Canaloplasty Surgery FAQ

What is Canaloplasty?
Canaloplasty (pronounced Kah-NAL-oh-plas-tee) is a new glaucoma treatment that gives many people with this potentially blinding condition the hope of saving the vision they have. Canaloplasty can reduce pressure in the eye (IOP) by nearly 40%, and many glaucoma patients who have had Canaloplasty no longer need medications. This “minimally invasive” procedure is available alone or can be done with cataract extraction (phacocanaloplasty). It is a “non-penetrating” surgical procedure that does not require creation of a fistula nor result in a “bleb” such as with traditional trabeculectomy surgery. Insertion of a micro-catheter into Schlemm’s canal (the eye’s internal drainage duct) facilitates exit of eye fluid through the natural outflow. The canal is then dilated by injecting a sterile, gel-like material called a viscoelastic. After the drainage channel is made larger the micro-catheter is removed and a suture is placed within the canal system. Suture tension within this system keeps it open for years resulting in a controlled eye pressure.

See how Canaloplasty is done. Watch Dr. Richardson’s video online Go to http://new-glaucoma-treatments.com/canaloplasty/
Why Canaloplasty?

**Safety.** Canaloplasty is safer than traditional glaucoma surgery (trabeculectomy). If you are considering glaucoma surgery to prevent further vision loss then choosing a surgery that has fewer risks makes sense.

**Age.** Younger patients need a better option than traditional glaucoma surgery. Traditional glaucoma surgery is less likely to succeed in younger patients and carries a lifetime risk of infection. Success with Canaloplasty is not age dependent and there is no lifetime risk of infection.

**Active Lifestyle.** If you are an energetic person who enjoys such activities as watersports, it is important for you to know that having traditional
glaucoma surgery will severely limit your ability to participate in certain sports. No such limitation exists with Canaloplasty. Once healed, patients who have had Canaloplasty are able to return to their previous active lifestyles without restriction or limitation.

**Nearsighted.** People who are very nearsighted (highly myopic) are at a much higher risk of vision-threatening complications from traditional glaucoma surgeries. This is not true with Canaloplasty.

**Ethnicity.** Traditional glaucoma surgery has a high failure rate among African American patients. In contrast, Canaloplasty has a well-established track record of success among many races.

**Fear of Cataract.** If you do not currently have a cataract, you should know that the risk of developing one increases substantially after traditional glaucoma surgery. This risk is much lower with Canaloplasty.

**Difficulty with Glaucoma Medications.** If you are having trouble tolerating or affording your glaucoma medications, then Canaloplasty may be an option for you. With traditional glaucoma surgeries, the risk is just too high to consider for reasons of financial hardship or side effects of medicines alone.

These are just some of the many reasons to consider Canaloplasty. If you have open angle glaucoma (the most common type) and are considering glaucoma surgery, then you should explore your available options before making a decision. Although there are certainly instances where traditional glaucoma surgery is the best (or even only) option available, most patients with glaucoma are candidates for Canaloplasty and should consider this safer option.
How long has Canaloplasty been around? The answer to this question is not as straightforward as it might seem. Although the iTrack catheter (required to perform canaloplasty) has only been FDA approved since 2008, the surgical technique used to perform Canaloplasty has been around for decades*. The modern procedure is essentially a modification of viscocanalostomy, which was first described by Dr. Stegmann in 1991. Because viscocanalostomy is a technically difficult surgery to perform, it was not very popular among most eye surgeons. However, with the invention (and FDA approval) of the iTrack, the impressive results and superior safety profile of Canaloplasty have convinced a number of surgeons (myself included) to become adept at this procedure.

What does “Minimally Invasive” really mean? Traditional glaucoma surgeries (trabeculectomy or shunt surgery) require the creation of a full-thickness hole (or fistula) through the wall of the eye (sclera). This allows fluid to flow from the inside of the front of the eye (anterior chamber) through the scleral hole to a bleb (cyst, or blister-like elevation of the conjunctiva). From here the fluid somehow finds its way back into the venous system. These surgeries are called “penetrating.” Canaloplasty, on the other hand, is a non-penetrating (or “minimally invasive”) surgery because only a partial thickness flap is created in the sclera. This flap is then sewn back in place after Schlemm’s canal is opened so there is no fistula created between the inside and outside of the eye. Instead, fluid in the eye drains out through the (newly opened) natural drainage system of the eye.

How long does Canaloplasty take? Canaloplasty is not a quick surgery (at least by eye surgery standards). In order for the surgery to work properly, your surgeon must make a flap in the sclera (the white part of the eye) and extend this all the way to a very thin and fragile membrane called Descemet’s membrane without tearing it. This flap is created just above a vascular tissue (which easily bleeds) called the choroid. All of this happens in a space no larger than the fingernail on your “pinky” finger. It can be tedi-

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ous and requires both skill and patience from your surgeon. Thus, it can take anywhere between 45 minutes and two hours. The benefits, however, can last a lifetime.

4 What if my natural drainage canal cannot be fully catheterized? To get the full benefit of Canaloplasty, it is important for your surgeon to canulate the full 360 degrees of Schlemm’s canal, dilate the canal with viscoelastic, and stent it open with a suture. The inability to complete any one of these elements (say, from prior scarring of the canal) can limit the effectiveness of the surgery. However, even if a full Canaloplasty procedure cannot be completed, your surgeon can most likely convert to either a traditional trabeculectomy or viscocan­alostomy. A recent study** confirmed that, while not as effective as Canaloplasty, viscocanalostomy can significantly reduce the pressure in the eye providing for some protection from glaucoma.


5 Is Canaloplasty surgery painful? No. During surgery your eye will be anesthetized (numbed). After surgery you will be given drops to reduce inflammation and prevent pain. Generally, people do notice a “foreign body sensation” (scratchy sensation) under the upper eyelid for up to a few weeks after surgery. This is caused by the slowly dissolving sutures and resolves on its own. If you have Canaloplasty surgery and have more severe pain than what is described here, you should immediately contact your surgeon.

“If something doesn’t work, then try something else. Because this new procedure is unbelievable. I can’t say enough about it. I’m just thrilled. It’s like giving me a new life!”
Canaloplasty

ELIGIBILITY

6 I’ve had glaucoma laser surgery. Can I have Canaloplasty? If you have had either of the laser surgeries for open angle glaucoma (Argon Laser Trabeculoplasting or Selective Laser Trabeculoplasting), you may still be a candidate for Canaloplasty. It depends, however, on how much scarring there is from the laser surgery. Although your surgeon can visually inspect the area around Schelmm’s canal using a special contact lens (a technique called gonioscopy), s/he cannot tell if there has been permanent scarring of the canal itself. It may not be possible to fully catheterize the canal if there is dense scarring of the canal (called stenosis). In that case, your surgeon would not be able to stent the canal open with a suture, but would still inject a special gel (called a viscoelastic) into the partially opened canal. When the canal cannot be fully canulated and the stent is not placed, this is called viscocanalostomy. Although not as effective as canalopasty, it can still lower the IOP.

7 I’ve already had traditional glaucoma surgery (trabeculectomy). Can I have Canaloplasty? The standard answer would be “no.” However, it is possible (though technically quite challenging) for Canaloplasty to be done in an eye that has already had a trabeculectomy that is no longer functioning. If you and your surgeon are considering this option it is important for you to have realistic (guarded) expectations of success. Many patients are interested in the option of Canaloplasty because (compared to other glaucoma surgeries) there are fewer risks. But, if you are not the ideal candidate, there may also be less of a potential benefit.
I’ve used glaucoma drops for a very long time. Will that affect the success of Canaloplasty? Possibly*. There is growing evidence that Schlemm’s canal (the eye’s natural drainage duct) decreases in size with long-term use of glaucoma medications. If there is significant stenosis (scarring down) of the canal, then it may not be possible to thread the catheter all of the way around the canal. However, even if a stent cannot be left in the canal it is generally possible to dilate a significant portion of the canal with viscoelastic. When the catheter cannot be fully threaded and a stent is not placed, this procedure is called viscocanalostomy. Viscocanalostomy has been around since 1991 and is also an effective treatment for glaucoma (though less so than Canaloplasty).

Canaloplasty

BENEFITS

Will my vision change after Canaloplasty? If you are hoping for better vision after canaloplasty, it is important to point out that the purpose of any glaucoma treatment (including Canaloplasty) is to preserve vision, not improve it. That being said, your vision will change in the following ways after surgery. First, your vision will likely be worse the first few days (or even weeks) after surgery. This is expected. When Schlemm’s canal is dilated some blood refluxes back through the newly dilated canal into the eye. Some even consider this a sign of successful surgery. This blood eventually is cleared out the same way it got into the eye. Another cause of (generally temporary) fluctuations in vision is surgically induced astigmatism from the suture used to close the surgical incision. This almost always resolves by a month or so after surgery. Once the eye is fully healed (about three months after surgery) an interesting thing happens: some patients note that their vision does seem better than it was prior to surgery. This is likely because glaucoma drops worsen a condition called Tear Dysfunctional Syndrome that can cause blurred vision. After successful Canaloplasty surgery the need for glaucoma drops is reduced (or even eliminated). Without these drops, Tear Dysfunctional Syndrome improves which can result in clearer vision for some patients.
Will Canaloplasty cure my glaucoma? No. To date there is no cure for glaucoma. The best any treatment can do is to halt (or slow) the progression of this disease. The closer the IOP to 8mmHg, the better (below that and the eye can lose vision from the pressure being too low). Studies have shown that for most glaucoma patients an IOP of less than 15mmHg can be protective (a goal often achieved with Canaloplasty). Some forms of glaucoma (such as advanced, low tension, or normal tension glaucoma) require IOPs of less than 12mmHg in order to avoid loss of vision. Only your eye surgeon can determine what your eye’s goal should be.

Will I be able to stop using glaucoma drops after Canaloplasty? Possibly. Remember that the primary objective of any glaucoma surgery (including Canaloplasty) is to lower your IOP into a safer range and protect you from further loss of vision. A secondary goal would be to reduce (or even eliminate) the use of glaucoma drops. Studies have shown Canaloplasty to be effective at achieving both of these goals. Not only do most people who undergo Canaloplasty have lower IOPs after surgery, but on average, they are able to stop just under two medications. What does “just under two” mean? Well, some people are able to stop one drop, some two, others none and some are even able to stop all of their drops. How many you will be able to stop if you have Canaloplasty cannot be predicted, though it’s likely that you will be able to stop at least one of them if you are on multiple drops.

How long will my IOP stay controlled with Canaloplasty? Because Canaloplasty has only been FDA approved since 2008, we only have three-year results. There is no reason, however, to believe that the surgery will “stop working.” In a study that looked at the long-term (7 year) results of combined cataract surgery and viscocanalostomy (the less effective precursor to Canaloplasty), IOP was reduced by over 33% (on average) at the last docu-

We can reasonably expect the long-term results of Canaloplasty and Phacocanaloplasty to be even better than those published for viscocanalostomy and Phacoviscocanalostomy.

**What if Canaloplasty doesn’t work? Can I still have traditional glaucoma surgery after Canaloplasty?** Yes. Having Canaloplasty does not affect your ability to have other types of glaucoma surgery at a later date as long as your Canaloplasty surgeon operates in one of the superior “quadrants” of the eye. Some Canaloplasty surgeons, however, operate at what is called the 12:00 position. This approach can make it difficult (but not impossible) for a surgeon to perform traditional glaucoma surgery at a later date.

**I’m a very active person. Will having Canaloplasty force me to limit my activities?**

The answer to this question depends on what time, after surgery, you are referring. Immediately after surgery (and at least for a few days, but sometimes up to weeks after) your vision will be blurry in the eye that had canaloplasty. Therefore, any activities that require good binocular vision (such as working with heavy machinery) should be avoided until the vision improves. Additionally, it is generally a good idea to keep the eye clean and dry (no gardening or swimming) for at least a few weeks. Once the incision has healed over (about a month after surgery) it is generally OK to resume all of your usual activities.

Contrast this with traditional glaucoma surgery (trabeculectomy) which does limit your activities for the rest of your life. Because of the fragile nature of a bleb after trabeculectomy (and the risk of rupture and/or infection), once someone has had trabeculectomy surgery s/he cannot participate in most water sports without high-quality protective eyewear.

I wear soft contact lenses. Can I continue to wear them after Canaloplasty? Yes, but you may have to wait until the eye is healed from surgery. How soon you may restart use of contact lenses will be up to your surgeon. Additionally, it may be necessary to get fitted for new contact lenses after Canaloplasty as the surgery can sometimes change your refractive error.

Contrast this with traditional glaucoma surgery (trabeculectomy). Because of the fragile nature of a bleb after trabeculectomy (and the risk of rupture and/or infection), once someone has had trabeculectomy surgery s/he cannot wear soft contact lenses after surgery for as long as the bleb is functioning. Hard contact lenses, however, are generally OK to wear even with trabeculectomy (though a refitting may be needed after surgery).

I’ve heard that Canaloplasty is not as effective as more traditional glaucoma surgery (trabeculectomy). Is this true? No, although this is widely believed by many surgeons who do not perform Canaloplasty. It has generally been thought that trabeculectomy is the only way to get intraocular pressures (IOPs) under 12mmHg. However, a recent head-to-head study comparing one year results of Canaloplasty vs. trabeculectomy showed no significant difference in average IOP between the two surgeries. Granted, average IOP does not address the issue of the lowest IOP achievable. Nevertheless, some of my own patients who have had Canaloplasty now have pressures between 8-10mmHg. This is by no means the average result, but does speak to the issue of whether it is possible for Canaloplasty to lower the IOP below 10mmHg.

Is Canaloplasty really safer than traditional glaucoma surgery (trabeculectomy)? Yes. A recent study compared one year results of Canaloplasty vs. trabeculectomy. Although there was no significant difference in the final intraocular pressures (IOPs) between the two surgeries (meaning both surgeries were equally good at lowering IOP), two differences were noted: (1) Canaloplasty patients experienced fewer side effects and complications compared to those who had trabeculectomy; and (2) the patients who had Canaloplasty had better vision than those patients who had trabeculectomy.

RISKS
Canaloplasty

What are the Risks of Canaloplasty?

Although it is true that there are fewer risks with Canaloplasty than there are with traditional glaucoma surgery (trabeculectomy), it is not without risk. All surgeries (there are no exceptions) have risks associated with them. The important thing to consider when faced with the need for surgery is the relative risk of the procedure compared to going without the procedure. If your glaucoma is not under control then (given enough time) you will lose vision. Glaucoma surgeries offer a method of preventing that loss of vision. The most commonly encountered risks of Canaloplasty are:

1. **Bleeding in the eye.** Almost 30% of people who have Canaloplasty have some bleeding in the front of the eye. However, as mentioned earlier, this bleeding (called a hyphema or microhyphema) is pretty much to be expected (and may actually be desired*). This resolves with time and rarely causes any permanent reduction in vision.

2. **Intraocular pressure “spikes”** during the healing period after surgery. About 5% (one in twenty) people will have a short period after surgery when

the IOP is actually higher than it was before surgery. This almost always resolves.

3. The formation of a bleb (blister) on the surface of the eye in the area of the incision (6%). It is worth noting that with trabeculectomy, the formation of a stable bleb is necessary for success, while with Canaloplasty, it is considered to be an undesirable outcome, or “risk.” These blebs rarely limit the effectiveness of Canaloplasty. However, blebs can be associated with Tear Dysfunctional Syndrome (Dry Eye Syndrome) and could limit your ability to participate in certain activities (such as certain water sports).

4. Descemet’s Membrane Separation, or Detachment (3%). In order to open Schlemm’s canal, a gel-like substance (called a viscoelastic) is injected into the canal. If the canal is particularly “tight” it is possible for the gel to follow the path of least resistance and dissect beneath Descement’s Membrane (the thin film on the back of the cornea). If this happens, the vision could be affected. However, with time (weeks to months) these almost always resolve on their own. If it is not spontaneously improving, it is generally possible for your surgeon to inject a gas bubble in your eye to press this membrane back against the cornea.

5. The need to perform traditional glaucoma surgery (4%). Less than one in twenty Canaloplasty surgeries “fail” and must be converted to either trabeculectomy or a “shunt.” This may be done either at the time of initial surgery or at a later date. Your surgeon would make this decision as clinically appropriate.

6. Hypotony (IOP too low). “Too low?” you may be wondering, “I thought the problem was that the pressure was too high?” Well, if the IOP drops below 5mmHg (millimeters of Mercury) and stays there, vision can be lost from a condition known as “hypotony maculopathy.” Fortunately, this condition is pretty rare with Canaloplasty (only one person in 200 would be expected to have prolonged hypotony). Compare this to trabeculectomy in which at least 1 out of every 10 people is likely to experience hypotony.
7. **Infection.** To date, vision-threatening infection of the eye (called “endophthalmitis”) has not been documented with Canaloplasty. In theory, however, anytime an incision is made in the eye, an infection could be possible. So, although the risk seems to be less than 1 in 1,000, it’s probably not zero. Compare this to trabeculectomy which carries up to a 5% chance per year of developing an infection called “blebitis” that (if not caught early and treated) can result in endophthalmitis and loss of vision.

In summary, although not without risk, Canaloplasty is associated with significantly fewer risks (both in number and severity) than traditional glaucoma surgeries such as trabeculectomy.

19 **I’m afraid of having something placed in my eye. What are the risks of the stent?** Although this is an understandable concern, the only thing left in the eye after Canaloplasty is a suture. The material used in this suture (polypropylene) has been used in eye surgery for decades and has a very good safety record. In fact, this material has been used in the eye far longer than most of the materials used to make the intraocular lenses (IOLs) in modern cataract surgery. It is very unlikely that this suture would ever erode into or through the eye wall as it is securely threaded through Schlemm’s canal. In the few reported cases where the suture has eroded into the anterior chamber it seldom causes any problem.

20 **What is the big deal about a bleb, anyway?** With traditional glaucoma surgery (trabeculectomy), a blister-like fluid collection (called a “bleb”) must be present on the surface of the eye for the surgery to work. Aqueous fluid (the fluid inside the eye) flows through the fistula into this bleb where it then finds its way out of the eye. If this bleb scars down, the surgery fails and the intraocular pressure (IOP) goes back up potentially causing a further loss of vision from glaucoma. Unfortunately, the body wants to scar down the bleb as part of the natural healing response. In order to prevent this from happening most modern trabeculectomy surgeons use a chemical called an “antimetabolite”
to preserve the bleb. The most commonly used antimetabolite (Mitomycin-C, or MMC) causes permanent damage to the eye tissue in the area of the surgery.

The tissue exposed to MMC is very fragile and does not heal well. Fluid in the bleb exerts pressure which can result in what is called a “high bleb.” This is essentially a thin bubble-shaped bleb. These can cause (or may exacerbate) Tear Dysfunctional Syndrome resulting in chronic irritation, tearing, and blurred vision. Because the wall of the bleb is so thin any trauma to the eye can rupture it. Since it does not heal well any damage to the bleb may require surgical revision.

Finally, and most concerning, is that when MMC is used during trabeculectomy, there is up to a 5% risk per year of bleb leak” which can progress to infection of the inside of the eye (endophthalmitis, up to 1% per year) if not successfully treated. Endophthalmitis often leads to severe loss of vision or blindness. This risk continues for the life of the patient unless the bleb scars down (fails).

**Canaloplasty is a “blebless” (or bleb-free) procedure.** With Canaloplasty no fistulas are created and there is no need to modify the natural healing of the eye. Without a bleb, there is no worsening of Tear Dysfunctional Syndrome or risk of blebitis. Occasionally (about 6% of the time), a bleb will spontaneously form with Canaloplasty. However, because most Canaloplasty surgeons do not use MMC, the bleb is usually “shallow” and unlikely to result in Tear Dysfunctional Syndrome or blebitis.

Surgeons & References

Canaloplasty

Are all Canaloplasty surgeons Glaucoma Specialists? No. For example, Dr. Richardson is not fellowship trained but does specialize in treating glaucoma with advanced procedures such as Canaloplasty. A “fellowship trained” glaucoma specialist is someone who spends one to two additional years after residency learning how to deal with advanced and unusual forms of glaucoma. Because Canaloplasty can most effectively treat earlier (less advanced) forms of the more common types of open angle glaucoma, it is often performed by general ophthalmologists and/or cataract surgeons. Indeed, it is particularly effective when done at the same time as cataract surgery - in which case it is called “phacocanaloplasty.”
What training is required to become an Interventional Ophthalmologist (Canaloplasty Surgeon)? Interventional Ophthalmologists must first complete their training as EyeMDs (completion of a bachelor’s degree followed by four years of medical school, one year of internship, and three years of residency training in eye diseases and surgery). Once proficient as an eye surgeon, an ophthalmologist can request to be trained in the technique of Canaloplasty. Doctors are required to complete a “wet-lab” (practice on cadaver eyes) prior to performing Canaloplasty surgery on humans. Then, the first 10 surgeries are conducted under the direct monitoring of a Clinical Specialist. Only a fraction of surgeons who start the Canaloplasty training complete the monitoring requirements and go on to become Canaloplasty surgeons.

Where can I find a Canaloplasty surgeon near me? Visit the iScience website. This site will provide a list of Canaloplasty surgeons near you.

How much does Canaloplasty cost? The amount charged for canaloplasty varies by surgeon and surgery center. If you do not have insurance, the total cost for canaloplasty can range from $4,000 to upwards of $8,000 per eye. Fortunately, Medicare and many insurances pay for Canaloplasty when surgical treatment of glaucoma is indicated. Even if you do not have insurance, however, Canaloplasty can pay for itself over time simply by saving you thousands of dollars per year in the cost of glaucoma drops that may no longer be necessary after this surgery.

* http://canaloplasty.com/iscience/find_a_physician.php
Where can I learn more about Canaloplasty?
Below are some additional resources that could help you to decide if Canaloplasty is right for you:

1. **Canaloplasty.com** - Created by iScience, the manufacturer of the catheter used in Canaloplasty. This is where you would go to find a Canaloplasty surgeon near you.

2. **YouTube.com** - If you want to see what this surgery actually looks like (and aren’t too squeamish).

3. **New-Glaucoma-Treatments.com** - This website was created by Dr. Richardson in order to provide a ‘one stop solution’ for those patients looking for the latest information about Canaloplasty. Dr. Richardson updates this site weekly with the latest news about this and other glaucoma treatments.

4. **Find a Canaloplasty surgeon and schedule a consultation** - There is no better way to find out if Canaloplasty is right for you than to have your eye evaluated by a surgeon certified to perform Canaloplasty.

Fill out our brief online evaluation form to see if you or your loved one is a candidate for this exciting new surgery.

Dr. David Richardson has performed thousands of eye surgeries using the most advanced techniques. He is trusted not only by thousands of patients, but also by other medical professionals. Dr. Richardson was named a “Super Doctor” by his peers in the Los Angeles Magazine in 2010, 2011, 2012 and 2013. In a similar survey conducted by Pasadena Magazine, Dr. Richardson was also voted as a “Top Doc” for the past 6 consecutive years (2008-2013). Actions, though, speak louder than words - Dr. Richardson is the personal eye surgeon for many of the most respected doctors in the San Gabriel valley. Dr. David Richardson is among a select group of ophthalmologists in Southern California offering Canaloplasty as a treatment option for his glaucoma patients.

Do you want to receive other patient-focused materials regarding glaucoma or cataract? Visit -> drmd.me/newsletter-pdf