

## **Thymectomy: A form of treatment for Myasthenia Gravis**

Myasthenia Gravis, commonly referred to as MG, is a chronic neuromuscular disease characterized by muscle weakness. It can affect individuals of any age, race or sex. Although there is no known cure for Myasthenia Gravis, the symptoms may be treated in a variety of ways. The treatments for MG may include drug therapy, plasmapheresis, and a form of surgery which removes the thymus gland, called “thymectomy.” This presentation will explain the role of the thymus gland, and the use of thymectomy as a form of treatment for MG.

The thymus gland is located in the upper portion of the chest behind the breastbone or sternum. The thymus gland, especially early in life, is involved in the development of the immune system which enables the body to defend itself against infection. The thymus produces certain cells, called T-cell lymphocytes, which are a vital part of the immune system. These T-cell lymphocytes stimulate the production of antibodies whose job it is to recognize and fight off foreign invaders called antigens. Normally the antibodies destroy the antigens before major illness occurs. However, in Myasthenia Gravis, the exact role of the thymus is unknown.

To understand the weakness which occurs in a person with MG, it is important to understand first how muscles function. Muscles are controlled by the nervous system. For example, when a voluntary muscle contracts so that a person can chew, talk, breathe, or walk, a message is sent from the brain along a nerve pathway to the nerve ending. The nerve ending is very close to the muscle, but does not touch the muscle. This space between the nerve ending and the muscle is called the sub-neural space. The area made up of the nerve-ending, the sub-neural space and the receptor sites on the muscle is called the neuromuscular junction.

The message that has been sent from the brain to the nerve ending causes the release of the chemical acetylcholine at the neuromuscular junction. The acetylcholine carries the message to a special place on the muscle called an acetylcholine receptor site. Each neuromuscular junction has many receptor sites. When sufficient number of receptor sites has been activated by the acetylcholine, the muscle contracts. In MG, muscle weakness occurs because there is a reduction in the number of receptor sites at the neuromuscular junction. This reduction in the number of receptor sites is caused by an unexplained out-of-balance condition in the immune system. Antibodies, which are supposed to protect the body, become confused and attack the receptor sites. This reduces the number of receptor sites, thereby making it difficult for muscles to contract. This action of the confused antibody attacking a part of the body that it is supposed to protect is called an autoimmune response. MG is an autoimmune disease. We now know that there is an 80 to 90 % reduction in the acetylcholine receptor sites due to the action of the confused antibodies. And the rate at which receptor sites are destroyed is greater than the rate at which they are replaced. It is thought that the thymus may play a role in the production of these confused antibodies.

In a person with MG, the thymus may be normal, or it may have an abnormal increase in the number of cells – called thymic hyperplasia. Or the thymus may contain a tumor called a thymoma. This is most likely non-cancerous. To determine the status of the thymus, the medical doctor may order specialized x-rays, such as a CT scan of the chest.

Thymectomy is not a new treatment for MG. Since the late 1930's when Dr. John Blalock first removed a thymus gland, thymectomies have been performed around the world as part of the treatment for patients with MG. Not everyone diagnosed with MG will undergo a thymectomy. In most treatment centers, surgery is

reserved for adolescents and young adults unless a tumor is suspected. Surgery may then be offered regardless of the patient's age, so long as he or she is a reasonable surgical candidate.

Once the decision to have a thymectomy is reached by the patient and the medical doctor, the patient will be referred to a surgeon. After the surgeon review the specialized x-rays and agrees that a thymectomy may be beneficial, a hospital admission will be required. The surgeon will select the best surgical approach. A thymectomy may be performed in one of two ways. In the trans-sternal surgical approach, an incision is made over the patient's sternum, or breastbone. Once the sternum has been exposed, it is separated in the center so that the thymus gland can be visualized and removed. In the trans-cervical approach to thymus surgery, a small horizontal incision will be made across the lower portion of the neck. The incision will be just above the breastbone. The surgeon will then remove the thymus gland.

As part of the preparation for surgery, blood and urine tests may be performed. Muscle strength and breathing ability will be tested so that there will be a base from which to evaluate post-operative progress. Before surgery, the nurse will teach the patient the best way to deep breathe and cough.

The nurse will also show the patient how to turn in bed as well as how to do leg exercises. All of these procedures will help to decrease the possibility of problems during the post-operative period. The patient should practice the deep breathing, coughing, and leg exercises as well as the turning techniques with the nurse prior to surgery. The practice will help after the operation.

Another part of the preparation before surgery will be a visit from a member of the anesthesia department. The anesthesiologist will want to know about any allergies and about all medications that are being taken, and will then discuss the anesthesia plan with the patient. Food and fluids will be withheld after midnight, or on the day of surgery. Routine medications for myasthenia may or may not be given. On the morning of surgery, a pre-operative medication may be given by injection. This medication can cause relaxation, drowsiness, and dryness of the mouth.

After surgery has been completed, a one to three hour stay in the recovery room, or post-anesthesia room, is required. Once the effect of the anesthesia has worn off, the patient will be transported to a room in the hospital. In this phase of recovery, fluids and medication will be given by means of a needle in the vein called an intravenous, or I.V.

As is the case in any surgical procedure, some pain or discomfort may be experienced. The nurse should be notified so that any medication the doctor has ordered for pain relief can be administered. Deep breathing, coughing, and frequent turning while in bed are essential throughout the post-operative period. The nurse will assist with these procedures. Measurements will again be taken of muscle strength and breathing ability. These measurements will be guidelines used to determine the amount of drugs required after surgery for a patient with myasthenia gravis.

After surgery there may be an increase in muscle weakness in some patients. However through close clinical observation by the health care team, treatment will be adjusted to meet individual needs. Once fluids are tolerated by mouth, the intravenous fluids will be stopped. Solid foods will be started slowly and the patient's medications will once more be given by mouth. Length of stay in the hospital varies for each patient.

Thymectomy may lessen the severity of the myasthenic symptoms; however the degree to which the symptoms are lessened differs in each patient. A slight improvement in muscle strength, or a remission may occur. Remission, which may be either temporary or permanent, is the complete elimination of symptoms without medication. It is only natural to expect immediate results after surgery. However, the improvement in muscle strength may occur within a period of several months or may take as long as a few years. In most instances the symptoms of MG can be controlled with a combination of treatments including thymectomy. Together these treatments can improve the quality of life for the MG patient.