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Glaucoma: what every patient should know. Part 3. What treatments are the right ones? Drops, scissors, laser

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Abstract

This part of the article discusses present mainline therapy for glaucoma, lowering the eye pressure: daily eye drops, laser treatment to the angle, or various forms of surgery. Though each method works, they all have their own advantages and downsides. Choice of the starting treatment largely depends on the form of glaucoma and should be a mutual decision of both the doctor and the patient.

Eyedrops are the most widespread beginning treatment and can be enough for many patients. Their strong points are that they usually don't do permanent damage to the eye, they work as indicated the majority of the time and, in case of necessity are easily switched to something else, mostly without any ill effects. The two weak points are: side effects and adherence problems. Side effects vary from temporary to lasting and serious, that can force about 10% of patients to stop regular instillations. The second problem with taking drops is adherence: patients forgetting to take them or not taking them as prescribed.

As for laser angle treatment, its good points are that it is nearly impossible to hurt vision or the eye when done properly, and, having laser treatment doesn't prevent a person from later using other treatments to lower eye pressure if the laser doesn't work. It's painless, takes only eyedrop anesthesia, takes about 15 minutes to do, and vision is nearly normal immediately. It's biggest problem is that laser angle treatment often isn't powerful enough. It works best for those with uncomplicated or primary glaucoma, and probably shouldn't be tried in those with secondary glaucoma.

The main upside of glaucoma surgery is a reasonable success at lowering pressure. As for the risks of surgery, they can be grouped into the bothersome, such as a gritty sensation and the dangerous, such as overly low pressure potentially aggravating vision, infections and risk of cataract development.

Further details are given on hypotensive drop instillations. According to the studies conducted over the last years, patients instill from 20% to 75% of the prescribed medicine. Possible reasons for the adherence problems are numbered.

The importance of having an iron-clad reminder system is emphasized, for example, wristwatch alarms going off every day or every 12 hours, relatives reminding to take drops, making instillation schedules, linking the instillations to something in daily routine and keeping the medicine in plain sight.

The article dwells on the doctor-patient collaboration when taking the drops, gives tips for the doctors that could help increase the adherence and finally the 13 ways the patient can get glaucoma eye drops into the eye, while being effective at lowering eye pressure and saving money are enumerated in details.

KEY WORDS: glaucoma, hypotensive drops, laser treatment, glaucoma surgery, adherence.

Глаукома: что необходимо знать каждому пациенту. Часть 3. Как правильно лечить глаукому? Капли, операции, лазер

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Резюме

В этой части статьи обсуждаются основные способы лечения глаукомы: гипотензивные капли, лазерные вмешательства и различные формы хирургического лечения. Несмотря на то что все перечисленные методы снижают внутриглазное давление, у каждого из них есть свои собственные плюсы и минусы. Выбор начальной тактики лечения во многом зависит от формы глаукомы и должен быть совместным решением врача и пациента.

Глазные капли являются самым распространенным начальным методом лечения, и во многих случаях терапевтическое лечение оказывается достаточным. Капли не причиняют необратимого вреда глазу, отличаются предсказуемым эффектом и в случае необходимости легко заменяются на другой вид лечения. Их слабые стороны заключаются в побочных эффектах и в возможном нарушении предписанного режима терапии. Нежелательные эффекты могут варьировать от краткосрочных до серьезных долгосрочных. Около 10% пациентов вынуждены прекращать регулярные инстилляции из-за риска дальнейших осложнений. Второй проблемой гипотензивного режима является недостаточная приверженность назначенной терапии: пациенты могут забывать закапать капли или нарушать предписанный порядок их закапывания.

Что касается лазерного лечения глаукомы, его сильные стороны заключаются в следующем: оно является быстрым, безболезненным, требует только местной анестезии, при правильном выполнении не может снизить зрение или причинить вред глазу, его можно сочетать (одновременно или последовательно) с другими видами лечения. Основным минусом является его недостаточная эффективность в ряде случаев. Наиболее эффективно лазерное вмешательство при неосложненной первичной глаукоме, в случае же вторичной глаукомы оно вряд ли может считаться тактикой выбора.

Главным плюсом хирургического лечения глаукомы является ее эффективность. Сопряженные с операцией риски можно разделить на две группы: беспокоящие, такие как раздражение глаза, и опасные, такие как потенциально угрожающая зрению чрезмерная гипотензия, инфекции и риск последующего развития катаракты.

Завершающий раздел статьи более подробно останавливается на проблемах закапывания капель, снижающих внутриглазное давление. Согласно исследованиям, проведенным в последние годы, из назначенных лекарств пациенты принимают лишь от 20 до 75%. Автор приводит возможные причины снижения приверженности лечению.

Также сделан акцент на необходимости системы напоминаний в случае назначения гипотензивного режима. Возможные варианты включают будильники на наручных часах, срабатывающие 1 или 2 раза в сутки, напоминания со стороны родственников, создание календаря закапываний, психологическое привязывание закапывания капель к какому-нибудь ежедневно выполняемому действию, а также нахождение флакона с лекарством в поле зрения.

Поскольку важным фактором правильного выполнения режима является сотрудничество пациента и врача, в статье приводятся советы врачам по повышению приверженности больных лечению. Завершают статью 13 подробных подсказок пациенту с инструкцией правильного закапывания для повышения его эффективности и уменьшения чрезмерного расхода капель.

КЛЮЧЕВЫЕ СЛОВА: глаукома, гипотензивные капли, лазерное лечение, хирургия глаукомы, приверженность лечению.

Take Home Points

- **Any of the 3 pressure lowering methods works**
- **Side effects differ in each method**
- **Drops work for many, but produce side effects and require remembering to take them**
- **Laser has very low risk, but often isn't powerful enough in lowering pressure**
- **Surgery has reasonable success at lowering pressure, but a small number have bad effects**
- **Every method stops working in some eyes over time**
- **The method can be changed from one type to the other**
- **Decisions are shared by patient and doctor**

In this section, we'll talk about the present mainline therapy for glaucoma, lowering the eye pressure. With due respect to the old game of rocks, scissors, paper, each has advantages over the other, but also each has a downside or two. The 3 methods are daily eye drops, laser treatment to the angle, or various forms of surgery. Which method to lower eye pressure is best for you to start with? This discussion applies whether you have open angle glaucoma, or you are an open-angle suspect who chooses therapy, or if you have angle closure or angle closure glaucoma after iridotomy, and even for others with miscellaneous forms of glaucoma.

The scientists in the crowd would say that all three treatments have been tested in big studies and they all work. Yes, that is correct. You wouldn't be wrong to start with drops, with laser or with surgery. The big organization that eye surgeons belong to, the American Academy of Ophthalmology, has guidelines called preferred practice patterns. These are written by committees that put together the best information for doctors to present to patients. The practice pattern says that every new glaucoma patient should be told the upsides and downsides of each of these methods, and that it's fine to start with any one of the three. Every new patient in our practice runs through the following discussion with us before the mutual decision about how to start treatment is made. So, what's the good news and the bad news?

Eyedrops

More patients begin treatment by taking daily eye drops than the other treatments. Perhaps this shows that patients think that medicines are safer than procedures. Perhaps it is because doctors have been most often telling patients that they should start with drops. It is true that many persons can have safe eye pressure lowering by taking daily drops. When we look

at large studies, about half of those who start with drops will reach their goal pressure with taking one kind of drop per day, while another quarter will need two kinds of drops every day (two different bottles put in separately), and the final quarter will not find any combination of drops that works well enough and is tolerable enough for them to take.

The strong points of drops are that they usually don't do anything permanently bad to the patient or the eye, and they work as indicated the majority of the time. Also in their favor is that you can start them and if you don't like it, you can stop and switch to something else, mostly without any ill effects. The two weak points are: side effects and adherence problems. Soon after starting or in the longer term, some side effect or allergy can develop that keeps the drop from being usable. The specific problems with individual drop types are given below. Side effects vary from annoying and temporary to lasting and serious. Rarely, medicines for glaucoma can affect the heart and lungs and we know that a small number of people have even died from taking drops. But, it is surely true that more people have died from taking aspirin than glaucoma medicines. Our experience is that about 10% of people taking any eye drop will suffer a problem that forces them to stop taking it.

The second problem with taking drops is that we forget to take them or do not take them as prescribed. This is a much bigger issue than most patients believe. Once you know you have glaucoma, you will think that as a reasonable person, knowing your vision is on the line, you'll take the drops. You try your best. Unfortunately, careful observation of patients shows that it doesn't happen ideally. People who start the drops and fill some prescriptions will actually take drops on 3 out of 4 days. We'll deal with this issue in a whole section below (How to succeed at eye drop treatment).

Presently, there aren't ways to tell whether you will respond with a low enough pressure to a particular kind of drop. Some investigators have suggested extensive genetic testing to find out ahead of time who will have a good lowering from a certain type of drop. This approach is not presently possible and even though it sounds elegant, in a couple of weeks we can find out if your pressure fell by having you try a bottle, and that's cheaper.

Laser Angle Treatment

Argon Laser Trabeculoplasty (ALT), Selective Laser Trabeculoplasty (SLT) or Laser TrabeculoPlasty (LTP)

Almost 40 years ago, a brilliant doctor named David Worthen tried to lower eye pressure by shining laser energy at the meshwork in a controlled trial. Considering that he was working with advanced glaucoma eyes, the beneficial effect was pretty impressive, though small. Five years later, Dr. James Wise reported that when he treated fairly early glaucoma patients, their eye pressures fell impressively, and since then, a large controlled trial (the Glaucoma Laser Trial) showed that there is sustained lowering of pressure by this treatment as initial therapy. The meshwork runs all around the eye in a circle, so treatment generally is either half the circle or all the way around (360 degrees).

The good points of laser angle treatment are that it is nearly impossible to hurt vision or the eye when done properly, and, having laser treatment doesn't prevent a person from later using other treatments to lower eye pressure if the laser doesn't work. It's painless, takes only eyedrop anesthesia, takes about 15 minutes to do, and vision is nearly normal immediately.

However, a fair statement is that only half of those treated initially with laser will have sufficient pressure lowering that they don't have to do something else, too (such as taking daily eye drops). About another one-quarter get some lowering but have to start drops to get low enough. And, one-quarter get no good effect at all (though they aren't worse off either). Therefore, the biggest problem is that laser angle treatment isn't powerful enough. It works best for those with uncomplicated or primary glaucoma, and probably shouldn't be tried in those with secondary glaucoma.

I am always amazed to hear from patients that they were told by an eye doctor that laser angle treatment frequently stops working and that is why they should have either drops or surgery. In fact, every glaucoma treatment sometimes stops working after a period of control. This can be because the disease gets worse and the baseline pressure is rising, making it look like the treatment has become less effective. But, this is not only true of laser treatment, nor is it likely worse for laser than for eye drops or surgery.

In all the years it's been used, no one has succeeded in making the laser treatment of the angle more effective — despite using a variety of lasers and delivery methods. During the last 10 years, another laser was proposed to be an improvement. This is called selective laser trabeculoplasty or SLT, since its laser energy was delivered over a wider area and at lower power. The claim that one could use this approach repeatedly has been stated, but not proven in any peer-reviewed controlled study directly compared to the established ALT-type laser method. In fact, the existing ALT approach was shown in the past to have some ability to be repeated if it had worked for some years and then the eye pressure rose again. There is no reason to think that the SLT instrument's treatment is either better or worse than the ALT form.

Glaucoma surgery

Until recently, few eye doctors would recommend glaucoma surgery as initial treatment. The general principle of such surgery is to let aqueous humor leak

out of the eye through a hole created at the junction of the colored and white part (where the iris meets the sclera) under the covering layer called the conjunctiva. The chief reason to avoid surgery was pretty obvious and often expressed in plain English by patients: "you can't go blind from eye drops, but you can with surgery". As surgery complications decreased over the years, and as we recognized that patients preferred the idea of eye drops, but didn't take them at an ideal rate, some argued that surgery first had a strong argument in its favor.

A large controlled study (the Collaborative Initial Glaucoma Treatment Study) then randomly assigned volunteer, new open-angle glaucoma patients to take either eye drops or have trabeculectomy glaucoma surgery. Ten years into the study, both groups were doing well, and those who got surgery in both eyes were, if anything doing slightly better at preserving their visual field test results. Indeed, as shown in other studies, one can get the eye pressure to fall really low with trabeculectomy. But, 20% of operations had failed within the first year. And as with drops and laser, a small percentage of early successes lose pressure control every year that we follow the patient.

The risks of surgery can be generally grouped into the bothersome and the dangerous. Among the former, patients who have the surgery have minor to modest feelings on the eye that are like a gritty sensation or a feeling as if something is in the eye off and on. Most often these get better quickly. For 1-2% of patients, the feeling in the surgical area is too troublesome and revision surgery is done to relieve it. More serious problems include developing so low an eye pressure that vision is poor, requiring revision surgery to raise pressure. Infections happen early after surgery in one per thousand eyes, and over time, there is a continued chance that the area of surgery makes the eye more susceptible to later infection requiring intensive treatment, revision surgery, and rarely, severe vision loss. Cataract (hazy lens) occurs more often after glaucoma surgery. In fact, there is evidence that all of the glaucoma treatments speed up the development of cataract. While this is undesirable, cataract is surgically removable.

At present, more patients choose eye drops than laser or surgery as their first glaucoma treatment. Yet, a recent large study found that those with serious glaucoma damage did as well or better with first surgery than the comparison group who took eye drops first. Patients who find surgery to be a good first choice are people who can tolerate a bit higher risk, as well as those who feel that they are generally not good at remembering to take medication. Surgery is a good option, then, for those who would like to have the treatment that most allows them to "forget about" their glaucoma.

How to succeed at eye drop treatment: It's all in your hands

Take Home Points

- **The average patient only takes 70% of their drops — don't be average**
- **The chief problem is forgetting, and you don't know you forgot**
- **Using memory aids can dramatically improve drop taking**
- **Link the drops to something else you do, keep them out in plain sight**
- **Target should be lower if damage is greater or risk is higher**
- **Follow the 13 tips for taking drops**

Your ability to put a drop on the eye every day means that you are in charge of keeping your vision with glaucoma. But, as we'll see, the secrets of succeeding with drops are as much your head and your wallet as they are in how well you do with the mechanics of eye drop taking. In the next section, we'll talk about the specific medicines now available as glaucoma drops (Glaucoma eye drops: choices, choices). Here, we'll talk about how to get the drop in your eye and how to remember to do it.

The dirty little secret of glaucoma drops (until recently) was similar to what used to be a humorous description of the Soviet Russian economy, where salaries were low and no one really did much work. The joke by Soviet workers was: "I pretend to work and they pretend to pay me". For glaucoma, it was: "I pretend that I take all my drops and the doctor acts like I take them all". Twenty-five years ago, researchers put an early computer in an eye drop bottle and found that patients were taking only 3 out of 4 of their drops — even when the bottles were handed out free.

Studies done in the last 5 years by our Wilmer Glaucoma Center of Excellence have confirmed that little has changed. What we know is very disturbing:

• Of patients who are given a new prescription for glaucoma drops, 25% never fill the second one after getting their first bottle. They had not stopped because the doctor had switched them to another drop).

• Of those who fill the second prescription, only half of all the patients are still taking their drops regularly at the end of the first year. This includes those who switched or went on to surgery or something else.

We gave our own patients free glaucoma drops and told them we were going to monitor how many drops they took using an electronic counter on their bottle that recorded when they took the drops. Even though we told them we were keeping track of when they took the drops and urged them to do their best to take them every day, the average patient took only 70% of the drops. Amazingly, when we interviewed these folks and asked how many drops they thought they were taking, they said they were taking 95% or more. I know and

respect these patients and I suspect that they believe that they are taking all the drops. So it isn't that they are lying to me. Most of them just don't know that they missed the drops — that's why we call it forgetting. Now with pills, if you have 31 pills to take in a month, when you get to the end of the month and there are 5 pills left, you know you screwed up. With eye drop bottles there's no such clue. If you don't have an iron-clad reminder system, you will forget.

While it isn't an excuse, patients taking pills for long term diseases that have no symptoms (like high blood pressure) do just as badly as glaucoma patients at remembering to take their meds. There's only one kind of chronic medication that does far better than this, where patients take 100% of the pills on time. It's the erectile dysfunction drugs (no surprise there).

Some of our patients took only 20% of the drops. These folks with big adherence problems have some characteristics we can identify. They may have serious memory issues, such as dementia. They may not understand that the drops must go in every day, which means there was a lack of appropriate education. They may have a personality that allows them to ignore that glaucoma can blind you. This is called denial. They do not have a family member with glaucoma. They aren't as likely to have taken the time to find out about glaucoma. By reading this you're marking yourself as someone who is more likely to win by taking drops better. Congratulations! But, if two or more of the statements above apply to you, you may have more trouble remembering drops than you think.

Patients do best with drops right after the doctor visit, tail off between visits, then start using them better again during the week coming up to the visit. We all floss and brush our teeth like mad just before seeing the dentist, so this behavior is understandable though unfortunate. The secret to preventing vision loss is to be consistent and to take drops every day in between visits. As we'll see below, the key to making this happen is to use memory aids that are as strong every day as that just before going to see the doctor feeling.

One of the surprises of our studies was that we thought eye drop side effects were a big cause of not taking drops properly. We found just the opposite! Those who reported redness or stinging or blurring from drops were more likely to be taking them. We should have realized that if you're not taking drops very often, you won't have any side effects. Not that the side effects are that bad — after all, those who reported some minor side effects from drops were taking 9 out of 10 drops dutifully.

So, how can we help patients do better with their drops? Our group has done two big studies that show that effective memory aids work very well. Those who were using only half of their drops improved dramatically after we helped them to do a better job. We tried several ways to remind them. First, we used an alarm that beeped when it was time for the drops. Second, we used telephone calls, emails or text messages at the time that they were supposed to take the drop. These simple efforts helped patients succeed in controlling their glaucoma.

There are some simple memory aids that you can use to help you take all the drops as prescribed. Inexpensive wristwatches can be set to have their alarm go off every day or every 12 hours. Partners and spouses can remind you to take drops. We call this acceptable nagging. A paper calendar sheet and a pencil can be set next to the drop bottle. Every time the drop is taken an X is put on the paper. By checking at the end of month, patients can see when they're forgetting. An example is the patient who found that no drops were getting in every Wednesday night. Wednesday was bridge club night and she came home late and was missing the drops. Anything that changes your usual daily routine will be likely to cause you to forget your drops.

Memory aids to remember drops

- **Link drop time to something else you always do**
- **Alarm clock or wrist watch alarm set for eye drop time**
- **Spouse or family member who reminds you every day**
- **Paper calendar sheet and pencil to mark when drops are taken**
- **Taking extra care to remember drops when away from home**
- **Don't hide the bottles in refrigerator or medicine cabinet**

It also matters what time of day the drops are supposed to be used. Patients who plan to take drops every night at bedtime should not get into bed and start reading or watching T.V. before their drops go in, because they are likely to fall asleep and forget to take the drops. Make sure you take the drop whenever you do something you always do, like taking a morning pill, shaving, or putting the coffee pot on to brew. Out of sight, out of mind: don't put drops in the refrigerator or the medicine cabinet. The prostaglandin drops do NOT need refrigeration.

The doctor should be part of the solution (and our studies show that some doctors are part of the failure to achieve perfect drop taking). When we studied the behavior of eye doctors with their glaucoma patients, we found they could be grouped into 3 camps, which we called skeptics, reactives, and idealists. The skeptics simply wrote the prescription for drops and acted as if it was up to the patient to take it. When their patients didn't take drops well, they felt that there was nothing that could be done. The reactive group of doctors was willing to try to help patients with adherence with treatment when it was pretty obvious that there was trouble. The final group is one that we hope will be

emulated by young doctors in training. These were the idealists — and actual data shows that their patients take their drops better.

Idealist doctors realize that taking medicine is a shared activity between doctor and patient. They establish a non-judgmental environment. For example, they discuss with patients how hard it is to remember to take every drop and agree that it is only human to forget sometimes. They ask questions in an open-ended way that lets patients talk about the problems that they're having. They listen. The skeptic-type and reactive-type doctors in our studies did most of the talking during video-taped study of actual glaucoma visits. They asked closed questions like: "you're taking your drops, right?" for which patients would have to be pretty bold to say "No". Ideal doctors give patients a chance to tell them what they do and don't know about glaucoma. We did a study in which we asked veteran glaucoma patients to tell us what the drops were intended to do. Unfortunately, there were some who didn't understand that drops lower eye pressure and that lowering pressure stopped vision from getting worse. It is too often that we hear: "I'm taking the drops, doctor, but my vision doesn't seem to be getting better". That means we haven't properly educated our patients on how glaucoma treatment stops further damage, but does not restore vision. Finally, ideal doctor behavior is to prescribe only the amount of drops needed, and to keep it as simple as possible.

It's hard enough to remember to take the drops, but using the drops effectively requires more thought than most people realize. Information about drop-taking is unfortunately based on very little scientific data, and pharmacies and drug companies (despite what should be the case) don't always help you to use the right amount of drug efficiently. If you sell a product by the bottle, then having someone use it up as fast as possible makes more money. To paraphrase Winston Churchill, capitalism is the worst form of economic system, except for all the others. We don't have to feel sorry for drug companies and drug store chains — they're making nice profits. But, if you ever had drops come pouring out of a bottle as soon as you began tipping it up toward your eye, you realize that the bottles aren't designed to be easy to use (at least some aren't).

Here are the Lucky 13 ways you can get glaucoma eye drops into the eye and not on the floor, while being effective at lowering eye pressure (and saving money).

1. Face the ceiling when putting drops in. Maybe teenagers can look in a mirror, tilt their head way back and get a drop in the eye, but for most of us, several drops wind up on the floor that way. Get horizontal when taking drops, tilt your head way back while sitting in a big comfy chair or better, lie flat in bed.

2. Brace the back of the hand with the bottle on your forehead before tipping it up. We all have tremors and having the bottle waving around without support hurts your aim.

3. Next, before you tilt the bottle over, look up to see that the tip is over the nose half of your eye. Since you're going to be looking through the top of your head (see below) when the drop falls, you can't (and don't want to) see it falling anyway. If any of the drop falls on the area on the nose side of the eye, even if some hits the edge of the eyelid or the inner corner, enough will get on the eye surface to do the job. If you miss on the temple side, it's likely to treat the glaucoma in your ear, not your eye.

4. Pull down the lower eyelid of the eye with the hand that isn't holding the bottle. This increases the target on the white part of the eye. As soon as the drop hits the eye, you can let go.

5. Let the bottle deliver as you tip it over and only squeeze if it doesn't come out by itself. This means that you will tip the bottle over, above the nose side of the eye, and let it fall by gravity from about 2 inches or less. Some bottles start having drops come out right away. If the drop doesn't come out by itself, squeeze gently until it does.

6. Use only one drop per eye! Yes, I know that some bottles say put in 2 drops (so does the information sheet from some drug stores). That's a huge waste. Each drop (which has from 25-50 microliters of fluid) contains probably 5 times more drug than is needed for each treatment. So even if you have 80% of it go somewhere else than on the eye surface, you're OK. The drop is absorbed mostly through the clear part of the eye, the cornea. Furthermore, using two drops gives you a greater chance for bad effects on the rest of the body. When you put medicine on the eye, it mixes with the tears, and this drains into the nose through the lacrimal (tear) system in the corner of the eye near the nose. That's why you sometimes taste drops in your nose and throat when you take them. It's also why cocaine abusers snort drug up their nose — it's an effective method to get drugs into the body and head. The same goes for eye drops, but with drops you want the least amount anywhere else other than on the front of the eye.

7. As soon as you hit the eye with drop, close the eyelids and don't blink for 60 seconds. We're now onto some pretty thin ice, scientifically. There is some evidence that not blinking leaves the drop on the eye longer — thus making it go into the eye more. But, when we tested the actual pressure lowering with and without the don't blink instruction, it didn't make a substantial difference. So it makes sense not to blink, but we can't say it has definitive support.

8. Many doctors teach patients to push on the inner nose for 1 minute after putting the drop on the eye, to block the lacrimal drain area and keep drops out of the nose, throat and the rest of the body. Certainly, this naso-lacrimal occlusion makes logical sense, and there is evidence that for children this can reduce the level of drug that can be found in the blood stream after drops — which is a really good idea if you are someone

sensitive to the general body effects of whichever drop you are using. However, very few of my patients are doing nasolacrimal occlusion correctly when I ask them to show me where they're pushing. The fingers must be far back from the bridge of the nose (almost poking the eye) and pushing almost hard enough to hurt in order to stop drug from going to the nose.

9. After the drop hits and you close your eyes, some will be on the skin of the eyelids. Blot off the excess, since some of us are sensitive to it or may have an actual allergy to the drug or its component parts. We don't want to expose the skin daily to something that may lead to itching, redness, and puffy lids. This requires having facial tissues around before you start putting in drops.

10. You can treat one eye at a time, close, blot, push the nose, and then treat the other eye in the same way. Or, if you're a veteran and can hit both eyes pretty quickly, you can do drop right, drop left and close both, blot both, and push on both sides of the inner nose with the thumb and forefinger for the 60 seconds. If you need to take more than one kind of drop at that time of day, it's faster to do both eyes at once.

11. Wait between two types of drop on the same eye. Many glaucoma patients need to use more than one drug to keep pressure at target. They may have two or three bottles to put in, morning and evening. If you put in drop 1 and in less than 60 seconds you put in drop 2, the second one will wash away the first one and you're not getting the full effect of either one. Now the controversy: how long to wait between bottles? I've heard doctors tell patients to wait 15 minutes! This would mean that the person with 3 kinds of drops would need nearly an hour to get the medicine in. There are no conclusive studies of how long to wait. I suggest that the shortest possible time should be 2 minutes, and if you have a system that lets you wait 5 minutes it's possibly better. However, humans being humans, I know that if you put in drop 1, then say — I'll just dry the dishes and come back for the second drop, you're more likely than not to forget to come back. Don't walk away until they're all in.

12. If you're using more than one type of drop, the order in which they go in doesn't matter. At least something is easy.

13. Running out of medicine can be a big cause of non-adherence. Many pharmacy plans give you either a 1 month or a 3 month supply of drug. They don't usually give you more than you need and typically it is just barely enough if you use one drop at a time. The biggest cause of running out of drug is using too much each time. Use one drop if possible! A second cause for running out is not planning ahead. If you're going to the beach, you won't forget the beach chairs, but an astonishing number of people leave their eye drops at home. Most doctors can fill a new bottle at the ocean-side drug store, but you'll probably pay full price for it. There is a third rule of drops, namely, they always run out late on Friday night after the doctor's office is closed. Give things a shake on Thursday and see if you're going to need more. Fourth, the Food and Drug Administration (FDA) puts an "expiration date" on drop bottles. This is something to look for when the druggist gives you a 3 month supply — make sure they won't already have expired before the 3 months is up. Finally, a very disturbing (but understandable) finding in one research project was that needing to use a second eye drop type every day led some patients to delay refilling the first bottle until they needed to get both bottles filled. Some drops come as combinations of two types in one bottle and this may help you with this problem.

To be end in the 4-th part.

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