in a given patient. Long term, lower pressures will likely be achieved, with less loss of vision and less likelihood that incisional surgery will be needed.) Second, the laser effect may wear off over time. Third, complications must always be considered, but in all of the studies that have been published to date, selective laser trabeculoplasty appears to be very unlikely to lead to serious complications. Cost must always be a consideration, but unlike glaucoma medications, laser surgery is covered by insurance. For most patients the co-pay will be approximately the same cost as a bottle or two of glaucoma medication.

SUMMARY
In the medical field these days, doctors try to practice what is known as “evidence-based” medicine. In other words, we try to guide our decision-making by referring to studies that can insure more effective therapies. There have been such studies in considering laser as initial treatment for Open Angle Glaucoma. The oldest of these studies, the Glaucoma Laser Trial, compared initial treatment of glaucoma with laser verses initial treatment with medications. This study showed that eyes treated with laser first fared better than eyes treated with medications first. Over the long run (an average of 9 years), the “laser first” eyes required less medications, achieved lower pressures, lost less vision and required less incisional surgery than the “medicine first” eyes. Several other more recent studies have confirmed the safety and effectiveness of selective laser when used as initial treatment of glaucoma.

In my 24 years as a glaucoma sub-specialist, I have always tried to practice the golden rule in treating my patients. I am actually a “glaucoma suspect” myself. Because of my family history, nearsightedness, and the shape of my optic nerves, I am at risk to develop glaucoma and I see a doctor here at Carolina Eye Associates regularly to be watched for the possible development of glaucoma. Should I be diagnosed with glaucoma, I know that I personally would prefer to have selective laser trabeculoplasty before being placed on medications. (I am not unique in this approach-half of all eye doctors would choose laser as initial treatment if they had glaucoma.) There are some medications that I cannot take, and there are others that I would not take. I know that laser surgery is the only treatment available that actually helps the drain of the eye function better. Since this is the treatment that I would prefer to have administered to my eyes, it seems logical and reasonable for me to offer this treatment to my patients.

INTRODUCTION
The purpose of this discussion is to outline the treatment options for lowering high eye pressure. Glaucoma occurs when the pressure inside the eye is too high, leading to damage to the delicate optic nerve fibers in the back of the eye, resulting in gradual loss of vision. Glaucoma is the second leading cause of blindness in the world today. Eye pressure becomes elevated due to poor function of the “drain” of the eye, known as the trabecular meshwork. The only currently accepted and proven treatment for glaucoma is lowering of eye pressure.

Many patients ask if diet or exercise can improve their eye pressure. Exercise has been shown to cause some improvement in eye pressure, perhaps a few points of improvement. If not contraindicated by other health problems, all glaucoma patients should try to exercise regularly, not just to help their glaucoma, but to help keep the rest of their bodies in good health. And although a good diet is obviously important for good health, a change in diet has never been proven to lead to lowering of eye pressure.

There are three basic means by which we lower elevated eye pressure: conventional surgery, laser surgery, and medications. Traditionally, in this country, medications are usually tried first, laser surgery is tried second, and incisional (cutting) surgery is reserved for those patients who cannot be controlled with medications and/or lasers. Interestingly, in other parts of the world this sequence of treatment is not the same. In Europe, for example, surgery (either incisional or laser) is often the first line of treatment, and medications are reserved for those patients who fail to achieve a low enough pressure with surgery.

CONVENTIONAL SURGERY
Conventional surgery requires a trip to the operating room, where an incision is made into the white of the eye (the sclera) creating a new passageway for fluid to escape the eye, bypassing the drain which isn’t functioning adequately. Success rates vary depending on the type of glaucoma, age and race of the patient, and of course skill and experience of the surgeon. In general, the success rate varies from 60-90%. Incisional surgery has the potential to achieve the lowest pressure, but of the three types of treatment available, surgery also carries the greatest risk.
of complications. However, a recent study has shown that patients with severe glaucoma do best if treated aggressively with surgery. For less severe glaucoma, I feel that incisional surgery is best reserved for patients who cannot be controlled with use of medications and/or laser surgery.

**MEDICATIONS**

Medications have been used to treat glaucoma for over 150 years. In the last 30 years, several new and very effective medications have been introduced. Studies have proven that medications can be quite effective and quite safe in lowering eye pressure over long periods of time. Many recent studies have shown that patients with severe glaucoma eventually have to take more than one type of eye medication. Studies have shown that it is difficult for many glaucoma patients to remember to use their medications appropriately, especially when more than one medication is being given or if the medication requires more than once or twice a day dosing.

Unfortunately, the cost of these medications cannot be ignored either. The cost of one bottle of glaucoma medication can vary from $25 to well over $100. For many glaucoma patients, the cost of medications is not covered by insurance, and even when covered by insurance the “copay” can be significant, varying from $20 to $65 or more for many insurance plans. Of course, medications do not correct the loss of function of the drain of the eye to achieve their therapeutic effect. For the most part, eye drops lower pressure by reducing fluid production within the eye, or by helping fluid bypass the drain of the eye. Once medications are stopped, pressure fairly quickly returns to an elevated state, so for medications to be effective they must be taken every day.

**“To be effective, medications must be taken every day.”**

Serious side effects such as breathing problems, heart problems, problems with fatigue, memory problems, and unfortunately the list goes on and on. For the most part, once we decide to treat a patient with medications, is likely the patient will need to take those medications for the rest of his or her life (for until something better comes along). Many patients with glaucoma eventually have to take more than one type of eye medication. Studies have shown that it is difficult for many glaucoma patients to remember to use their medications appropriately, especially when more than one medication is being given or if the medication requires more than once or twice a day dosing.

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**Laser Surgery - ARGON LASER**

Laser surgery was first introduced as a treatment for open-angle glaucoma in the late 1970’s. The first laser used was the so-called “argon” laser. Laser is basically concentrated light which is absorbed by the tissues of the eye (in this case the drain of the eye) to achieve the desired response. With argon laser, generally 50 to 100 microscopic burns are distributed throughout the drain of the eye. Four to six weeks later, the pressure in the eye is reduced anywhere from 15 to 35% (this is comparable to the reduction in pressure that can be achieved by most glaucoma medications). Because the argon laser achieves its effect by “burning” trabecular meshwork tissue, once the entire drain of the eye has been treated, should the effect of the treatment wear off in the future, no more laser can be done. Studies have shown that if attempts are made to retreat with argon laser, the potential benefit is fairly low and the risk of causing the pressure to go higher goes up. If actually performed and published one of these studies myself in the mid 1980’s while I was in glaucoma training). Consequently it is generally accepted that, with rare exceptions, argon laser should not be repeated once the entire drain of the eye has been treated.

**Laser Surgery - SELECTIVE LASER**

In 1996, a new laser procedure for open angle glaucoma was first described. Known as “selective laser trabeculoplasty,” this laser uses a lower-energy laser to selectively treat pigment cells within the drain of the eye. Laser has shown that this “selective” laser procedure achieves its effect without causing structural damage to the trabecular meshwork of the eye, unlike argon laser which, as stated above, creates several burns in the trabecular meshwork.

Selective laser trabeculoplasty has been shown to be effective in open angle glaucoma, even in patients who have had previous argon laser treatment.

The success rate of this procedure is comparable to the success rate of argon laser trabeculoplasty. As with argon laser, the procedure takes approximately three minutes, and most patients experience no pain or minimal discomfort. Potential complications are few and mild, with no significant complications. Because the success rate of this procedure is not always high, selective laser trabeculoplasty is not recommended for patients who have severe glaucoma.

**“Studies indicate that the Selective Laser to be most effective when used prior to drops having been started.”**

A recent study from England indicates a sustained lowering of pressure for over two years. Other studies indicate selective laser to be most effective when used prior to drops having been started.

This laser has been available in many parts of the world for over ten years. It was approved by the FDA for use in the United States in the spring of 2001. Because it achieves its effect by targeting pigmented cells within the trabecular meshwork, and because it does not cause any structural damage within the trabecular meshwork (unlike argon laser), it is theorized that selective laser trabeculoplasty may be repeatable. This is important because unfortunately the effect from laser tends to wear off over time. Studies have shown that the effect of argon laser has worn off in 50% of patients treated by five years after the procedure, and only approximately 30% of the patients are still controlled ten years after treatment. Of course, argon laser (as stated above) is generally not repeated after the entire drain has been treated. A 2006 study has shown that selective laser is indeed repeatable (at least once) with reasonable success.

What are the drawbacks of the selective laser trabeculoplasty? There are a few to consider. First, for many glaucoma patients it gives only a modest reduction in pressure, and medications will still be needed. However, it is likely that should the laser succeed, medication use will be delayed or at least reduced.

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