower. Despite these theoretical advantages, the majority of surgeons recommend a total, or near-total, thyroidectomy for Graves' disease, and subtotal thyroidectomy is rarely performed.

### What are the advantages of surgery for Graves' disease?

The greatest argument in favor of surgery is that thyroidectomy is the fastest, most consistent, and most permanent way to restore normal thyroid hormone levels. There is frequently a prolonged delay after RAI before the treatment becomes effective (maybe even as long as 6 months). Furthermore, more than one RAI treatment may be needed in some patients. Following total thyroidectomy the thyroid hormone level always drops because the thyroid is the only organ that makes and stores thyroid hormone. The "rollercoaster" hormone levels that many patients complain of during medical therapy do not happen because the thyroid tissue is gone. As the body's natural thyroid hormone washes out of the system, doctors calculate an appropriate dose

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of thyroid hormone to administer in pill form. Graves' disease has no effect on the circulating thyroid hormone levels achieved from taking thyroid hormone pills.

There are a number of clinical situations where thyroidectomy is considered the best course of treatment for Graves' disease. If the finding of a suspicious nodule in a Graves' thyroid gland raises the possibility of thyroid cancer, surgery is clearly the best option. The reason is that surgery is the first step in the treatment of most thyroid cancers, and RAI and antithyroid medications are ineffective treatments for thyroid cancer by themselves.

Thyroidectomy is also probably the best treatment for patients with severe Graves' eye disease. Controversy exists in the medical literature about to what degree thyroid surgery and RAI might improve or worsen eye disease. Some patients may not want to take the risk that their eye disease could be made worse by RAI, and therefore select surgery.

Surgery is indicated for large goiters that have low iodine uptake and are therefore resistant to

radioiodine therapy. Patients in whom the surgical treatment of Graves' disease should be strongly considered include children (because of the effects of prolonged hyperthyroidism on their growth and development), young women (because of the limitations on childbearing that comes with RAI), and patients with thyroid nodules (because of the concern for thyroid cancer).

Thyroidectomy is a very reasonable treatment for pregnant women with Graves' hyperthyroidism because it avoids the need for antithyroid medications during pregnancy and the effects of radioiodine therapy on the unborn baby. Furthermore, normal thyroid levels are very important to the developing fetus. Surgery does not carry the possible long-term risks of cancer that some investigators have associated with RAI.

### **What are the risks of thyroid surgery for Graves' disease?**

The risks associated with thyroid surgery include common sense surgical considerations as well as factors specific to thyroidectomy. The common sense risks of surgery (that are the same for any operation) include bleeding, bruising,

pain, infection, and scarring. Risks specific to thyroid surgery include possible temporary or permanent nerve injury, temporary or permanent low calcium levels in the blood, and the possible need for lifelong thyroid hormone replacement. There is also the risk that the hyperthyroidism from Graves' disease would persist if not enough thyroid were removed.

Temporary or permanent injury to the recurrent or superior laryngeal nerves during thyroidectomy can cause hoarseness, changes in the singing voice, or even problems breathing. In a very unusual case where both recurrent laryngeal nerves were injured a patient might need a temporary or permanent tracheostomy to breathe. The possibility of this tragic complication is what has kept many people from considering thyroid surgery for the treatment of their Graves' disease. Fortunately, the risk of permanent nerve damage during surgery by a surgeon experienced in operating on the thyroid gland for Graves' disease is less than 2%.

Temporary or permanent low calcium can occur if the parathyroid glands are

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inadvertently injured or removed.

Hypoparathyroidism (a low level of parathyroid hormone) can result, leading to a decreased calcium in the bloodstream. Patients with low calcium are required to take calcium and vitamin D pills several times a day. The risk of permanent hypoparathyroidism in the hands of an experienced endocrine surgeon is less than 1%.

After total or near-total thyroidectomy patients are required to take a daily thyroid hormone pill for the rest of their life. You cannot live without thyroid hormone, and the thyroid gland is the only way the body can produce thyroid hormone. Fortunately thyroid hormone pills are effective and inexpensive. Thyroid hormone has a very long half-life, which means that it is a forgiving medicine. For example, if you forget to take your thyroid pill one day, you take two the next. Also, it takes a long time for thyroid hormone to build up in your system, so doctors do not need frequent blood tests for thyroid levels. Patients who undergo subtotal thyroidectomy have a chance of not requiring

lifelong thyroid hormone pills.

### **What does it take to prepare for thyroid surgery?**

A very important component of preparing for thyroidectomy is the medical control of hyperthyroidism prior to surgery. Patients should continue taking antithyroid drugs and undergo blood tests to ensure controlled levels of thyroid hormones (T3 and T4). Patients are required to have a complete physical exam to be sure that all other medical conditions are optimized prior to general anesthesia and surgery. Ten days before surgery, patients are usually started on a low dose of potassium iodide orally. The iodine lowers the risk of thyroid storm, a dangerous condition caused by rapid secretion of thyroid hormone during surgery. This short course of iodine also makes the surgery easier and less risky by shrinking the blood vessels of the thyroid.

### **How is the operation performed and what is recovery like?**

In our practice, thyroidectomy is performed under general anesthesia. An incision is made proportionate

to the length of the short axis of the thyroid gland (usually 2 inches or less in length). A muscle-sparing technique is utilized: the strap muscles of the neck are pushed aside from their position over the thyroid and are left intact. The recurrent laryngeal nerve is preserved at all costs. The four parathyroid glands are either preserved or reimplanted so their activity is maintained after the thyroidectomy.

Patients stay overnight in the hospital following the surgery, and are limited to consuming cool liquids that first night. Regular breakfast can be had the morning following surgery. Patients may shower the day after surgery. Calcium levels are checked following thyroidectomy to ensure proper functioning of the parathyroid glands. Most patients are no longer taking strong pain medications 3 days after surgery. We don't allow patients to drive if they are taking prescription pain medications or have any limitations in turning their neck. Depending on how well hyperthyroidism was controlled before surgery, patients may need to stay on beta-blockers for a week or two after the operation. Antithyroid medications (PTU or Methimazole) are

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stopped right away.

Moderate activity such as walking and climbing stairs is encouraged right after surgery, but any activity that would result in excessive exertion or perspiration is prohibited for 10 days.

### **Thyroid surgery isn't for everybody!**

If you are considering thyroid surgery for the treatment Graves' disease, consult your physician. If you have already undergone RAI or medical treatment and it has failed, you are probably still a candidate for surgery. Not everyone is a good candidate for thyroidectomy, however. Select your surgeon wisely: recent studies suggest that fewer complications occur when experienced surgeons perform the procedure. Make sure you understand the risks of surgery as they pertain to you. The best course of treatment is probably different for every Graves' patient. The decision to pursue medical, radioiodine, or surgical-based treatment should be made by the patient and doctor, and individualized based on the patient's needs and other medical conditions.

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