



Nearly half of Americans who currently have glaucoma are unaware of their condition. Why?

- Most types of glaucoma are painless, with no feelings of discomfort.
- Glaucoma typically affects peripheral vision first, so many people remain unaware of the disease until their central vision is affected.
- Glaucoma is often associated with aging, and patients often perceive subtle vision changes as a result of normal aging.
- For many people, professional eye care can be difficult to obtain or too expensive.

Don't let glaucoma rob your patients of vision

Educate your patients about glaucoma risk factors and the importance of regular comprehensive eye examinations.

Risk factors:

- Over age 60
- Family history of glaucoma
- Diabetes
- People of black African, black Caribbean, Latin American, and Asian descent
- History of eye injuries
- History of multiple eye surgeries for chronic eye conditions
- High myopia or hyperopia
- Chronic steroid use

Guidelines for routine monitoring:

- If no risk factors are present, start regular comprehensive eye exams or screenings BY age 40, repeat every 3-5 years.
- If any risk factors are present, start regular comprehensive eye exams or screenings BEFORE age 40, repeat every 3-5 years. After age 65, repeat every 2 years.
- If of black African descent, black Caribbean descent, Latino, or Asian, start regular comprehensive eye exams or screenings in your 20s or 30s, repeat every 3-5 years.

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Glaucoma

IN THIS ISSUE:

- Glaucoma risk factors
- Referral guidelines
- Medical and surgical management of glaucoma

Dear Colleagues,

January was National Glaucoma Awareness Month, an important time to spread the word about this vision-robbing disease. Glaucoma is a leading cause of worldwide blindness; yet, half of the three million Americans with glaucoma are not aware that they have it. People of all ages (including children) and of all ethnic backgrounds are at risk. This includes Latinos, Asians, and especially people who are of black African or black Caribbean descent. By 2020, the number of people with glaucoma worldwide is expected to exceed 70 million.



John Earle Photography

While early diagnosis and routine monitoring remain the most essential tools to prevent glaucoma from causing irreversible vision loss, a new wave of diagnostic, medical, and surgical innovations are advancing treatments. For example, a new generation of pharmacologic drugs with novel outflow targets are now FDA-approved or in the pipeline. Minimally invasive glaucoma surgery (MIGS) procedures are also gaining popularity as alternatives to traditional major glaucoma surgery. MIGS procedures target various ocular tissues and can effectively reduce intraocular pressure with distinctly lower complication rates and shorter recovery times compared to traditional glaucoma surgeries—in some cases eliminating the need for medication.

Recent innovations also include the use of ultra-high resolution, three-dimensional optic nerve imaging. These new imaging methods have the potential to improve our ability to diagnose glaucoma, to more precisely detect structural changes associated with glaucoma progression, and to improve research methodologies. In genetic research, exciting progress has led to the identification of novel genes for primary open-angle glaucoma (including three new genes in 2016) and normal-tension glaucoma—a critical first step in developing targeted, gene-based therapies.

While still in its early stages, comprehensive, genetic diagnostic testing is becoming more widely available. Sensitive and specific genetic tests are now available for dozens of inherited eye diseases. Among its many benefits, genetic testing can diagnose disease, improve accuracy of a patient's prognosis, identify gene mutations that could be passed on to children, and help guide genetic counseling. The Harvard Department of Ophthalmology Ocular Genomics Institute, based at Mass. Eye and Ear, is one of several sites to offer CLIA-certified comprehensive genetic diagnostic testing for inherited eye diseases, including early-onset glaucoma (Learn more: masseyeandear.org/genetic-testing).

We hope you find this issue of *Eye Insights* useful in your practice—it includes key information about glaucoma risk factors, guidelines for comprehensive eye exams, updates in the medical and surgical management of glaucoma, and links to patient handouts.

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THE PROBLEM

Glaucoma is a leading cause of blindness worldwide that is significantly under-diagnosed.

THE SOLUTION

Early detection and monitoring of glaucoma progression is critical to prevent damage to the optic nerve and minimize vision loss.

THE WAY FORWARD

1. Educate patients about risk factors, comprehensive eye exams, and healthy habits that may help prevent glaucoma.



Download, print, and share with your patients:

- **What is glaucoma?**
- **7 habits that may prevent or slow progression of glaucoma**

2. Refer early to a glaucoma specialist or comprehensive ophthalmologist



Be aware of clinical features suggesting more rapidly progressive disease:

- Presence of optic disc hemorrhage or progressive excavation of the neuroretinal rim tissues
- Progressive nerve fiber layer thinning on serial optical coherence tomography testing
- Progressive reduction of retinal sensitivity on serial visual field testing that cannot be attributable to other causes like cataract

Keep in mind that glaucoma can occur at eye pressures above 20 AND with eye pressures within the statistically normal range.

3. Treat the whole person. Vision rehabilitation can help patients with any degree of vision impairment.



Download, print, and share with your patients:

- **How vision rehabilitation can help patients with low vision**

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Pierce-Harman Photography

Latest Advances in Patient Care

■ Diagnostic Technology

Diagnostic technology for glaucoma is evolving at a rapid pace. Examples of optic nerve imaging technology that aid in the early detection and management of glaucoma are: digital fundus photography, confocal scanning laser ophthalmoscopy (HRT), and optical coherence tomography (OCT). Other important diagnostic measures include gonioscopy, slit lamp examination, perimetry and occasionally ultrasound biomicroscopy. Genetic testing may be indicated in individuals with disease onset before age 50, or for patients with an affected family member with disease onset before age 50.

■ Medical Management

Many glaucoma medicines—such as prostaglandin analogs, beta blockers, alpha agonists, carbonic anhydrase inhibitors, and combination therapies—are available to lower intraocular pressure (IOP). Prostaglandins often have the best user compliance because they are required only once daily.

FLASH UPDATE

Two new glaucoma drugs will become available in early 2018: netarsudil (Rhopressa®) and latanoprostene bunod (Vyzulta™)

Netarsudil ophthalmic solution (Rhopressa®, Aerie Pharmaceuticals) is a rho kinase inhibitor administered in the evening to lower IOP in open-angle glaucoma or ocular hypertension by targeting the trabecular meshwork. FDA-approved in December

2017, Rhopressa® lowers IOP by as much as timolol 0.5% for many glaucoma patients. The most common side effect (53%) is conjunctival hyperemia, or eye redness. Other common (approximately 20%) ocular adverse reactions are corneal verticillata (seen within first four weeks; resolved upon discontinuation of treatment), instillation site pain, and conjunctival hemorrhage.

Latanoprostene bunod ophthalmic solution (Vyzulta™, Bausch + Lomb and Nicox) is the first dual-acting prostaglandin analog - nitric oxide donor. FDA-approved in June 2017, this once-daily eye drop lowers eye pressure in open-angle glaucoma or ocular hypertension patients. Vyzulta™ seems to lower IOP by ~1-2 mm Hg more than latanoprost. The most common ocular adverse reactions with incidence ≥2% are conjunctival hyperemia (6%), eye irritation (4%), eye pain (3%), and instillation site pain (2%).

■ Surgical Management

Minimally invasive glaucoma surgery (MIGS) procedures are generally considered ones that limit surgical manipulation of the sclera and conjunctiva. They take less time and support faster postoperative eye healing than traditional glaucoma surgery, and the microscopic devices are less intimidating to patients. However, these procedures are not always as effective at lowering IOP and may not be appropriate for patients with advanced glaucoma or very high eye pressures. MIGS procedures concentrate on two pathways: 1. Increasing aqueous outflow and 2. Lowering aqueous production. Most MIGS procedures focus on the former and are approved for patients with ocular hypertension and mild-to-moderate glaucoma.

MIGS Procedures that Increase Aqueous Outflow:



The **iStent®** is currently the most commonly used MIGS procedure in the United States. It is an implantable canal-based device that bypasses the trabecular meshwork. It has the potential to mildly reduce eye pressure in combination with standard cataract surgery and may reduce a patient's need for glaucoma eye drops.

The **Trabectome®** is an electrocautery device that ablates part of the trabecular meshwork. When combined with cataract surgery, the Trabectome® can lower eye pressure to the mid-teens. In use since 2004, the Trabectome® indications have broadened to include its use after failed trabeculectomy and in narrow angles.

The **Kahook Dual Blade®** is a single-use instrument that makes precise incisions of the trabecular meshwork with minimal residual leaflets. It has been shown to reduce IOP up to 25% when combined with cataract surgery, although more studies are needed to determine its efficacy.

The **CyPass® Micro-Stent** is an implantable suprachoroidal shunt that drains the aqueous into the suprachoroidal space. Implantation of CyPass® is made through a clear corneal incision, which avoids the formation of a filtering bleb. CyPass® is used in combination with cataract surgery or as a stand-alone procedure in patients with mild-to-moderate primary open-angle glaucoma. In the COMPASS Study, more than 98% of the CyPass® Micro-Stent group achieved 20/40 or better best-corrected visual acuity compared to a control group. Over the past year, the use of Cypass® has broadened and some complications have been observed in patients who have severe glaucoma or who are hyperopic. Significant IOP elevation from sudden closure of the cleft and refractive shift can occur in the postoperative period and requires careful monitoring.

The **Xen Gel Stent®** is an ab interno implantable device that drains the aqueous into the subconjunctival space. Once inserted, a low-lying diffuse bleb is created. According to the clinical trial used for FDA approval, reduced mean IOP was reported to be >25% in >80% of eyes treated, and the mean number of medications was decreased from 3.5 to 1.7.

Trabeculotomies and canaloplasties can be performed using the **iTrack™** device, an illuminated microcatheter that allows cauterization and dilation of all components of outflow resistance. According to some studies, it can reduce IOP by up to 34% and medication use by up to 66%. It can be done as a stand-alone procedure or with cataract extraction.

MIGS Procedures that Lower Aqueous Production:

Endoscopic Cyclophotocoagulation (ECP) is a laser procedure that can lower IOP by treating the ciliary processes directly. ECP can be performed in combination with cataract surgery or as a stand-alone procedure. It can be especially beneficial in patients with narrow-angle glaucoma or plateau iris syndrome.

MicroPulse Cyclophotocoagulation is a transcleral, non-penetrating procedure that targets the ciliary processes. It is associated with fewer complications than a traditional diode laser and can significantly reduce IOP. Like ECP, it can be combined with cataract surgery, although care must be taken to control postoperative inflammation.

Ask the Expert

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At what point should an eye care provider refer a patient to a glaucoma specialist?

Glaucoma specialists have the training and expertise to medically and surgically treat all types of glaucoma—common, advanced, rare, and complex. Eye care providers should consider referring a patient to a glaucoma specialist when:

- The diagnosis of glaucoma is uncertain
- Available diagnostic resources are limited
- The patient is taking multiple medications
- The patient is not responding to treatment
- The disease is progressing, despite normal IOP

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We welcome your feedback. Send comments to: eyeinsights@meei.harvard.edu

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