

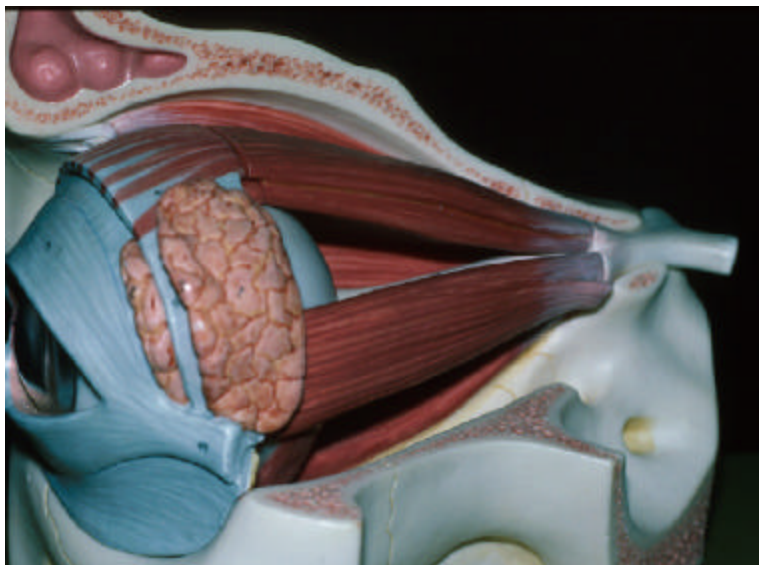


## Thyroid Eye Disease

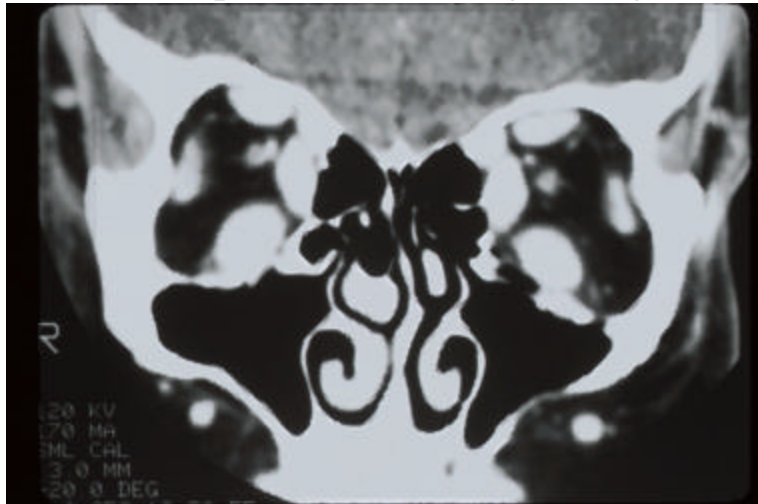
Your doctor thinks you have thyroid orbitopathy. This is an autoimmune condition where your body's immune system is producing factors that stimulate enlargement of the muscles that move the eye. This can result in bulging of the eyes, retraction of the lids, double vision, decreased vision, and ocular irritation. This is often associated with abnormalities in thyroid gland function (either too much thyroid (Graves' disease) or too little (Hashimoto's thyroiditis)). The eye findings of thyroid orbitopathy may be independent of treatment of your thyroid abnormalities and may not resolve in spite of the fact that the thyroid is now "controlled." These symptoms may be present even if your thyroid has no apparent problems.

### Anatomy:

There are 6 muscles that move your eye.



Four of these, the inferior rectus, superior rectus, lateral rectus and medial rectus, are most frequently involved. These muscles originate behind the eye at the peak of the eye socket and attach to the eye just behind the cornea (the clear portion of the eye overlying the colored part of the eye). The muscles cannot be seen on the surface as they are covered by a thin layer of tissue (the conjunctiva) but may become visible as the blood vessels over their anterior portion become very prominent. The immune system singles out the fibroblasts, support cells within the muscles causing the muscles to enlarge. With muscle enlargement the globe (eyeball) is pushed forward leading to the characteristic "stare." In addition, the muscles become stiff and the upper lid tends to retract, pulling away from the colored portion of the eye. The eyes may become red due to difficulty closing as well as increased prominence of the blood vessels. If the muscles get large enough, they may press on the optic nerve causing damage to the nerve.



This dysfunction within the optic nerve, which transmits information from the eye to the brain, results in decreased vision. This, fortunately, occurs only in about 5% of the patients with thyroid orbitopathy and may be reversible if the pressure on the optic nerve is relieved.

Physiology:

We aren't sure how or why the immune system attacks the muscles. The result is enlargement of the muscles. As the muscles get larger, 3 things can happen. The eyeball gets pushed forward, the muscles themselves become stiff (the eye may not move normally), or the muscles may press on the optic nerve. The inferior rectus muscle (located beneath the eye) tends to be more often affected than others. When it becomes stiff, the globe cannot move up normally. This often results in double vision with one image seen on top of the other. If the optic nerve is compressed, the patient is usually aware of blurred, dark or dim vision. There may be blurring or distortion related to surface problems due to the exposure and drying. It is important for your physician to sort out whether or not there is any evidence of optic nerve dysfunction. This is detected by carefully checking vision, pupillary reactivity, visual fields, and the appearance of the optic nerve head.

Although thyroid orbitopathy is usually preceded by thyroid abnormalities sometimes the eye symptoms may come first or the thyroid may appear to be normal. The connection between the eyes and the thyroid is through the immune system. The same conditions that lead to the immune system attacking the eye muscles often precedes an attack on the thyroid gland. Most frequently this makes the thyroid gland over produce thyroid hormone that in turn can lead to tremors, shakes, weight loss, rapid heart beat or palpitations, nervousness, and sensitivity to heat. Less commonly the attack on the thyroid gland leads to low thyroid production or even normal thyroid levels. We may see antibodies in your blood that can be identified as attacking thyroid tissue.

#### Symptoms:

Patients with thyroid orbitopathy often notice blurred or double vision. As the eye is pushed forward it frequently results in irritation, redness, tearing and a gritty sensation. Pain is not usually a major finding in thyroid patients, although patients will be aware of fullness within the orbit and sometimes a mild

irritation, light sensitivity, or ache. The double vision is most frequently one image on top of the other or offset although it may be side to side. Double vision will often change with direction of gaze, seeming worse when looking up and to the side. Sometimes patients will only be aware of symptoms related to thyroid overaction (nervousness, tremors, rapid or irregular heart beat, increased sweating and intolerance to heat, weight loss, and diarrhea) or underaction (fatigue, weight gain, constipation, thickening of the skin). These symptoms may precede eye symptoms by months or even years.

### Signs:

Thyroid orbitopathy is suspected based on the patient's external appearance.



Upper lid elevation, particularly when looking down, is very characteristic of thyroid orbitopathy. The eyes frequently bulge forward and the blood vessels on either side of the pupil tend to become dilated. The lids often don't close completely at night and there is resistance to pushing the globes posteriorly within the orbit. The pupils may not react normally and the eyes may be limited in their movement. Pressure inside the eye may be high particularly while looking in one direction.

## Prognosis:

Thyroid orbitopathy, like other autoimmune diseases, often comes and goes on its own. There is frequently only one acute inflammatory episode but unfortunately the effects may persist for years or even permanently. Even when the inflammation resolves, things usually do not go back to normal. Thus, although there may be some reduction of the prominence of the globe, eye movements will often not return to normal. Lid position will also likely remain elevated, possibly with persistent problems with closure.

## Treatment:

Treatment is aimed at improving the symptoms of orbital involvement. In patients with mild involvement, irritation and foreign body sensation may improve with artificial tears and the use of lubricating ointment at night. If the lids are not closing completely, they may be taped closed at night. With more severe corneal problems, lid surgery to help partially close the lids or to raise the lower lids may be necessary. In severe retraction of the upper or lower lid, surgery to reduce the effects of the lid retractors, either without or with spacer placement (such as a piece of tissue removed from the roof of the mouth) can help the lids to close. Smoking may worsen symptoms and should be discontinued.

There is no medicine that improves the ability of muscles to move (and thus relieves double vision). Recent studies suggest that controlling the thyroid function may be beneficial in decreasing the chance of worsening but is unlikely to restore normal motility. Covering one eye immediately relieves double vision. It doesn't matter which eye is covered. It may be possible to optically realign eyes with the use of prisms either applied to glasses or ground into the lens although this may not be effective until things stabilize. When double vision cannot be corrected with prisms, eye muscle surgery may be necessary. In most cases, physicians choose to wait until the double vision is stable. If we operate on a patient who is undergoing progressive change, we

may correct them now but have things change within the next few months. Often multiple muscle operations are necessary. It is sometimes not possible to completely remove double vision, but the goal is to remove double vision looking straight ahead and in reading position, as these are the most important directions of sight.

Fortunately, optic nerve problems resulting in decreased vision are uncommon. When it occurs, treatment is aimed at shrinking the muscles, usually by the use of high dose steroids (prednisone). For those patients who will not tolerate steroids radiation therapy may be of benefit. If the muscles cannot be made small enough to relieve the compression of the optic nerve (resulting in decreased visual acuity) then the orbit can be made larger. This is usually done surgically by removing one or more of the bony walls of the orbit. Since the optic nerve is usually compressed at the very back of the orbit, removing the posterior medial wall of the orbit is most critical. This may be done directly (through the soft tissues or skin around the eye), through the sinus under the eye, or through the nose. To further reduce the eye bulge the floor, lateral wall, or even the roof of the orbit may be removed. One of the problems with surgical decompression is that this often affects eye movements, thus changing the pattern of double vision (if it already exists) or potentially producing double vision in those patients who don't have it before surgery.

### Frequently asked questions

*The doctors tell me they fixed my thyroid and that it is now normal. Why are my eyes acting up?*

In Graves' disease the thyroid gland is stimulated by the immune system to secrete too much hormone. This excess hormone results in nervousness, palpitations, weight loss, diarrhea, tremors, and a feeling of being hot all the time. Treatment is aimed at limiting the thyroid glands ability to make thyroid hormone. This may be done

with medications, surgery, or radioactive iodine; usually resulting in normalization of thyroid production (occasionally requiring thyroid replacement). This does not, however, affect the primary auto-immune process and the immune system may continue to target other tissues; in particular the extraocular muscles. Orbital symptoms may even worsen following treatment with radioactive iodine. The eye and orbit changes must be treated separately as outlined.

*The steroids made my eyes much more comfortable. Can't I just continue taking them?*

Steroid therapy may be effective in halting the inflammatory phase of thyroid orbitopathy and partially shrinking the muscle swelling. Steroid side effects are very common with continued treatment. If there are still problems with eye movements (double vision), exposure problems (irritation and foreign body sensation), or decreased vision then surgery should be considered.

*Why can't you fix my eyelids now?*

Eye muscle surgery on the vertically acting muscles may change the eyelid position. Thus we don't want to do eyelid surgery until we have done any possible muscle surgery.

*Can't you just put my eyes back?*

We can reduce the bulging of your eyes by doing orbital decompressive surgery. If you already have tight muscles, decompressing the orbit may produce double vision. This is usually treatable with eye muscle surgery but if you don't have double vision now and your central vision is normal we may be able to deal with the bulged appearance with lid surgery alone without the risk of double vision.

*Why do you want to operate on my "good" eye?*

Eye muscle surgery may release a restricted muscle but the muscle is often incapable of moving normally due to its enlargement and fibrosis. Thus if we operate only on the more affected eye that eye will have very limited movement and you will have double vision whenever you look away from straight ahead. By limiting the movement of the other eye we can maximize the area over which you can see singly.



