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Glaucoma: Going the Distance

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EDITORIAL

Glaucoma: Going the Distance

Through innovative methods of educating, screening and diagnosing the world's population, we can win the battle against glaucoma

Constance Okeke is Glaucoma and Cataract Specialist Partner, CVP Physicians – Virginia Eye Consultants, Norfolk, Virginia, USA

Glaucoma, this complex condition, has benefited from amazing progress in recent years, but there is still much to do in the prevention of vision loss in glaucoma patients worldwide.

Glaucoma is highly prevalent – and rising (1). Unfortunately, there are significant shortages of skilled doctors in regional areas, who would not only be able to provide a diagnosis, but also the continuity of care that is so essential in glaucoma management.

The emphasis has to be put on early disease detection and comprehensive screening, which demands increased awareness and ongoing education of patient populations, as well as health and social care professionals. We are now able to disseminate information via internet channels, such as YouTube, using specific educational tools. For example, my MIGS University Video Series on the iGlaucoma YouTube channel reaches people in Africa, Asia, Australia and Europe, as well as North America.

Telemedicine and artificial intelligence will inevitably provide a significant advantage, by making use of a healthcare workforce that can screen patients anywhere – and using the data they provide in increasingly effective and novel ways.

Well-established diagnostic methods are not going away anytime soon, but I can see how newer technologies, such as corneal hysteresis, optical coherence tomography angiography (OCT-A) and implantable IOP monitoring devices, can aid in providing more accurate diagnoses. I'm personally excited about the prospect of a diagnostic test that shows retinal cell apoptosis in the optic nerve using fluorescent labeling...

Real innovation – and spreading the word about those advances – will become our most effective weapons in the battle against glaucoma over the next decade and beyond. With all available resources dedicated to initiating conversations at all levels, we can prevent irreversible vision impairment.

IN MY VIEW

How to Pick Low Hanging Glaucoma Fruit

In an era of improved technologies, it has never been easier – or more affordable – to identify undiagnosed glaucoma patients

Jonathan Myers is Chief of Glaucoma Service, Wills Eye Hospital, Philadelphia, Pennsylvania, USA

Doctors generally go to work wanting to make a difference. Fortunately, there has never been a better time for our patients with glaucoma – there are an ever-increasing number of advanced technology and treatment options. Not only do the latest OCT machines reveal incredible details of the retinal nerve fiber layer and macular ganglion cell layer, we also have the ability to measure corneal hysteresis and corneal thickness, helping further reduce a person's risk of glaucoma progression.

Recent research promises quantification of apoptosis in retinal ganglion cells in vivo, while new classes of drugs and novel approaches to surgery allow more customized approaches for individual patients. These tremendous advances mean we can offer better care to our patients with glaucoma and they may even allow us to reduce the patients' risk of vision loss and burden of treatment. However, studies suggest that a large portion of people with glaucoma – perhaps half – are undiagnosed and, as a result, untreated.

Unfortunately, it has proven challenging to identify these patients and get them the care they need; efforts to create screening have been hampered by low disease prevalence, increasing costs per identified case. And when patients fail to return for care, it reduces the impact of finding undiagnosed disease. But there is hope: recent studies suggest that there are simpler and more affordable ways to screen for the disease (1, 2). In the Philadelphia Telemedicine Glaucoma Detection and Follow-up Study (PTGDFS), screenings were done in 23 minutes, and at a cost of less than $8 per screen and less than $65 per vision-threatening diagnosis found. Follow up and retention were improved by a number of small and simple steps, although retention remains a critical challenge.

So, what made the difference? The central aspects of these two studies can be summarized in just a few simple concepts. First, start with high risk populations. Both the Screening to Prevent (SToP) Glaucoma Study and the PTGDFS screened underserved populations at a high risk of ocular disease: people of color, people over the age of 65, and those who had a family history of glaucoma or diabetes. These criteria resulted in 60 percent of those screened having significant ocular diagnoses, including glaucoma and diabetic retinopathy.

"There has never been a better time for our patients with glaucoma – there are an ever-increasing number of advanced technology and treatment options."

Second, use low-level technology to screen. Both studies relied on visual acuity, a focused history, and non-mydriatic fundus and external photography. The cameras used are hand-held, require little training, and cost about $7,000. Remote evaluation of the photos and testing were done in a timely and efficient manner by physicians and trained non-physicians – the latter were used whenever possible to keep costs down. Getting these underserved patients into the eye care system – and retaining them – is a difficult process as people have complex lives with many competing priorities. Elements that bolster success include involving their primary care doctors, arranging follow-ups with local eye care providers, using patient navigators, and engaging the community.

Remember: when it comes to screening, perfect is the enemy of good. An affordable, efficient screening system cannot catch every case or ensure that every patient is still being cared for a year later. However, a small investment can easily lead to hundreds of people getting care for undiagnosed glaucoma, diabetic retinopathy, and visually significant cataracts – as we found after setting up a screening program in an underserved community with the help of local primary care doctors.

If all this seems too ambitious, there is an even simpler, cheaper screening program: tell each and every glaucoma patient in your practice to have their close relatives tested annually. Monitoring these higher risk patients will inevitably lead to many saved eyes. Using the latest tools and treatment to make sure an established glaucoma patient gets great (rather than adequate) care is incredibly important – but getting an undiagnosed patient any care before they go blind is even more so. Don't underestimate the impact it can have on the patient, their family, and their community.

ONLINE

Musings of a Prospective Angle Closure Patient

The "gold standard" treatment for angle closure disease is evolving – and it is a welcome change

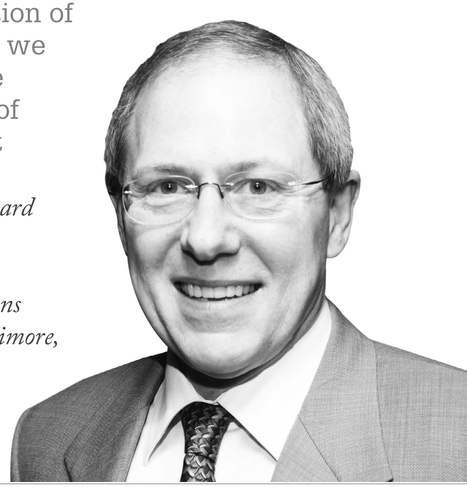
Chelvin Sng is Consultant Ophthalmologist at the National University Hospital, Singapore; Assistant Professor at the National University of Singapore; Honorary Consultant at Moorfields Eye Hospital, London, UK

ONLINE

It's Nothing Personal

An objective definition of glaucoma is vital, if we are to overcome the current limitations of clinician judgement

Harry Quigley is A. Edward Maumenee Professor of Ophthalmology, Wilmer Eye Institute, Johns Hopkins University, Baltimore, Maryland, USA



FEATURE

Physician, Heal Thyself

The perils of diagnosing patients as "glaucoma suspects"

By Raymond Radford, ophthalmic surgeon, Preston, UK

Few of us would claim that glaucoma management is ideal: we lack the tools to predict the course of disease in any individual, and we are frequently required to make clinical decisions under time-limited and stressful conditions. But the reality may be even worse than we thought: the truth is that most of the patients we label as "glaucoma suspects" will neversuffer glaucoma-related vision problems. Yet we send them from our clinics burdened with the fear of encroaching blindness, and often recommend unpleasant therapies or traumatic surgery to manage a risk we cannot quantify.

Other than waiting for better predictive tools, is there anything we can do to change this state of affairs? I believe so. Firstly, we glaucoma specialists need to adopt a more patient-centric approach and take greater account of the patient's own risk attitude and individual needs. And secondly, we need to reflect more deeply on the extent to which our decisions are affected by unconscious bias and limited knowledge. These actions are within the capability of every glaucoma physician, and would, I believe, result in better, more individualized patient care.

Careful what you say – and how you listen

It's telling to listen to the language commonly used in a glaucoma clinic: we happily inform patients they are "glaucoma suspects" without considering the effect we are having. Think about it from the patient's

"We should accept and admit that we have no idea which patients will progress and which will not; that we have no insights into the plot of a given individual's glaucoma story."

perspective: when we say "glaucoma" – even when qualified by "suspect" – the patient most likely hears "blindness." We all know that elevated IOP in the absence of disc changes or field loss is not equivalent to clinical glaucoma, but in our patients, we allow this observation to trigger the fear of sight loss. In consequence, our well-meant "glaucoma suspect" label reduces patients' quality of life forever, particularly if they have any family history of blindness. Thus, our good intentions end up causing harm to people who do not actually have glaucoma when they first visit our clinic.

We should also be mindful of the time asymmetry inherent in glaucoma management. The five to fifteen minutes we allocate to each patient during a clinic contrasts remarkably with the ten to forty-year time-frame required for ocular hypertension to develop into significant open-angle glaucoma. Remember, 95 percent of confirmed glaucoma patients progress slowly while maintaining good visual acuity (1).

Indeed, UKTGS data show that two-thirds of patients have no progression during two years without treatment, and EMGT studies reveal that one-third exhibit no progression in seven years (2). Furthermore, where progression occurs it is often largely limited to one eye; hence, binocular vision compensates for the monocular deficit such that patients are not impeded in daily tasks.

Even end-stage glaucoma patients often function well in standard life tasks (3). Given these statistics, why are we labeling healthy people as "glaucoma suspects," thereby making them worry about blindness for the rest of their lives? It would be far better to use our limited time with each patient to truly understand their needs, to explore their attitude to the risk of progression and to share what we know of the actual likelihood of progression.

Gnothi seauton: know thyself

How might we change things? A critical part of the answer is to recognize our own limitations. We should accept and admit that we have no idea which patients will progress and which will not; that we have no insights into the plot of a given individual's glaucoma story. All we can do is talk about the present in the context of the past – and, in doing so, we are influenced by our inherent biases, habitual thought patterns, and our experiences of previous decisions (4). Thus, our insight is no more than hindsight, and is of limited value in determining which patients are at risk of blindness.

It is clear that we do not make clinical decisions on the basis of knowledge alone; my own experience suggests that conformity, bias, expectation, distraction, and fatigue all influence us significantly. Of these factors, unconscious bias may be particularly problematic. It seems to be hard-wired into humans, perhaps because in many

It's hard to see what's before our eyes

A patient was examined at a glaucoma clinic over 20 times: first by a consultant, next by several registrars, then by some middle-grade doctors and finally by a new junior doctor

All clinicians noted that the patient's CDR was 0.7 – except for the new doctor, who recorded a CDR of 0.3

Instant reaction: the outlier CDR reading must be an error made by an inexperienced, newly qualified doctor

Subsequent observation: the actual CDR was indeed 0.3; therefore, only the junior doctor had been sufficiently free of bias or influence to record what he actually saw

This example illustrates how an opinion – especially one held by a senior individual – can gather increasing credibility as more individuals conform to it, regardless of its actual basis in fact.

"Our observations and actions are inconsistent and easily influenced by factors that have nothing to do with what is actually in front of our eyes."

circumstances it is an efficient way of operating. The ability of unconscious bias to skew glaucoma management is exemplified by confirmatory inaccuracies in cup-to-disc ratio (CDR) assessments (see box "It's hard to see what's before our eyes").

Conversely, Swedish studies – in which "experts" examined the same disc images on multiple occasions – reported marked variability in a given expert's descriptions of a given image (5). In other words, people can't even confirm their own CDR assessments when shown the same images at subsequent times! These kinds of observations have led me to conclude that only CDR changes of 0.2 or more should be taken to indicate genuine changes in disc morphology.

Similar problems arise in the field of IOP measurement. We assume that instruments are correctly calibrated and good technique is always applied, it is clear that IOP readings are not reliable, but nothing is written as to how the reading can be influenced by the observer's expectations (6). An objective pressure reading therefore requires the observer to be ignorant of previous readings.

The point is that our observations and actions are inconsistent and easily influenced by factors that have nothing to do with what is actually in front of our eyes; in fact, it is a humbling experience to realize just how wrong one can be and how often!

Unconscious decisions have real consequences

Unsurprisingly, clinical decisions made on the basis of flawed observations and limited knowledge are substantially imperfect. For example, a physician whose clinic starts with a patient exhibiting complete loss of field in one eye, advanced losses in the other, and a pressure profile that has always been below 25 mmHg is likely to work to a relatively low "treatment threshold" for the rest of that clinic.

By contrast, a physician whose first 15 or 20 patients have no significant field loss is likely to have a higher treatment threshold – possibly a lower limit of 25 or even 30 mmHg. The same patients may be managed differently according to which other patients their doctor has seen that day.

This kind of questionable decision-making persists throughout the glaucoma management timeline. Notably, a 15-year audit in Glasgow found that only 7 percent of therapy changes were related to evidence of progression; most were due to drug intolerance or to a perception that IOP had been insufficiently lowered. This statistic raises a question: if 93 percent aren't progressing, why were they prescribed drugs? It's difficult to claim that we are managing their risk of progression when, as noted, we don't know what that risk is for any given patient.

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Take homes for the glaucoma specialist

Revise your attitude to IOP: accept that a normal pressure is any pressure at which there is no field loss or disc damage

Revise your attitude to glaucoma diagnosis: progression is the only evidence for glaucoma

Be aware of your limitations: at present, it is not possible to predict the course of glaucoma in any individual

Listen to your patients: understand their experiences and concerns, the extent to which they are satisfied with their current vision, and their attitude to the risks of glaucomatous sight loss

Be aware that disease management decisions can easily suffer from unconscious bias. Understand your own biases, risk attitudes and decision drivers, and reflect on how these differ from those of your patients

Tell and show your patients what you know: the Spaeth glaucoma chart is an excellent resource

Review your patients' understanding of what you have said.

FEATURE

Considered Decisions

Can a glaucoma diagnosis do more harm than good? Let's see what the experts have to say...

WIth Keith Barton, Malik Y. Kahook and Dan Lindfield

We asked three glaucoma experts for their opinions on the issues brought to the fore by Raymond Radford's feature: "Physician, Heal Thyself." Here's what they told us.

Keith Barton, Consultant Ophthalmologist, Moorfields Eye Hospital, London, UK

The idea that being labeled a "glaucoma suspect" affects the patient's life forever does not ring true for me. Sometimes a diagnosis of glaucoma is not clear cut, although accuracy has improved considerably in recent years, with advanced imaging technologies. However, these improvements mean that more abnormalities to the optic nerve are detected, but they might not result in the patient developing glaucoma.

I do see a lot of over-treated mild glaucoma, and a lot of under-treated severe glaucoma, with many patients losing their vision unnecessarily. Two decades ago, general ophthalmologists were adept in trabeculectomy, but with therapeutic advances, the rates of trabeculectomy dropped, and it is now seen as a more specialized procedure. Many glaucoma specialists do not perform a lot of glaucoma surgery, resorting heavily to the use of drops, but that has real implications for patients who would benefit from surgical approaches, even if they are a very small minority.

Malik Y. Kahook, The Slater Family Endowed Chair in Ophthalmology. Professor of Ophthalmology, Sue Anschutz-Rodgers Eye Center, University of Colorado School of Medicine, Aurora, USA

It is without doubt that our inherent biases can shape the way we interact with patients. Physicians are human, after all – and we are prone to all of the factors that influence decisions both personally and professionally. This is, in large part, why we call what we do an "art" rather than a concrete science dependent on a "check-box" approach to patient care. Daniel Kahneman and Amos Tversky, who partnered in research at the crossroads of psychology and economics, dissected our decision-making process and championed a path that involved undoing our assumptions, which they believed caused the human mind to err systematically when forced to judge situations in the presence of uncertainty (1). The term attached to their work was "heuristic," which Wikipedia defines as "any approach to problem solving or self-discovery that employs a practical method, not guaranteed to be optimal, perfect, logical, or rational, but instead sufficient for reaching an immediate goal." This definition sounds very much like the decision-making technique employed by many, if not most, physicians around the world every day. To what degree should our clinical decisions leverage concrete data? To what degree should we lean on subconscious decision making based on past experiences? As with most things in life, a balance between the two is likely the

"I believe that, as physicians, we have to highlight our use of language. Despite my repeated pleas, my hospital sends all patients a letter confirming their 'glaucoma clinic' appointment prior to even meeting a diagnostic professional."

best path. Readers of "Physician, Heal Thyself" would be well-served to take some time for self-reflection on what factors guide us in clinical decisions and to continue to contemplate these factors the next time they see patients in clinic. I am left wondering how much of my own inherent biases shaped the writing of this commentary!

Dan Lindfield, Consultant Ophthalmologist and Glaucoma Lead, Royal Surrey County Hospital, UK

I believe that, as physicians, we have to highlight our use of language. Despite my repeated pleas, my hospital sends all patients a letter confirming their "glaucoma clinic" appointment prior to even meeting a diagnostic professional.

Radford's article makes an evocative and provocative point about the "cost" of carrying the label of glaucoma. However, there is also the unmentioned flip side whereby patients with glaucoma often present late with significant visual impairment, and threat to their lifestyle; for example, keeping their driving license.

Immediate previous experience certainly subconsciously (and often consciously) impacts our decision making. We're high-functioning humans after all, not binary machines outputting a "yes/no" answer. For example, last week I saw a patient referred over five years ago with suspected glaucoma, who had been reassured and discharged back to optometric care. However, the patient didn't attend routine annual checks as instructed, believing that the optometrist "got it wrong" the first time. Five years later, the patient presented with central visual field defects in both eyes.

I will welcome AI into this process, but judgement is the hardest thing to teach (both to the doctor and the machine). Our patient's own views and beliefs should be at the center of our care. No two patients are alike. We must not fall into the trap of just seeing mmHg, RNFL thickness, and mean deviation.

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IN PRACTICE

Safety First

The pandemic has forced physicians to rethink glaucoma treatment – starting with updated tools and protocols for safety-conscious encounters

Jason Bacharach is Medical Director and Founding Partner at North Bay Eye Associates in Sonoma, California, and Director of the Glaucoma Division at the California Pacific Medical Center in San Francisco, California, USA

Physicians are living in a new reality. Every day, we are being called on to do incredible, creative things in increasingly complex conditions. The situation is evolving in real-time and the impetus is on us to make sound decisions that keep ourselves and our patients safe – all while providing the best possible care. We must do more than simply take precautions; we must find innovative approaches to treatment as well – and glaucoma is no exception.

Challenges to treating right now

Though hospitals and surgical centers are reopening, many continue to experience major backlogs as there is a lack of OR time available for incisional glaucoma treatments. In many locales, equipment is unavailable as resources are being reallocated for emergent care. Patients' fear of COVID-19 exposure also continues to be a major concern, particularly for the elderly and vulnerable. This issue is compounded by many nursing homes and long-term care facilities still being in mandatory lockdown, which prevents patients from getting to the doctor or to the pharmacy.

To overcome these challenges, there are a few ideas to consider: implement office-based procedures to move your patient from the OR backlog to the front of the line; choose procedures that are safe and durable with minimal post-op care to reduce follow-up visits; and incorporate new office operating procedures to keep yourself, your staff, your patients and your business safe.

New standard operating procedures (or the "new normal")

Providers have a principal responsibility: not being vectors for disease. Our duty is to help people, not put them at risk. With that in mind, my practice has reimagined everyday logistics and implemented a series of thorough safety protocols.

These new operating procedures begin well before a patient arrives, with intake paperwork, patient history, and pre-screening completed over the phone where possible. Patients are also triaged virtually to see if they have been out of the country or to any hotspots recently, and to make sure they haven't had a fever or exposure to a COVID-19-positive patient. At the time of appointment, a staff member – wearing a face shield and other appropriate PPE – greets the patient at the door with sanitizer and a mask, if one is needed, and a temperature check is performed.

Once a patient passes the pre-screening and temperature check, they wait outside (weather permitting) or in their vehicle until they are called to be seen. Check-in, temperature, and IOP checks can be performed car-side as well. Patients only wait inside our waiting room in extenuating circumstances. Even then, the waiting room is arranged to allow for proper distancing. It is free of all magazines and print materials, and thoroughly sanitized on a regular basis.

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IN PRACTICE

Glaucoma and IOL Selection

Some patients may be good candidates for presbyopia-correcting IOLs – despite underlying disease

Paul Harasymowycz is Founder and Medical Director of the Bellevue Ophthalmology Clinics and the Montreal Glaucoma Institute in Montreal, Canada

Historically, most surgeons have considered glaucoma to be a contraindication for implantation of a presbyopia-correcting IOL at the time of cataract surgery. For the most part that still holds true, although extended depth of focus (EDOF) IOLs may be considered for patients with mild, well-controlled glaucoma. Additionally, new IOLs in development may mean that we can offer a greater range of vision – even to those with more advanced disease.

Contrast sensitivity concerns

Early in the course of glaucoma, patients begin to lose retinal ganglion cells (RGCs) and retinal nerve fiber layer (RNFL) thickness. These structural changes are associated with functional change, in the form of contrast sensitivity loss, which occurs even before we can measure visual field loss. Contrast sensitivity (CS), while rarely measured in a standardized fashion in glaucoma exams, is likely implicated in a common patient complaint: "It's getting more difficult to see at night."

Most presbyopia-correcting IOLs also reduce CS by splitting the amount of light that reaches the retina for distance vision. Healthy individuals may not even notice the reduced contrast, but the combination of a significantly CS-reducing IOL with pre-existing, glaucoma-related CS loss is much more concerning.

Certainly, not all presbyopia-correcting IOLs are the same. The traditional, high-add multifocal IOLs decrease distance contrast by almost 20 percent. The more recent trifocal lenses (we have several available in Canada, including the Alcon PanOptix lens, the FineVision PhysIOL. and the Zeiss AT-Lisa) decrease distance contrast by about 15 percent. An EDOF lens like the Tecnis Symfony (or in countries where it is available, the Zeiss AT-Lara) reduces distance CS by only about 7 percent. With a 7 percent reduction in CS, I am comfortable implanting EDOF lenses in patients with glaucoma or ocular hypertension who have minimal damage, pressure in the low- to mid-teens and who are well controlled with one or two topical medications (see Figure 1). The product labeling also states that EDOF lenses may be used in patients with early, well-controlled glaucoma.

If these patients desire greater spectacle independence, an EDOF lens is an excellent option – with the caveat that they may require glasses for prolonged near work.

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SITTING DOWN WITH

Healthy Body, Open Heart

Sitting Down With… Ningli Wang,
Director of the Beijing Tongren Eye Center, China

What did you want to be growing up?

When I was a child, I wanted to be a scientist. The first book I ever read was "One Hundred Thousand Whys" [a popular Chinese science book]. I was a really curious kid and this book was my first window into understanding the basics of this world. As I grew older, I came to appreciate the beauty of art and was fascinated by the paintings of Salvador Dalí. It was amazing to me that you could present a world almost beyond imagination through the tip of a brush – and so I started dreaming about becoming an artist.

Why did you decide to pursue a career in ophthalmology?

I almost didn't. When it came to my college entrance exams, I actually applied to study art as my first choice and engineering as my second choice, but was unsuccessful. However, in another way, it actually worked out just fine as I got into medical school – after all, medicine is the perfect blend of science and art.

What route did you take to become Director of the Beijing Tongren Eye Center?

In 2002, Beijing Tongren Hospital issued a job announcement saying they were looking for a Director of their ophthalmology department. Becoming the Director of the ophthalmology department, the largest eye center in north China that has a history of over 120 years, does have its unique appeal. Back then, I was working in the largest eye center in south China, the Zhongshan Ophthalmic Center. With my life, my work, and my family and friends all in Guangzhou, the decision to leave was a hard one to make. However, after thorough consideration, I knew it would be a great platform for me to realize my potential and to see if I would be able to serve not only as a doctor but also as a leader. I decided to apply for the job.

Though the competition was fierce, I managed to get the position. After starting working in Tongren as Director of the ophthalmology department, I led the founding of Beijing Tongren Eye Center. With a decade of effort, under my watch, the center transformed from a clinical center to a center of global influence that pioneers both clinical practice and scientific research. The ophthalmology department of Tongren Hospital is one of its best, with over 200 ophthalmologists. I was then entrusted with an even bigger responsibility – vice-president of the hospital, mainly in charge of scientific research. And in another shift, my social influence, leadership, and management skills were put to use as president of the hospital from 2016 to 2017.

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A Double Duty of the Dual Blade

The Kahook Dual Blade is now an established tool used by glaucoma surgeons to reliably lower patients' IOP – but how does it perform in combination with cataract surgery?

Esther Hoffmann, Head of Glaucoma Department of Ophthalmology at Mainz, and Anselm Jünemann, Professor of Ophthalmology, Chairman, and Medical Director of the Department of Ophthalmology at the University of Rostock, Germany, discuss using the Kahook Dual Blade for their cataract patients.

What is your experience with using the Kahook Dual Blade (KDB)? What kind of patients do you use the tool for?

Hoffmann: I have been using the KDB for several years and I'm very happy with the tool and its capabilities. I use it for cataract patients with mild to moderate glaucoma when I need a way to lower their IOP – and, in fact, I have been able to get an additional 2–4 mmHg IOP-lowering effect for these patients. For patients before trabeculectomy, I sometimes use the KDB as a bridging therapy.

In my opinion, the KDB is one of the best tools to use for my cataract patients with glaucoma, because I have found that the canal of Schlemm tends to show blood reflux at the end of surgery. The canal of Schlemm tends to show blood reflux at the end of surgery, which signals the successful removal of the impaired outflow pathway.

Jünemann: I also find the KDB useful in combination with cataract surgery. I use it for patients with open angle glaucoma with a target pressure of around 15 mmHg. I have been able to achieve reduction to 13–15 mmHg mean IOP values while reducing patients' medication. Gonioscopically, the angle should be graded 3–4 in the Shaffer scale.

Due to the excision of trabecular meshwork, using KDB is not just trabeculotomy, but trabeculotomy ab interno, with all the clinical advantages that entails.

What are the main advantages of the KDB in combination with cataract surgery?

Hoffmann: First of all, the surgery is quick and easy to perform – especially if surgeons are used to performing angle surgery – with

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"The KDB is a brilliant tool for mechanical trabecular excision without alteration of the surrounding tissue, especially the outer wall of the canal of Schlemm."

minimal trauma and, in my experience, no additional paracentesis. KDB is small and allows for "soft" removal of the trabecular meshwork by lifting and stretching the tissue and providing a smooth transition through the canal wall.

Jünemann: The KDB is a brilliant tool for mechanical trabecular excision without alteration of the surrounding tissue, especially the outer wall of the canal of Schlemm. It can be used very easily in combination with cataract surgery using existing paracentesis. I feel very confident when using the KDB thanks to its great safety profile.

Could you share any pearls for surgeons who might be thinking of starting to use the KDB?

Jünemann: To begin with, it might be helpful to select pseudophakic or phakic patients with a deep anterior chamber. Remember that trabecular pigmentation helps to identify the structures of the anterior chamber angle – take time to visualize it during surgery.
If possible, use the KDB first in combination with cataract surgery. First, because corneal alterations like edema may reduce visualization of the anterior chamber angle; second, because the excised trabecular tissue will be removed during cataract surgery.

Hoffmann: You should be educated in performing gonioscopy – perform it in every patient before using KDB to visualize the canal of Schlemm and check if the angle has no goniosynechia. Also, at the beginning of your learning curve, be mindful of not pulling too much tissue.

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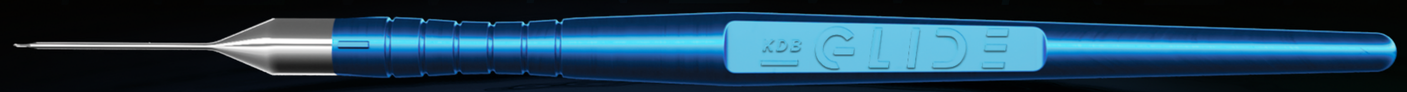

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Cutting It Fine – in a Good Way

For complete removal of trabecular meshwork – with active irrigation and aspiration – look no further

Meet the TrabEx Pro from MST – an extension to the leading TrabEx line of goniotomy blades from a company continually investing and innovating in the glaucoma space. TrabEx Pro is a surgical instrument designed specifically for the complete removal of diseased trabecular meshwork.

MST's glaucoma focus is to take traditional goniotomy surgery to the next level. In goniotomy, an incision is made in the trabecular meshwork, allowing for aqueous to access the collector channels of Schlemm's canal and drain via the natural outflow system. One concern that surgeons have expressed with goniotomy is that incomplete removal of trabecular meshwork may allow remaining tissue to reactuate and reocclude the aqueous outflow. TrabEx Pro includes innovative features that may facilitate a more complete excision of diseased trabecular meshwork.

What are the unique features that allow the TrabEx Pro to fully and cleanly remove the required tissue? First, the device features a trapezoidal blade head with laser-honed serrated blades. The trapezoidal orientation of the blades allows for a custom cut for each individual patient and each section of tissue, which often varies (1). In narrow sections of trabecular meshwork, the tissue is cut at a narrow section of the blade. In wider sections of trabecular meshwork, the tissue passes further up the graduating blades and is cut at a wider section, leaving minimal amounts of tissue behind. While other blades for goniotomy offer a one-size-fits-all approach, the TrabEx Pro can offer a custom cut for each specific situation.

The TrabEx Pro is also completely polished on the distal end, which can provide gentle contact with tissues that are not intended to be removed. The footplate of the blade is rounded and comes

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"The ergonomic handle is designed to provide comfort and control for the user and features a blade directional indicator that clearly defines the orientation of the device."

down to 66 microns at the distal end, allowing for high levels of precision and surgical control. What's more, the rounded distal heel of the blade head is contoured to the arch of the eye.

But perhaps the most important aspect of the TrabEx Pro is the way it is compatible with all phacoemulsification platforms. The ergonomic handle is designed to provide comfort and control for the user and features a blade directional indicator that clearly defines the orientation of the device.

Finally, the TrabEx Pro boasts a silicone sleeve that eliminates the need to change incision sizes when performing a combined goniotomy and cataract procedure. Improvements have also been made to the ergonomics of the hand piece, which provide maximum user comfort to every surgeon for every procedure.

The TrabEx Pro is pending 510(k), and not available for sale within the United States.

Reference

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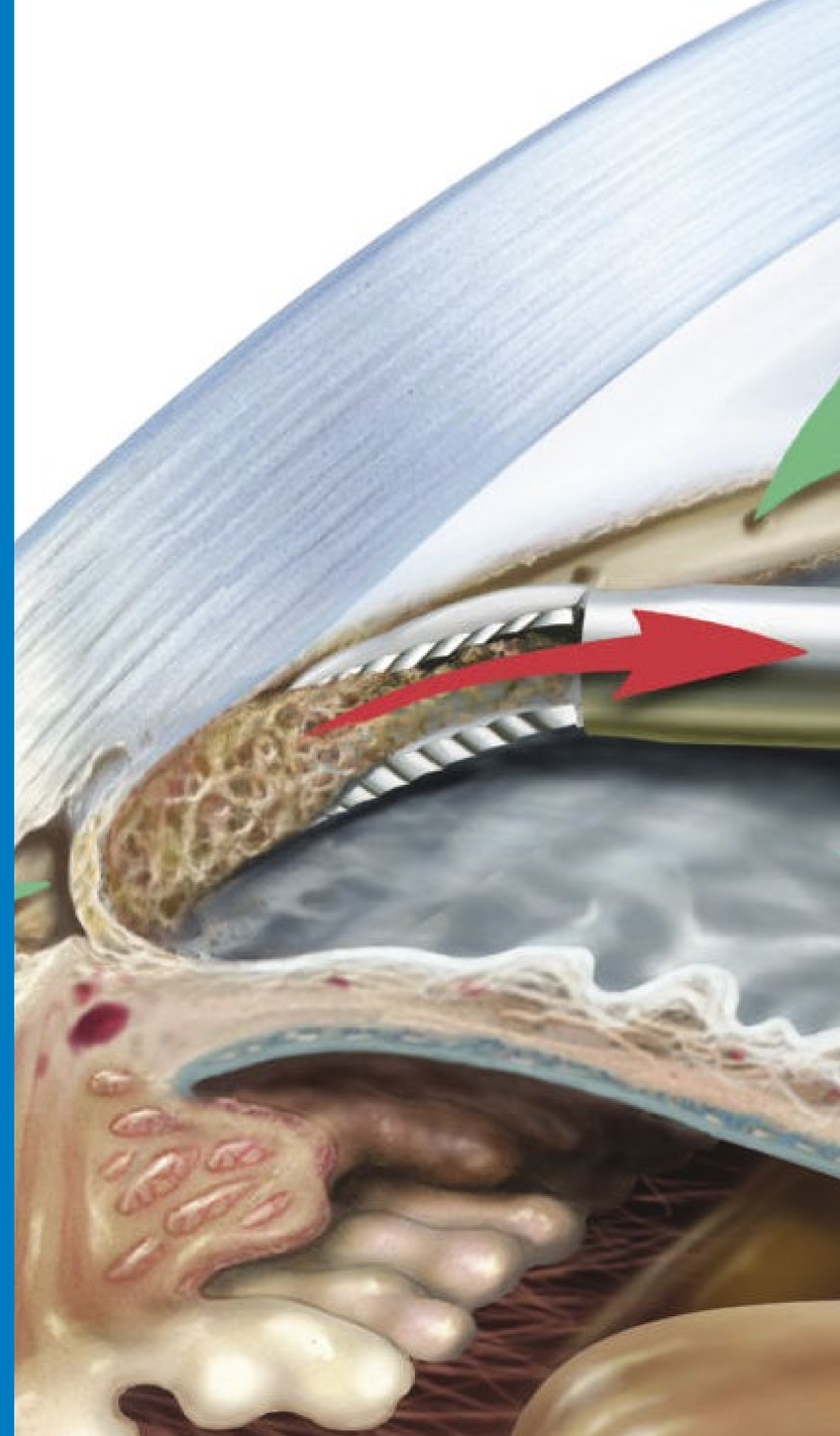

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Ab Interno Approach with No Implant Needed

High Frequency Deep Sclerotomy from Oertli – a modern MIGS procedure that's easy to learn, efficient, and safe to perform

Swiss company Oertli is the only manufacturer in the ophthalmic field offering solutions for cataract, retinal, and glaucoma treatments in one surgical platform. Now, the company presents its High Frequency Deep Sclerotomy (HFDS®) – an implant-free, minimally invasive ab interno procedure to treat open angle glaucoma – to give all surgeons operating with Oertli surgery platforms an effective, efficient glaucoma option.

HFDS is a reliable procedure with proven long-term (six years) efficacy in lowering IOP and reducing antiglaucoma medications (1), partly or fully releasing patients from the topical therapy burden. What's more, further surgical glaucoma interventions are possible without any restrictions, because HFDS technology doesn't affect the episcleral or conjunctival tissue (2).

Curious about how HFDS works? It is based on diathermy, using electrically induced heat or high-frequency electromagnetic arcs to improve aqueous humor outflow. The reusable glaucoma tip operates via high-frequency diathermy to cut six pockets into the iridocorneal angle, where the highest outflow resistance in the trabecular meshwork is addressed. The tip itself is 1 mm long, which supports the outflow of aqueous humor through the trabecular meshwork and Schlemm's canal, where the intrascleral collector channels dock directly.

The procedure's success is based on the principle that, in glaucoma, the juxtacanalicular connective tissue of the trabecular meshwork is the site of the greatest pathological outflow resistance. The surgery bypasses the trabecular meshwork, creating a series of scleral pockets to encourage intrascleral filtration similar to that achieved with deep sclerotomy. The ab interno approach and the lack of subconjunctival filtration are aimed at considerably reducing the risks of intraoperative complications and subsequent bleb-related filtration complications (3).

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"HFDS is, in my opinion, one of the best MIGS methods with a low complication rate, particularly compared to other existing filtering procedures with their known high complication rates."

How do surgeons see HFDS? In the words of Lutz Blomberg, who practices at the Augenzentrum Hildesheim-Alfeld-Bockenem in Hildesfeld, Germany, "The HFDS is a low-complication and low-risk MIGS technique without implant. This has the great advantage of less follow-up care and no unpleasant surprises due to implant dislocation or endothelial cell loss after years." Manuel Jose Justiniano, specialist at Clínica de Ojos Norte in Santa Cruz de la Sierra, Bolivia, wholeheartedly agrees. "HFDS is, in my opinion, one of the best MIGS methods with a low complication rate, particularly compared to other existing filtering procedures with their known high complication rates."

The practice of combining procedures for patients with cataracts who suffer from glaucoma is well known – it saves time and money, allowing patients to improve their visual acuity while simultaneously lowering their IOP. HFDS is a viable option that allows surgeons to perform combined procedures without concerns about safety or efficacy. Bojan Pajic, Professor of Ophthalmology at the Augenklinik ORASIS in Reinach, Switzerland, comments on using HFDS in combination with cataract surgery: "HFDS is a minimally invasive procedure with a very good safety profile that has been established for many years. Unlike other minimally invasive procedures, no implant remains in the eye. The surgical method addresses the actual problem – a need to improve the aqueous humor outflow. Should another glaucoma operation be required, this is possible after HFDS without any limitations. Cataract patients with glaucoma benefit from the option to combine procedures."

The HFDS glaucoma solution has received the CE mark and is optionally available with all three surgery platforms from Oertli. Download the compendium now for further details.

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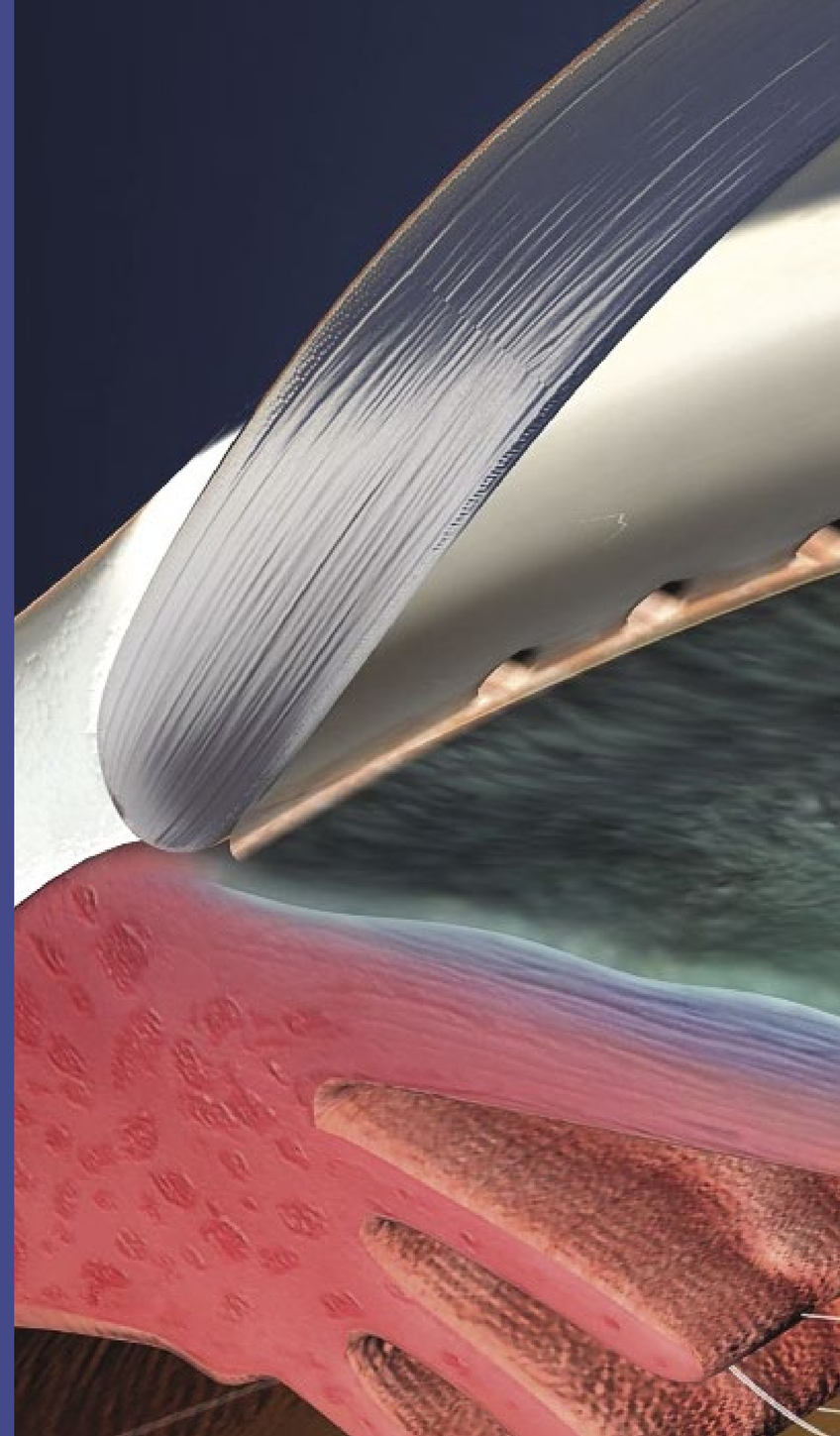

OMNI SURGICAL SYSTEM

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An Important Evolution in MIGS

One intelligently designed device. Two implant-free procedures. Three points of resistance.

Addressing the conventional outflow pathway first

Primary open angle glaucoma (POAG) is the most common form of glaucoma globally. It is estimated that about 2 percent of people over the age of 40 have the condition – rising to almost 10 percent in patients over 75. But the surgical management of glaucoma continues to prove challenging despite tremendous recent innovation, particularly within the minimally invasive surgical space, in part due to uncertainty as to where aqueous outflow resistance occurs in the conventional outflow pathway. Studies have found that 50 to 75 percent of resistance may be in the trabecular meshwork, and up to 50 percent in Schlemm's canal and the distal collector channels (1, 2, 3). But identifying where blockage or resistance occurs within the conventional outflow pathway can be hard. Targeting the trabecular meshwork alone or isolating a single point may not be enough to lower IOP. The possibility of resistance occurring at any point suggests that a surgical option addressing all three points of potential resistance – the trabecular meshwork, Schlemm's canal, and the distal collector channels – may offer the best chance of success.

A new MIGS solution

The OMNI Surgical System – by Sight Sciences. The OMNI Surgical System is a relatively new surgical device and the only one that combines two ab interno, minimally invasive treatments in a single procedure: canaloplasty and trabeculotomy. This new technology allows surgeons to address outflow resistance wherever it may be, both proximally (trabecular meshwork and inner wall of Schlemm's canal), and distally (Schlemm's canal and the collector channels).

A versatile procedure

Although OMNI itself was introduced in 2018, from a procedural standpoint, there is a rich and deep evidence base for both canaloplasty and trabeculotomy. OMNI is an implant-free procedure that treats the conventional outflow pathway but is differentiated in that it addresses resistance throughout the entire conventional outflow pathway. The OMNI Surgical System is one of the only MIGS devices that can be performed in conjunction with cataract surgery or as a standalone procedure to significantly reduce IOP from baseline levels.

Efficacy in stand-alone and combined procedures

In a study of 24 eyes with mild to moderate POAG and preop medicated IOP>18 mmHg, the OMNI in combination with cataract surgery resulted in a 31 percent (6.8 mmHg) reduction in IOP from medicated baseline (4), with one in three patients being medication-free at 12 months. Similar efficacy was reported when the OMNI was used as a standalone procedure (5). In a study looking at 38 mild to

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"The OMNI Surgical System is a sophisticated, minimally invasive delivery system."

moderate eyes with open angle glaucoma, 96 percent achieved IOP reduction of 20 percent (9.9 mmHg), with 63 percent of patients medication-free at 12 months (6).

In conclusion

True to the MIGS paradigm, the procedure is accomplished with minimal tissue trauma, sparing sclera and conjunctiva; recovery is rapid, there is demonstrable efficacy, and a very good safety profile. In contrast to microstent procedures, there is no implant that could have unintended long-term consequences. It is already making waves in the MIGS space, with pioneering surgeon Ike Ahmed (Prism Eye Insitute, Trillium Health Partners, University of Toronto, Canada) already a fan. "The OMNI Surgical System is a sophisticated, minimally invasive delivery system. I appreciate the fact that the two implant-free procedures it performs — ab interno canaloplasty and a titratable trabeculotomy — can target all three potential points of resistance in the conventional outflow pathway, especially because we do not know the cause of the outflow resistance."

So what are you waiting for?

When efficacy matters, the only choice is OMNI.

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