



Eye Muscle Surgery

Bringing you the latest in technology to help with realignment of the eyes.

It is often necessary to undergo an operation to correct a misalignment of the eyes. The goals of surgery are two fold. The first is to change the present ocular alignment in such a way to enable the brain to use both eyes together, hopefully reestablishing binocular function. The second is to improve the appearance so that the eyes look straight and move together. The chances for achieving these goals are influenced by the degree and severity of the strabismus, the age of onset, types of previous treatment, quality of binocular function (depth perception) and the compliance with pre- and post-operative therapy.

The results of strabismus surgery are not always perfect because human tissue varies from individual to individual. Therefore, *it may take more than one operation to achieve the goals of straight eyes.* The first surgery's success rate varies anywhere from 50 to 90 percent depending on the type of operation and condition of the eyes. In complicated eye muscle abnormalities the surgery may be performed in steps or stages with the first operation designed to only correct part of the problem. A second or even third operation may be necessary to deal with any residual misalignment or to correct another aspect of the problem. In some instances, the correction of one problem will uncover a second problem that was not apparent before surgery.

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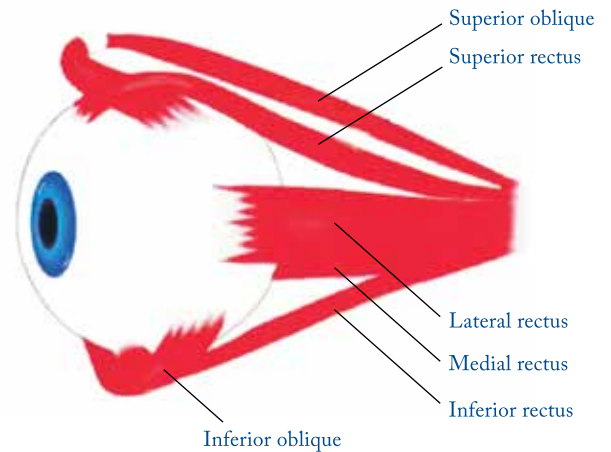
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The purpose of this discussion is to acquaint you with the facts about *strabismus surgery* so that expectations of what can be achieved are realistic. With vigorous and complete treatment the results are usually extremely gratifying.

Anatomy

Eye muscle surgery involves either weakening or strengthening the muscles that control eye movement. There are six extraocular muscles that control the movement of each eye. Four of these muscles are called rectus muscles and their functions are very straightforward. The superior rectus muscle attaches to the top of the eye and pulls the eye up.

The inferior rectus muscle attaches to the bottom part of the eye and pulls the eye down. The medial rectus muscle attaches to the side of the eye closest to the nose and pulls the eye in. And the lateral rectus muscle attaches to the outside of the eye closest to the ear and pulls the eye out. Two additional muscles, the oblique muscles, have very complicated eye movement functions. The superior oblique muscle attaches to the top back part of the eye and runs through a pulley at the top part of the nose. This muscle pulls the eye downward in order to look toward the nose. The inferior oblique muscle attaches to the bottom back part of the eye and pulls the eye back up when it is looking toward the nose. These muscles are called the oblique muscles because they attach at an angle to the eye when the eye is looking in the straight ahead position. The two eyes are coordinated by a central area in the brain and move together in a way that is analogous to the front wheels of an automobile.



You normally can't move the left front wheel independently of the right, and likewise, you cannot move your left eye independently of the right eye. If one of your car wheels is bent inward, you can, by turning the steering wheel, make it straight. However, the previously straight wheel will now be inturned. The same concept of movement applies to the eyes. Thus, while it may appear that it is the right or the left eye that's misaligned, it is really a problem between the two eyes. Therefore, you can correct eye muscle problems by operating on either one eye or, more commonly, both eyes.

Surgical Procedures

Strabismus surgery consists of two general types of operations. One is a weakening procedure of the muscle which is called a recession, and the other is a strengthening procedure which is called a resection.

The technique for doing these operations is as follows:

To expose the eye muscle an incision is made in the conjunctiva, which is thin skin over the surface of the eyeball. The conjunctiva is the tissue which becomes red and bloodshot when the eyes get irritated. The eye muscles are located underneath this conjunctival tissue. Therefore, incisions through the skin on the face or eyelids are not necessary to reach the eye muscles.

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A common misconception is that the eye is removed from its bony cradle called the orbit and placed on the face during the operation. This is completely untrue. There are far too many attachments and tissue holding the eye in place to remove it from the socket, and there is no need to do this. The eye muscles are located approximately 1/4 of an inch from where the cornea (the dome on the front of the eye) meets the conjunctiva or sclera (the white tissue). Therefore, it is not difficult to get to the eye muscles.

If a recession is planned for a particular muscle, a suture is placed in the tendonous portion of the muscle and the muscle is removed from its attachment to the eye. It is then recessed or moved backward approximately 1/4 to 3/8 of an inch and reattached to the eye. This movement from its original position to one further back on the eye effectively relaxes the pull of the muscle and allows the eye to come into a straighter position. After the muscle is sewn back to the eye, the conjunctiva is repositioned to its original place with stitches that are later absorbed. There are no stitches that have to be removed at a later date. In a resection or strengthening procedure, a small 1/4 to 3/8 inch piece of muscle is removed and the muscle is reattached at its original location.

The amount that the muscles are moved is normally determined prior to the surgery. The technique takes a great deal of skill to move the muscles correctly and is best performed by someone with extensive experience. The time estimate for the surgery varies but is usually 25 minutes per muscle. This is actual operating time; it does not include the time necessary to put the patient to sleep or wake him/her up.

Anesthesia

One of the risks of strabismus surgery is undergoing anesthesia. Luckily, with today's techniques and equipment, the risk is extremely small. It has been said that it is safer in the operation room having a strabismus operation than it is riding in a car on a four lane super highway. To minimize problems, every effort is made to ensure that the patient is in the best physical condition before he/she undergoes anesthesia. Prior to surgery you will be asked to obtain certain blood work, tests, and x-rays as deemed necessary. Unlike for many other types of surgeries, most of the strabismus patients are healthy, the operation is usually very short, and major organ systems are not involved. This keeps the anesthetic problems encountered to a minimum. Because of this, the surgery will most likely be done as an outpatient. This reflects the relative safety and ease of recovery from general anesthesia used for eye surgery. Since eye surgery is "elective", any condition that would increase the risk of complications from anesthesia must be eliminated prior to surgery. This is especially important in children. Conditions such as ear ache, pneumonia, flu-like symptoms, GI problems, etc., will result in postponement of the surgery until they have been treated. It is far safer to postpone the surgery than to operate on a child or an adult who is sick from an illness. The anesthesiologist will talk to you prior to the surgery and it's important that you discuss with him/her any questions that you may have regarding the anesthesia.

Complications

During surgery every effort is made to reduce the likelihood of problems. However during the course of any surgical procedure problems can arise. It is the surgeon's responsibility to minimize these problems in the operating room. After the surgery it becomes the patient's responsibility to carefully follow instructions and treatment prescribed. The most frequently encountered complications are as follows:

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1. *Overcorrection or undercorrection*—This is not really a complication but I will restate it here so that there is no misunderstanding. We might overcorrect or undercorrect a misalignment of the eyes that we are trying to repair. An overcorrection would be to make an eye that is turning inward to turn outward. An under correction would be an improvement in the alignment of the eyes but the eyes are still turned inward. This failure to achieve optimal alignment occurs up to 30% of the time, depending on the initial problem, and may result in the need for the use of glasses, special eye drops, prisms, or an additional surgical procedure. This failure may also be unnoticeable to the parents or patient and only detectable with specific testing by the physician. Please know that these situations cannot always be controlled and have nothing to do with the skills of the surgeon.
2. *Infection*—Infection can occur in the immediate postoperative period, but fortunately this is extremely rare. The ocular tissues are highly vascular, which usually helps prevent this problem. You will be given instructions regarding the use of preventative antibiotics and the care and use of the eyes in the immediate postoperative period. A postoperative visit will be scheduled to detect any early signs of an infection. Severe infection inside the eyes can result in loss of vision. Fortunately, this is very unusual after strabismus surgery.
3. *Scleral perforation*—During the operation, the eye muscle is often removed from the eye and then has to be reattached. The outer coating of the eye is approximately 1/12 inch thick. Rarely, the needle used to sew the eye muscle onto the eye actually enters into the eye itself. This is usually of little consequence and rarely necessitates any concern. Occasionally, a small hemorrhage may occur, but it will normally resolve without intervention. Very rarely (approximately one out of 10,000) a retinal detachment can result, requiring further surgery to repair.

In some cases, a freezing treatment called cryotherapy will be used to ensure that the puncture site is sealed. Fortunately, with today's modern needles and careful technique, this is an extremely rare occurrence.

4. *Slipped muscle*—The suture used to attach the eye muscle to the eye is extremely strong. However, in a rare situation the suture may break which can cause the muscle to slip or become detached from the eyeball. This requires immediate reoperation to reattach the muscle. Fortunately, this also rarely happens.
5. *Loss of vision*—Permanent loss of vision from eye muscle surgery occurs approximately in one out of 10,000 eye muscle operations. The cause is usually internal eye infection (endophthalmitis), internal eye hemorrhage, or retinal detachment. Early detection and treatment can save vision. Changes in eyeglass prescriptions can occur after eye muscle surgery due to slight alterations in the shape of the eye or cornea. This may not be permanent and new glasses will usually correct any refractive changes.
6. *Double vision*—In the immediate postoperative period it is not unusual for the patient to see double (called diplopia). The eye muscles are sore and are not working correctly, or occasionally the eye position has been changed enough so that the brain processes two images instead of one. The double vision normally resolves within days to weeks, and in some cases for adults it is desirable immediately after the surgery. Persistent double vision, however, may require additional intervention if it will not resolve in an appropriate period of time. Every effort is made to try to anticipate whether or not this will occur so that the patient can be prepared for this in the immediate postoperative period.

Postoperative Care

A separate sheet with instructions will be given to you at the time of surgery with regard to how to take care of the eyes in the postoperative period. Questions about additional issues not covered in this handout may arise. Please feel free to contact your surgeon prior to surgery in order to get these questions answered. You can contact the Grand Traverse Ophthalmology Clinic at (231) 947-6246. – Daniel D. Thuente, M.D.