Volume 1, Issue 2

July 2008

Special points of interest:

- Diabetic Retinopathy
- Evolution of Intraocular Lens
- Hidden Causes of Dry Eye

MADISON STREET COMPANY®

Proudly Owned by Employees

Eye Care Newsletter

Omni Eye Specialists · Madison Street Surgery Center
Spivack Vision Center · MSFS, Inc.· Colorado Laser Surgeons

Diabetic Retinopathy

By: Miriah Teeter, MD
Vitreoretinal Surgery

Diabetic retinopathy (DR) remains the leading cause of vision loss among American adults. The prevalence of diabetes continues to rise and is currently estimated by the CDC at 9.6% of adults over 20 years of age. Fortunately, most vision loss from DR is preventable with a combination of diabetic control and the treatment of ocular manifestations.

Diabetic control has proven to be the cornerstone of preventing retinopathy and vision loss. The risk of DR and vision loss is directly related to the duration of diabetes and the level of glycemic control. Other modifiable risk factors include hypertension and hyperlipidemia. In cases of visual impairment specifically due to macular edema, the use of oral glitazones has also been implicated as a contributing factor.

Diabetic eye exams are critical in the detection and early treatment of retinopathy. A baseline eye exam is recommended at the time of diagnosis, as many patients may go undiagnosed early in the course of their disease. Mild diabetic retinopathy warrants annual ophthalmologic exams. The frequency of exams increases with the severity of retinopathy and the need for treatment.

The medical and surgical treatment of DR has evolved greatly in recent years. Intravitreal injections of triamcinolone or anti-angiogenic agents have proven to be a very useful adjunct to traditional laser treatments for macular edema and proliferative diabetic retinopathy (PDR). We are currently involved in clinical trials involving anti-angiogenic treatment for diabetic macular edema. Surgical techniques have also changed significantly in recent years. The latest small gauge surgical platform (25 gauge) helps provide shorter operating times, less post-operative inflammation and more rapid visual recovery than traditional techniques. These features have proven advantageous in the surgical treatment of PDR, vitreous hemorrhage, and retinal detachments.

Diabetes will continue to increase as a public health issue in our country. We strive to maximize the vision of our diabetic patients through continued advancements in diabetic management and the diagnosis and treatment of diabetic retinopathy.

The Evolution of the Intraocular Lens in Cataract surgery

Terrence S. Spencer, MD

In the United States, surgical extraction of the age-related cataract is the most-performed operation in patients above 65 years of age. A cataract is the clouding of the natural lens of the eye, which is removed in cataract surgery. Prior to the latter part of the twentieth century, the cataract surgery procedure left the eye without a lens, or *aphakic*. An aphakic eye typically needs very thick spectacle correction to see well, but it could generally see much better with those glasses than the same eye did prior to removal of a severe cataract. Those times have changed however, thanks to development of the intraocular lens (IOL) implant. The most important step in the evolution of the IOL occurred over half a century ago.

Harold Ridley was an eye surgeon in London who had cared for some injured Royal Air Force pilots from World War II. At least one pilot, during the Battle of Britton, had taken flight in his Spitfire fighter plane without time to put on his protective goggles. Enemy fire caused fragments of the canopy to shatter into the pilot's eyes. Doctor Ridley had noticed that retention of the intraocular particles of polymethylmethacrylate (PMMA) from the shattered canopy caused no long-term adverse effects. Later, during a typical cataract surgery of the 1948, a medical student observing the surgical removal of the clouded lens asked Dr. Ridley when he would put in the new lens. The medical student did not know that there was no lens implanted back into the eye. This naive question, together with Ridley's knowledge that a type of clear plastic material called PMMA was tolerated when it remained inside the eye, stimulated Ridley to seek manufacture of the first modern-era IOL.

After creating a design, Ridley implanted the first IOL in 1949 in great secrecy. The surgery went well, but the power estimate of the lens implant was extremely inaccurate. He published the results of his early cases in 1951, and the idea of the implant was not initially well-received by the ophthalmologic community. There was a high failure rate and patients could have seen adequately after surgery with thick aphakic spectacles. As sterilization techniques and IOL designs improved, so did the results of the IOL.

Over the next 30 years, eye surgeons came up different ideas on where to place the IOL in the eye. The implant location varied between placing the IOL in the anterior chamber (fluid-filled space between the cornea and iris), attaching the IOL directly to the iris tissue, or fixating the IOL in the posterior chamber (behind the iris). Along with the IOLs, the technique for cataract surgery also went through a major evolution. The initial procedures were accomplished by removing the entire clouded crystalline lens. Now, we remove the inner, clouded nucleus and cortex of the lens. The outer lens capsule remains attached in the eye and becomes the empty bag in which to place the implanted IOL. A relatively large eye incision was necessary to remove the whole lens. Phacoemulsification is the use of a small ultrasonic instrument to remove the clouded lens by breaking it up and aspirating the small fragments out. This new technique of lens removal could be used through smaller incisions, but the incision had to be enlarged in order to implant a 6 to 7 mm diameter lens implant. Because the incision had to be enlarged anyway, most cataract surgeons continued to use their older techniques of removing the lens whole. In the mid-1980's, cataract surgeons learned they could fold IOL's made from silicone and implant them through a 3.5 mm incision. Over the next few years the popularity of using phacoemulsification for cataract surgery grew greatly.

In the 1970's the lens implants were still estimated to be about the same optical power as the natural lens of the eye, and the implant usually left the patient with approximately the same amount of near-sightedness or far-sightedness that they had prior to the surgery. Development of the A-scan ultrasound technique for measurement of the axial length of the eye helped change the refractive error outcomes. Lenses are now ordered in appropriate optical powers to allow the eyes to correct the near or far-sightedness.

Harold Ridley's IOL invention helped propel ophthalmology and medicine into a new era. He is considered a pioneer in the use of "artificial tissue" designed to remain permanently in a delicate part of the body. Ridley lived long enough to benefit from his own invention, having IOL implants placed in his own eyes during his cataract surgeries. Sir Harold Ridley also lived long enough to be knighted by the Queen. But the evolution of the IOL is not complete. The IOLs developed through Ridley's time could restore vision and eventually be implanted through a small incision, but they cannot make an eye see well for distance *and* near vision without spectacle correction.

The excitement in the cataract world today centers around the use of newer presbyopia-correcting IOLs. The standard implanted IOL does not accommodate (change focus from far to near) like the young natural human lens. Loss of accommodation with aging is normal and most people are affected with *presbyopia* by about their mid-forties. The mechanism of presbyopia is the natural lens becoming too stiff to change shape with attempted flexing of the ciliary muscle inside the eye. A standard IOL implant also would not change shape and focus. Now, there are two design approaches to correct this shortcoming. Multifocal IOLs have centered rings or zones that cause a distance and near focal point simultaneously. There are currently two multifocal IOLs approved for use in the United States. There is also an FDA-approved design of an accommodating IOL for use in cataract surgery. The accommodating

IOL is fixated within the lens capsule. The use the eye's internal ciliary muscle can actually change the focus of the IOL implant. These new lenses do not work as well as the normal young lens we are born with, but the technology continues to improve with new inventions and modifications of existing designs.

In addition to presbyopia-correcting IOLs, there are also IOLs that can correct existing astigmatism (*toric* IOLs) when they are implanted in the eye during cataract surgery. The newer presbyopia-correcting IOLs and toric IOLs cost extra to the cataract patient, and Medicare authorizes the option for patients to "upgrade" from the standard implant. The standard IOL implant should not be regarded as a bad choice. In-fact, many patients should only receive the standard implant. For example, a cataract patient who also has age-related macular degeneration may end up with a worse visual result from a multifocal IOL than he would with a standard IOL. Other patients may not have any interest in increased freedom from glasses, or they may decide they don't want to pay an out-of-pocket expense. With presbyopia-correcting IOLs, there is also an increased potential for unwanted visual phenomena , such as halos around lights.

The evolution of IOLs has been part of an exciting time in ophthalmology. As the baby-boomer generation approaches cataract age, we are finding more and more cataract patients who continue to work or are otherwise interested in a very active lifestyle. These patients are often the people who have the most interest in upgrading to the new IOLs.

Multifocal, accommodating, and toric IOLs offer a chance at increased freedom from glasses after cataract surgery, and many patients already know about the newer implants when they come in for a consultation regarding cataract surgery. The new IOLs offer so much upside, that even some presbyopic patients without significant cataracts are choosing implantation of these devices as an elective refractive surgery. The availability of new IOL technology stimulates the demand for great surgical results, and the demand for better results stimulates the desire to invent or improve the IOL technology. The fact that patients pay an upgrade out-of-pocket expense has added financial incentive to the pioneers who continue to try to develop the ultimate IOL, which would theoretically give a full range of vision without any optical side effects.

Hidden Causes of Dry Eye

Lisa Jordan, OD

Unsurprisingly, a lot of Coloradans have dry eye. We all love the beauty of this state, but along with that scene, comes a very arid climate. Many of us experience occasional ocular surface dryness, but there are many contributors to ocular dryness that may be masked in other systemic treatments.

Among systemic medications that can contribute to dry eye are:

- Antipsychotics
- Antidepressants
- Antidysrhythmics
- Anit-parkinsonian drugs
- Antispamodics
- Antihistamines

The underlying commonality of these classes of medications is that they all elicit anticholinergic properties. Hallmark in this is decreased bodily secretions which includes the lacrimal gland.

I have interacted with several patients over the years who start experiencing sudden ocular dryness. After a full ocular and systemic history review, often, systemic medication contributions to ocular surface dryness can be found.

In addition to a review of systemic and ocular contributions to ocular dryness, our clinical evaluation includes an assessment of the patient's lifestyle and work environment. Computer use is a large contributor as the blink rate decreases significantly. This promotes tear evaporation, and a decrease in the distribution of already present tears. Patients who do similar tasks that hold visual attention for other near or distance targets also experience the same issue.

Diagnostic tests for dryness include observing sloughed surface cells from the cornea and conjunctiva as well as dyes to stain desiccated cells that have not yet sloughed, and to evaluate the evaporative rate of tears. Biomicroscope evaluation of lid positioning, and blink function are useful. A Schirmer's test is done by placing medical grade absorbent strips along the inferior lid margin for a duration of time. With this, tear quantity can be determined.

Topical lubricants are a first phase of alleviating dryness. Other measures would include in-office procedures of occlusion of the lacrimal drainage system via collagen or silicone devices that would be placed in the punctum located in nasal aspect of the upper and lower lid. Cyclosporin is available in a pharmaceutically available preparation that may also be considered. Ocular dryness can cause a low grade inflammation which may cause inefficient production of the lacrimal gland. Cyclosporin is thought to modulate and decrease cytokine release and allow the lacrimal gland to better function.

When initiating systemic treatment, a consideration may be to advise patients that ocular lubricants may help them overcome their dryness symptoms in our already arid climate. We welcome the opportunity to work in concert with you for those patients that present with more enhanced dryness.

MADISON STREET COMPANY®

55 Madison St, Suite 355
Denver, CO 80206

Madison Street Surgery Center
55 Madison St, Suite 200
Denver, CO 80206
303-388-0599
www.madisonstreetsurgerycenter.com

MSFS, Inc
55 Madison St, Suite 600
Denver, CO 80206
303-388-5353
www.madisonstreetfinancial.com

Omni Eye Specialists
55 Madison St, Suite 355
Denver, CO 80206
303-377-2020
www.omnieye.com

Spivack Vision Center
6881 S. Yosemite St
Centennial, CO 80112
303-733-2020
www.spivack.com

Colorado Laser Surgeons
6881 S. Yosemite St
Centennial, CO 80112
303-393-8565
www.coloradolasersurgeons.com

We are on the Web!
www.madisonstreetcompany.com