Children's Surgery to Straighten the Eyes

Information for Parents

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The Children's Strabismus Center

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Unless otherwise noted, Paul David Reese, MD, is the sole author.

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Children's Surgery To Straighten the Eyes

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Notice to Parents

There are many excellent strabismus surgeons.

The information that follows applies necessarily to my own surgical practice. While much of the material may be applied to other strabismus surgeons, some of this material will not be applicable to every ophthalmology practice.

Parents of children being followed by other pediatric ophthalmologists should seek specific information about their child's surgery from the child's own ophthalmologist.
Part I

Children and Anesthesia

Interview with Dr. Bebe Wunderlich, former Director of Pediatric Anesthesia at Tufts Medical Center. Dr. Wunderlich is interviewed by Dr. Reese.

**How do you put a child to sleep with anesthesia?**

I think we need to start before the child even arrives in the Operating Room.

First, we have to evaluate what would be the appropriate anesthetic for the child. Many of the factors that come into our assessment involve what the parents tell us. We need to know how the child has been lately — if the child has had any recent infections, any prior exposure to general anesthetics, any heart or lung problems. Have there been any family problems with anesthesia?

Also, it's very important to understand what the child is like psychologically. Children who have been in day care and are used to strangers may require a very different going-off-to-sleep type medicine than children who are very shy. We're particularly concerned about the child who has had multiple procedures and comes back again and again and is afraid of shots and afraid of the hospital.

We have several different methods of having children go off to sleep. Children feel strongly about shots. They've been to the pediatrician and know that shots are the worst part of being at the pediatrician's office. So for all of our children, we have ways of having them go to sleep that do not involve needles.

We're frequently able to have children go off to sleep simply by breathing through a mask. The child selects the smell of the air that comes out of the mask. We have a lot of different flavors for children to choose.
How dangerous is anesthesia?

With our present high-tech monitoring devices, anesthesia is reasonably safe.

[Dr. Reese: Although hard statistics are lacking, according to one of my pediatric anesthesiology colleagues the risk of a healthy child dying from anesthesia is 1 in 500,000. The chance of dying in an automobile accident is 1 in 10,000. The chance of dying from an automobile accident is thus many times greater than the chance of an anesthetic death.

The only death of which I am aware was a child who died from a condition called Malignant Hyperthermia, an extremely rare genetic condition in which the child was allergic to the anesthesia. That happened to one of my colleagues in Denver, and it occurred over 20 years ago. Improvement in anesthesia may have prevented even that death today.

The single significant anesthetic complication I have experienced is discussed in Part III.]

Is there anything the parents can do to lessen whatever risks do exist for anesthesia?

Yes, there is a lot that families can do to contribute to the care of their child.

One major factor than can make it an unpleasant experience is to have the child come in who is not adequately psychologically prepared. This is a child who is going to require more medication, whose heart rate will be higher. The family can be very much involved in the psychological preparation so that less medication is required for entry into the operating room.
How, then, should parents prepare their child for surgery?

Let's take a child about two to three years of age. This is a child who can communicate and verbalize some of her fears and concerns.

First, I think the family has to prepare them for the fact that they're coming to the hospital.

They've met Dr. Reese and they need to be told that there's going to be a procedure done to fix their eyes. They need to be given assurance that Mom and Dad are going to be around, that they're not going to be abandoned, that someone's going to be waiting for them. This is very important.

Children also need to know a little bit about the fact that they're going to be meeting many nice people who have blue or gray dresses and pants on. And they need to know a little bit about waking up in a different room from where they go to sleep.

It's also important to tell the child that they will not be getting any breakfast that morning and the reason why — they will be able to come home sooner if they don't have breakfast (general anesthesia occasionally causes nausea).

What should the parents tell a 12-month old infant?

For an infant only a year old it's really very difficult to get much across to them, other than the fact that Mom and Dad are around and will be with the child as soon as he or she awakes.
After surgery, the child has a number of monitoring devices attached. Do any of these hurt?

The monitoring devices are a marvelous way for us to painlessly keep track of vital life functions. For example, we monitor blood pressure, which some kids think is kind of fun because the blood pressure cuff periodically squeezes their arm like a "muscle tester." We continuously monitor body temperature and heart rate. We also put a little Band-Aid sensor on their finger — it tells us the precise oxygen level in the child's blood. Thus, we are able to pick up any problems very early. None of these devices hurt. We take them off as soon as the child is reasonably awake.

What final advice might you wish to give parents?

We very much like families to be actively involved in the pre-surgical preparation of children. Jot down any questions you might have. In the hurry of the moment you may forget to ask things, so please feel free to write notes and bring them in with you.
How To Prepare Your Child For Surgery

Tell them that:

1. They will be coming to the hospital.
2. The doctor will be fixing their eyes.
3. They will see many nice people with blue or gray dresses and pants on.
4. You will be with them until they fall asleep.
5. They will be waking up in a new room, and you will be with them when they wake up.
6. They will not be getting any breakfast that morning (because they might get sick).

You do not need to tell them all of this weeks ahead of time; a day or two will be fine.
Part II

Risks and Benefits of Surgery

Every surgery entails risks and benefits. While there are risks to surgery, there are also potential benefits.

What is the Benefit in Operating?

The goal of surgery is to achieve binocular vision, that is, to have the eyes function together as a unit. When this is achieved, depth perception (stereo vision, stereopsis, 3-D vision) occurs. This is the reason we have two eyes in the first place: to use them together to accomplish what neither eye alone is capable of achieving.

Children with strabismus (eyes that are not straight) cannot use both eyes together. Instead, they use predominantly either the right eye or the left eye, never both simultaneously.

This is the most important goal of strabismus surgery — to get the eyes straight so that the eyes have the opportunity to be used together.

The best article on stereopsis [on the two eyes being used together], is "A Neurologist's Notebook: Stereo Sue, Why two eyes are better than one," by Oliver Sachs, published in "The New Yorker, June 19, 2006, pages 64 - 74.

I have copies of this article in the Wellesley office and will be happy to provide a copy to anyone who requests it.
What About the Risks of Surgery?

I wish we lived in a world in which there were no risks with surgery, where there was not even the remotest chance of complications, where further surgery was never required, where the surgery didn't even cause red eyes! But there are risks with any surgery, and eye muscle surgery is no different.

Fortunately, serious complications are rare. I shall tell you about these in the next few pages.

Do I Have Any Other Choices Besides Surgery?

Maybe. Occasionally an injection can be given into eye muscles to help straighten the eyes. This is impractical for most children because it requires general anesthesia. For adults, this therapy can work very well.

Rarely, prisms or other non-surgical therapy may also be an option. I shall discuss this with you prior to surgery if these forms of therapy may be useful. For most patients needing surgery, they are not effective and surgery is needed.

There is always the choice of doing nothing. If nothing is done, most children will continue with strabismus — for the vast majority of patients, it will not improve (but it will usually not worsen either).

Is There Any Benefit In NOT Operating?

The advantage in not operating is that there are absolutely no surgical risks, no inconvenience to families, no post-operative discomfort for the child, and no surgical or hospital expenses.
Is There Any Risk In NOT Operating?

Yes. If surgery is not done, the child will not be able to use the eyes fully synchronized for binocular vision.

The Risk of Complications is a Shared Burden

Parents sometimes believe that their child is the only one who assumes the risks of surgery.

This is not true — you as parents, and I as surgeon, also assume the risks of surgery.

In short, the decision for surgery entails uncertainties that all of us must accept — patient, parents, and surgeon alike.
The Strabismus Club

The Strabismus Club are parents whose children have had strabismus surgery and who are willing to talk with other parents now facing the same surgery.

If you would like to speak with a parent who has already been through the surgery with their child, let me know and I shall put you in touch with someone from The Strabismus Club.

You'll thereby automatically become a member of The Strabismus Club yourself — someday in the future, after the surgery is behind you and you're now an expert, you may be sharing your experience with parents just like yourselves.

If your child is being cared for by another pediatric ophthalmologist, ask your child's ophthalmologist if you may speak with a parent whose child has already undergone the surgery.
Part III

Information about the Risks of Strabismus Surgery in Children

(Eye muscle surgery to straighten eyes)

The following information is intended to help you understand the surgery and its risks.

Before surgery, I shall discuss the operation with you in detail and answer all of your questions.

What is Strabismus?

Strabismus refers to any condition in which the eyes are not straight — for example, crossed eyes. The surgery involves operations on the eye muscles attached to the outside of the eyeball.

Who Does the Surgery?

I do.

There is no "ghost" surgeon. No intern, resident, fellow, nor other physician-in-training is involved in your child's surgery.

My only assistant at surgery is an experienced surgical nurse.
What Will My Child's Eyes Look Like Immediately Following Surgery?

Your child's eyes will be a bit red and bloodshot. The redness will gradually fade over the next several weeks to months. Eventually, the eyes will return to their normal appearance and you will probably not be able to tell that any surgery had ever been done.

If there is any worsening in the redness or swelling after the first day, page me.

On the following pages are photographs of a 22-month old girl as she is waiting in the Pre-Op area a few moments before her surgery, and the same child at her first post-op visit four days later. Both eyes were operated.

Usually the eyes are a bit more bloodshot following surgery than is the case with this child, and not all children have this perfect a result immediately after surgery.
Lily, just prior to surgery
Lily, 4 days following surgery
Will My Child Have the Eye Patched or Need To Use Eye Drops?

Your child will not have the eye(s) patched. I instill antibiotics at the end of the surgery. Usually eye medication is not necessary following surgery.

Can I Reach You in an Emergency?

Yes. I take call 24 hours a day, every day. You can easily reach me anytime by paging me: (617) 647-3366. After the message, enter your number and I shall call you back as soon as I reach a phone (I do not have a cell phone, so wait until I can reach a phone).

When you call you will be speaking with me directly, not with an answering service or with a physician who has never seen your child.

DO NOT HESITATE to call me if you have any concerns following surgery — any time, day or night. I want you to call me!

"My child is afraid of being taken from me before surgery . . . "

You will be meeting the anesthesiologist before the surgery. I encourage you to make known your concerns.

If you wish, your child can receive a mild short-acting sedative (by mouth) before surgery. This liquid drink has a pleasant taste and is easily accepted by most children.

One of the child's parents is allowed in the Surgery Suite until the child falls asleep. A parent's presence in the Operation Room can be very reassuring for the child and I encourage it.
What Signing the Surgery Permit Actually Means

Signing the surgery form is perceived by many parents as somehow waiving their rights. This is absolutely not true. The only reason for signing the surgery permit is to indicate that you understand why the surgery is being done; that you understand the basic risks, accept those risks and, when available, that you have been informed of alternatives to surgery. You waive no rights whatsoever.

If you wish, I'll provide you a copy of the surgery permit so that you can read it at your leisure before your child's surgery.

Finally, the surgery permit is not the most important thing concerning permission for surgery. The most important point is that you understand everything you wish to know about the surgery. I'll tell you as much information as you desire; ask as many questions as you wish.
Surgical Risks to the Eyes

The following is a list of some of the risks of strabismus surgery — some common, some not. Not all risks can be foreseen, even by the surgeon, but these are the major ones.

Patients are entitled to know how many times the surgery has had a particular complication — not as some abstract number arrived at by a survey of anonymous ophthalmologists, but what is the risk of a particular complication when I do the surgery.

In the following pages, I have indicated in bold print how many times a particular complication has happened in my own surgical practice.

Strabismus surgery is the only surgery that I perform. That doesn't mean I'm perfect or that I never have complications. I do.

But it does mean, I hope, that the risks are reasonably small.
Undercorrection and Overcorrection

What Does This Mean?

The more the eyes are crossed, the more surgery needs to be performed. The amount of surgery is based upon my own surgical results that have been obtained over the past 30 years.

However, each patient may respond to surgery a bit differently, and the surgical correction is therefore somewhat uncertain. For eyes crossed in, for example, the eyes may still be crossed in after surgery (under-correction), or they may be turned out (over-correction).

What Can Be Done?

Often nothing needs to be done, because the problem will resolve on its own over the next few weeks or months.

Other times glasses, prisms or eye exercises may be needed. Some patients will require further surgery. If this is necessary, I usually wait at least six months to be certain the problem does not correct itself and the eye alignment is stable.

What is the Risk of Additional Surgery?

The risk of additional surgery is between 5% and 33%, depending upon the type of strabismus. Most children need only one surgery.
Slipped Muscle
("Lost" Muscle)

What does this mean?
The suture (surgical stitch) attaching the eye muscle to the eyeball has detached or loosened.

What can be done?
The patient must be re-operated to properly reattach the muscle to the eye.

What is the risk?
One in a thousand (my estimate)

Number of times this complication has occurred to Dr. Reese's patients:
Once. (See Supplement at end of this publication.)
Eye Infection

Reaction to the Eye Sutures

What does this mean?
An infection is always possible with any surgery.

What can be done?
Intensive antibiotics may be necessary.

What is the risk?
The risk of an infection is 1 in 1000s of cases.
The risk of a serious infection that may result in blindness is 1 in 100,000 cases (my estimate).

Number of times this complication has occurred in my own practice:
One infection (mild, no vision lost)
One reaction to sutures (no vision lost)
Perforation of an eye

What does this mean?

A surgical needle is used to re-attach the eye muscle to the wall of the eyeball. Strabismus surgery requires careful placement of the sutures. There is always the risk of the suture needle inadvertently perforating through the wall of the eyeball into the interior of the eye.

What can be done?

Usually there is no damage to the eye. However, the retina may be damaged and, if so, retinal surgery or other treatment may be necessary.

Number of times this complication has occurred in Dr. Reese's hands:

Never.
Double Vision

What does this mean?

Seeing two images.

What can be done?

Post-operative double vision does not usually occur in younger children.

If it happens to older children, it usually resolves within days to weeks. I have never had to re-operate for persistent double vision following surgery.

Loss of Vision

What is the risk?

Risk is impossible to calculate because it is so low. (I estimate 1 in 100,000 patients.)

Number of times this complication has occurred in Dr. Reese's practice:

Never.
Anesthetic Risk

Number of times a serious anesthetic complication occurred to one of Dr. Reese's patients: Once

This child received an adult dose of a sedative instead of a pediatric dose and needed to stay in the hospital until that evening, when the drug finally wore off; there was no injury to the patient, only a prolonged sedative effect.

The reason this happened was an error by the nurse giving the medication. I no longer operate at the hospital where this complication occurred.
Part IV

Instructions for Parents Before Surgery

The Five Day Rule

Children should be healthy and well five days before the surgery in order to minimize the risk of an anesthetic complication. This means no sore throat, fever, tummy ache, or ear ache. And especially, they are to have no respiratory or lung symptoms: no cough, no sneezing, and no runny nose.

If your child comes down with anything, you are to call me and I shall reschedule the surgery.

I want your child to be in his or her usual state of health before surgery. For example: if your child always has a runny nose, that is fine. But if the child does not ordinarily have a runny nose and gets a runny nose within 5 days of the surgery, I will reschedule the surgery.

The Five Day Rule — my own policy, not the hospital's — is an effort to protect your child from anesthetic complications such as laryngospasm or bronchospasm.
Preoperative Testing

Children should be seen by their pediatrician for a pre-op physical prior to surgery to be cleared for general anesthesia.

No laboratory testing is usually necessary for healthy children undergoing strabismus surgery.

African-American children should be screened for sickle cell disease or trait because these conditions can have a bearing upon how a child responds to general anesthesia.

Should any family member ever has had anesthesia and developed the condition "Malignant Hyperthermia," let me know. This condition is inherited. The anesthesia team will need to know this in advance and will undertake a rigorous protocol to protect your child from developing that complication.
Part V

INSTRUCTIONS FOR STRABISMUS PATIENTS

FOLLOWING SURGERY

What your child may eat

Children may eat anything following surgery. However, they may do better with a light meal, such as juice or soup, immediately after surgery.

Redness

The operated eye(s) will be "bloodshot." This is normal and no cause for alarm. The redness will take a few weeks to months to clear completely, but improvement should be noticed within two weeks. The redness does not cause the child any pain.

How will my child's eyes feel?

Immediately after surgery your child's eyes will feel somewhat "scratchy" and be sensitive to light. This will improve within a day or two. You can give your child Tylenol or Motrin if necessary. Many children do well without any pain medicine. By evening following surgery, most infants and toddlers have completely forgotten there had been any surgery done that day.

You may use an ice pack to help your child's discomfort. Place a few tissues or washcloth under the ice pack to prevent direct contact with the skin. Leave on only a few minutes at a time.
What should I do if there is discharge from the eyes?

Mild mucoid discharge from the eyes is normal. Gently wipe the discharge away with a Kleenex or similar clean tissue.

Will my child's eyes be patched following surgery? I never patch a child's eyes following surgery. The child may keep her eyes closed for a while after surgery. This is her way of patching the eyes: she controls the patching.

Will I have to put medicine into my child's eyes following surgery?

Usually, no. I shall instill antibiotic ointment at the conclusion of the surgery.

If the child is older, a teenager for example, I may prescribe antibiotic drops following surgery. But not in small children, which make up the bulk of my surgical practice.
Restrictions

For the first week you should make an effort to keep water out of your child's eyes. You can carefully shampoo your child's hair, but try to keep water out of the eyes (even baby shampoo getting into the eyes after surgery will cause a stinging sensation).

No swimming pool or sandbox for a week after surgery.

Most important — Keep your child away from any person with an active eye infection (conjunctivitis, "pink eye").

Non-restrictions

Your child can watch TV, read books, even play outdoors.

When do you need to be concerned?

The redness and swelling your child has the day after surgery should be at the maximum. Call me if there is any worsening beyond this.

These are the signs of possible infection:

- *Increasing* pain and redness in the eye
- *Increasing* swelling of the tissues around the eyes
- *Increasing* discharge from the eyes

If an eye does not move well after surgery and is severely turned to one side, the suture attaching the muscle to the eye may have detached — call me immediately. (See Supplement at end of this publication.)
Return Visits

I would like to see your child approximately two to four days following surgery. This first visit is very brief — I simply want to be certain the eyes are healing and there is no infection.

If everything is fine on that first visit, I'll plan to see your child about 4-6 weeks, 3 months, then 6 months following surgery. I shall see your child every 6 months thereafter until they are 7 years old, then annually throughout childhood.

You can always reach me

I take call 24 hours a day, every day, holidays included. *I want you to call me if there are any questions or problems. If needed, I am happy to see your child any hour, day or night.*

Page me at (617) 647-3366. After the message, enter your number and I shall call you back. (I don't have a cell phone; I shall return your call as soon as I reach a phone.)

If I need to see your child after hours or on weekends, I shall have you come to the Wellesley satellite of New England Eye Center (One Washington Street, Wellesley; the office is located exactly one mile west from Newton-Wellesley Hospital).

There is no charge for post-op visits, including emergency visits (they are included in the surgery fee).
Part VI

Eye Muscle Surgery

Questions for Parents

(Optional)

True  False  1) The most important reason to straighten the eyes is to give the child the \textit{opportunity} of developing depth perception.

True  False  2) If the eyes are straight after surgery, there is no chance of amblyopia (lazy vision) developing in either eye.

True  False  3) The eyes are quite sensitive to light for a few days after surgery, and may feel slightly scratchy.

True  False  4) There is only a small chance (less than 10 percent) of further eye muscle surgery being required.

True  False  5) Even if the eyes are successfully straightened, years later further surgery might be necessary.
True  False  6)  Immediately after surgery I should expect the eyes to be perfectly straight.

True  False  7)  There is a chance of death with eye muscle surgery, but it is much less than the chance of being killed in an automobile accident.
Answers to Parents' Quiz

1) True

The most important reason to straighten the eyes is to get them to be used together (depth perception, stereopsis). Surgery, even when successful in aligning the eyes, does not guarantee depth perception. However, it does give the child the opportunity of developing depth perception.

2) False

Even with straight eyes, a young child may still develop lazy vision that requires patching therapy.

3) True

The eyes are sensitive to light and scratchy for a few days. They are also bloodshot, and this may last for weeks to months.
4) True (and) False

This depends on the type of eye misalignment. The success rate in my hands varies from 67% to over 90%. I shall tell you the risk of additional surgery before I operate on your child.

5) True

Even with an excellent surgical result for years, a deterioration may occur at some point during the child's lifetime. The more time that elapses, the less likely an additional surgery becomes.

6) False

There may be some drift to the eyes over the first few days to weeks. One month after surgery most surgical results are fairly stable.

7) True

The chance of death from eye muscle surgery is possibly 1 in 500,000, though there are no hard statistics since the event is so rare. The chance of being killed in an automobile accident is 1 in 10,000 per year.
A Surgical Complication I Had Thought Impossible

(A "lost" muscle)

[This article originally appeared in Reese's Pieces on this website.]

1 PM

I have just returned from surgery. The patient was a 5-year old girl whom I had operated three days ago. She had had crossed eyes (esotropia) and I had weakened the inturning eye muscles of both eyes at surgery. The surgery involved detaching the inturning eye muscles from the eyeball and reattaching them more posteriorly (moving them back a bit from the front of the eyeball); in effect, placing some slack in the muscles. The medical term for this operation is a muscle recession.
This morning, Sunday, at 7:30 AM, I received a call from the child’s mother. Connie’s left eye, which had been crossed inward before surgery (and straight immediately following surgery), was now deviating outward, and she was unable to move the left eye at all.

I had the mother bring her daughter to my office immediately.

My worst fear proved to be only too true: one of the muscles operated three days earlier had detached from the eye. Having operated on a few thousand patients without this complication, I thought it could never happen to one of my patients.

If a muscle detaches from the eye following strabismus surgery, the patient must be re-operated as soon as possible to reattach the muscle to the eye.

I called the operating room and said I needed an immediate surgery opening. The nurse replied that an emergency appendectomy was already underway but they would be ready for my patient as soon as the appendectomy ended.

I had told the child’s mother before I went into the Operating Room that the surgery might be difficult: the muscle had possibly retracted well into the interior of the eye socket, behind the eyeball, and might not be visible. But I added that the suture that had been used in the first surgery would still be attached to the eye muscle, wherever it was. I would look for the suture and, if I could find the suture, I will have found the muscle.

Six hours after the mother’s call to me that morning, the child was out of surgery. Her eyes were straight again, and she was moving her eyes normally.

A happy ending, but a painful lesson for the surgeon — No matter how many surgeries one undertakes, there is always the possibility of complications, even complications the surgeon had thought impossible.

This should be a lesson as well to my patients, which is why I am writing this account.

I consider myself a competent strabismus surgeon.

But as this complication shows — I am not perfect.
This is how the Connie appeared three days following the first surgery.

The right eye is looking at the camera; the left eye is deviated to the extreme left corner; she cannot move the left eye.

Connie following reattachment of the detached muscle of the left eye.

The eyes are now straight following surgery to reattach the "lost" muscle.
IN HER DAY.
ONLY A BRUSH COULD CURE STRABISMUS.