Save Sight Institute’s Glaucoma

The Save Sight Institute (SSI), the ophthalmic research and teaching centre for the University of Sydney, held a glaucoma information morning for the general community in the Claffy Lecture Theatre within Sydney Hospital on 11 April. A near capacity audience was informed and entertained by the line-up of speakers. At the end of the formal presentations a questions and answer session was held and all presenters and organization representatives were available.

Such was the interest that they were almost overwhelmed by the response from the intensely interested audience, many of whom were glaucoma sufferers, and that session lasted the best part of an hour after which some presenters were approached one-on-one thereby extending the session even further.

Small displays by Glaucoma Australia and Guide Dogs NSW/ACT (who also announced a new website: www.visionloss.com.au at the gathering) rounded out the resources made available.

An overview of glaucoma

Ms Renee O’Kane, SSI’s communications manager, introduced Assoc Prof Ivan Goldberg, president of the Australia and New Zealand Glaucoma Interest Group as well as being president of Glaucoma Australia. He described glaucoma as being a problem related to pressure within the eye (although it can also be normal) and fluid [aqueous] circulation, the fluid being a blood derivative responsible for the carriage of oxygen and other necessary nutrients. Data analysis shows that about a third of glaucoma patients have an intraocular pressure (IOP) within normal limits (see later) and about two-thirds have IOPs greater than normal. Regardless, lowering the IOP in all cases was described as being beneficial.

Types of glaucoma

The primary glaucomas were given as childhood, angle-closure, and open-angle while the secondary variety can be the result of trauma, use of steroids, cataract, inflammation, pigment dispersion, and most commonly of all, pseudo-exfoliative (PXF) glaucoma which has a strong genetic association.

Childhood glaucoma is characterised by big, beautiful, watery, photophobic eyes and the disease is more likely to be detected if it is unilateral as the difference between eyes will draw attention. In advanced cases, globe stretching and, ultimately, rupture can occur. Treatment is almost invariably a surgical alteration of the drainage angle, especially if the anterior angle has not formed fully.

Angle-closure glaucoma (ACG), which is more common in Chinese and least common in Africans (and therefore so-called African-Americans), usually occurs in older individuals and is more common in females possibly because their eyes are smaller leading to a narrower anterior angle. ACG symptoms include sudden pain, headaches, nausea, vomiting, ocular redness, blurred vision, and haloes around light sources caused by the resultant corneal oedema. Despite the reputation surrounding ACG, Prof Goldberg does not see it as a crisis, rather it is a condition that can become an emergency and generally should be investigated/treated within 24 hours. If a ballooning iris (iris bombe) is found, a laser peripheral iridotomy (PI, current thinking is to locate a PI in the horizontal meridian rather than the more traditional location under the upper lid) is performed.

The situation surrounding primary open-angle glaucoma (OAG or POAG) is more complex and our understanding of it is still probably a work in progress. In POAG the angle is open but the pressure still rises due to other factors such as reduced drainage from the eye. Lifestyle factors were mentioned as having some involvement and factors mentioned included the wearing of tight-fitting swimming goggles, excessive water ingestion (increased production of aqueous), and the extensive and forceful use of wind instruments, and sleeping positions that entail an eye ‘buried’ in a pillow applying pressure to the globe via the closed lids.

To counter the effects, lowering IOP was seen as a way to increase the margin of safety, blood pressure should be normalized (neither too high nor too low) and blood cholesterol should also be normalized. Research into products that might offer neuroprotection or encourage neuroregeneration is in progress.

Prof Goldberg thought that the promise of stem cell therapy for retinal regeneration was at ‘long odds’. Because pressure is not the whole story and normal tension glaucoma is relatively common, the rate of ongoing damage is usually...
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slowed by a lowering of IOP to sub-normal levels.

He gave the statistical normal rate of retinal cell loss as one cell every 90 minutes but that figure can rise to every 9 minutes in glaucoma. Lost cells are irreplaceable with our current knowledge. While admitting that glaucoma is incurable currently, all therapy is aimed at stopping the ongoing destructive process. Retinal nerve fibre destruction at the optic disc is responsible for the characteristic thinning of the disc rim and disc cupping. Drance haemorrhages at the disc margin are also a tell-tale sign of a disc abnormality secondary to the glaucoma disease process especially nerve fibre loss.

Visual field determination was described as assessing the ‘island of vision’ who’s peak (central vision) is attributable to the fovea.

Glaucoma therapy requires an appraisal of the risks (side-effects) and benefits involved. Medical therapy was the most common and lowering the IOP either by increasing the outflow or decreasing the inflow (aqueous production) is the goal. The art of minimizing the treatment (frequency of drops, type of drops) needed to be practised. Selective laser trabeculoplasty (SLT) is a form of surgical intervention but a surgical trabeculectomy (surgery on the drainage system of the anterior eye) is a more common approach. Drainage devices that bypass the anterior drainage system are already in use and their latest incarnations constitute an evolving field using minimally-invasive glaucoma surgery (MIGS) and very small drainage devices.

Compliance

Compliance issues are an evergreen problem in medical and paramedical circles. About 73% of glaucoma patients are non-compliant in some way and few instil their medication correctly, i.e. block the tear ducts by the application of finger pressure to the corner of the eye after initial instillation to reduce (by about two-thirds) the systemic absorption of the active ingredients. However, given that more serious life and death matters like AIDS only have a 66% compliance rate, it seems highly unlikely that compliance in non-acute diseases like glaucoma (ACG cases aside) is likely to improve significantly.

Prof Goldberg introduced the term dyscompliance, non-compliance due to real issues such as complexity of steps, the number of steps, and compounding issues such as arthritis making correct instillation less likely. Overall, only about 45% of glaucoma patients applied their medications well, some 15% held the dropper bottle too high and about 5% were head-rollers, i.e. the drops were applied the skin adjacent to the eye and then the head ‘rolled’ until the drops drained over the skin and then into the eye (what they collect along the way would be an interesting research project). Some 15% of patients could not squeeze the bottle adequately because of inappropriate physical properties of the drug container suggesting a serious lack investigation of obvious issues by the manufacturers and/or their package suppliers. Worryingly, some 25% of patients had no success instilling their drops and half of those are unaware of their failure meaning medication was attempted but not achieved. An impregnated polymer ring device as an alternative was mentioned as something that might be brought to market eventually although Prof Goldberg did mention that in his eye, the discomfort of a prototype took some time to recede.

Changing hats to that of Glaucoma Australia (GA) president he described that organization as an advocacy group offering advice to patients that was complementary to that given by their practitioner. He saw GA as a bridge between patient and practitioner.

A glaucoma research update

Assoc Prof John Grigg, Head, Discipline of Ophthalmology, USyd gave an update on the research into glaucoma at the SSI titled See the Future. His subspecialty is glaucoma but ostensibly he is a cataract and paediatric ophthalmologist. He is also the chair of RANZCO’s scientific committee for paediatric eye disease and genetics.

In his overview he divided the whole glaucoma scene into: basic or laboratory research and clinical research into the aetiology of glaucoma, early diagnosis, and treatment (medical, laser, surgical).

Genetics

A genetic basis to glaucoma can be related to the iris, crystalline lens, or cornea (think: ACG) and anatomical factors can give clues to the mechanism(s) of glaucoma. Just because a particular patient is the first in their family line to get glaucoma does not mean that their disease is not genetic in origin. Confounding attempts to pinpoint a genetic origin is the fact that multiple genes can cause similar eye conditions and glaucoma is no exception. Factors that may be involved include: signalling molecules, transcription factors, structural proteins, and enzyme metabolism. The human genome has about 3 billion base pairs (building blocks of double-helixed DNA – the bases are adenine which always pairs with thymine and guanine which always pairs with cytosine) of which about 1.5% (45 million) are exons (an exon is a nucleotide sequence encoded by a gene that remains as part of a mature RNA product) of protein coding genes. The remainder are non-coding RNAs, regulator sequences, introns (an intron involves removal of a nucleotide sequence from a gene by gene splicing, the remaining material once spliced together becomes an exon), or repeats of exons.

Early detection

Multifocal visually-evoked potentials (MVEP) is one technique used to detect early changes objectively that was the subject of an 5-year NH&MRC study. The study concluded that MVEP did correlate with other methods and clinical techniques. Early detection remains a goal of much research and various techniques have been deployed to investigate glaucoma onset. The key benefit sought is to prevent glaucoma-induced losses in the visual system before they are established and irreversible damage is done.

Collaboration

Prof Grigg sees glaucoma care as a health care team issue requiring collaboration between ophthalmology, optometry, and other stake holders such as Glaucoma Australia. The magnitude of the need for care can be gauged from his figures that show about 1% of 50 year old Australians have glaucoma, a figure that rises to about 10% by 80 years of age. Issues that warrant consideration include who and how glaucoma screening is to be done, the initiation (a clinical decision) of glaucoma therapy, and the monitoring of the disease’s progression.

Other issues

Although a common problem, ocular surface disease in glaucoma including dry eye and dryness symptoms is not a common conference topic. If for no other reason, ocular surface issues are important to patients’ well-being and comfort and very important to quality-of-life overall. Prof Grigg recommended strongly the use of preservative-free glaucoma medications as a way of reducing irritation and redness but he was unconvincing about the effects of such drops on compliance levels.

On the efficacy of a trabeculectomy he noted that wound healing is a major determinant of surgical success, a factor that can be related to the patient’s age which in
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Glaucoma Australia

GA, which started as a not-for-profit organization in 1988, was detailed by Mr Geoff Pollard its national executive officer. Among its main aims are the minimization of glaucoma-induced sight disability and the support of those with glaucoma and their families regardless of whether it is a recent diagnosis or a well established one. GA also funds glaucoma-related activities of the Ophthalmic Research Institute Australia (ORIA) and plays an advocacy role on behalf of those affected. GA’s community messages encompass the idea that glaucoma is an invisible disease and it is now using the Big campaign – Beat Invisible Glaucoma. GA also fosters drop instillation technique training both face-to-face and over the phone. They also foster the use of special drop applicators to make the instillation process more successful. According to Mr Pollard about 50% of Australian glaucoma patients have stopped using their eye drops just 12 months after their commencement.

Q&A Session

From the fast-and-furious question-and-answer session that followed the formal programme, it was learned that:

- Unilateral glaucoma was more likely to be asymptomatic.
- PXF can be unilateral for a long time.
- The interval between routine eye examinations (no glaucoma involved) can be 2-3 years unless family history suggests otherwise, in which case more frequent examinations are prudent. If a first-degree family member has glaucoma then the other family members have a 23% lifetime risk of also getting the disease, i.e. approximately one in four chance.
- Dry eye associated with glaucoma affects women more than men.
- Dry eye is more likely in glaucoma patients taking medications for their disease but it is unclear if the medication is the cause of the dryness or whether the dryness is secondary to the disease itself.
- Neither tea nor coffee have much effect on IOP (about 1 mm elevation) but there is now some suggestion that caffeine (in coffee, not tea, or so-called energy drinks) may have some neuroprotective effects. The caffeine in tea is not available biologically.
- Tight-fitting ties are not recommended.
- Cataract surgery does not cure glaucoma but it can help, especially in ACI. There may be some slight benefit in POAG.
- Cataract surgery some time after a trabeculectomy can cause inflammation that can cause further trouble.
- Glaucoma patients should keep themselves well hydrated.
- Alcohol consumption can reduce IOP. Wine containing resveratrol may be the more desirable form of alcoholic drink.
- The lifting of excessive weights in the gym should be avoided.
- Peripheral iridotomies can become less effective with increasing age due to increasing crystalline lens thickness. In such cases further PIs or cataract surgery may be pursued as an answer.
- Head-down (upside-down) yoga postures can increase IOP significantly and are not recommended.
- Although the same glaucoma treatment may have been effective for a long time there is no guarantee that it will always remain so – the medication can become less effective, there may be some adaptation to the medication rendering it less effective, or the disease may progress.
- Photophobia may be related to glaucoma, cataract, or both.
- Average IOP is 16 mm. Two standard deviations gives a high-side reading of 21 mm and figures above that should be viewed with suspicion.
- The presenters were agreed on the fact that screening for glaucoma using just IOP was unsafe, it is a neuropathy not simply ocular hypertension.
- No special dietary advice was given, rather follow dietary advice related to a healthy heart, brain, and body.
- While fatty meats should be avoided generally, some fat is still required. Salads, vegetables, and fruits should become the food focus supplemented by light meats.
- Flying is not dangerous to the glaucoma patient.
- Except for overly tight-fitting goggles, SCUBA diving is not a danger.
- Dryness and ocular surface disease/dry eye symptoms when flying are simply the result of the very low (often <10% RH) relative humidity of the aircraft’s cabin.
- The SSI would have been well pleased with the attendance, intensity of interest, and the popularity of the Q&A session that wrapped-up the event.

Homeopathy is quackery: NHMRC finding

Homeopathy has been shown up as quackery by Australia’s peak medical research body, putting pressure on pharmacists to stop stocking homoeopathic products.

After three years of research costing at least $140,000, the National Health and Medical Research Council has issued a draft position statement on that concludes there is no reliable evidence that homeopathy is effective for treating health conditions. The NHMRC scrutinised 57 systematic reviews of homeopathy from across the globe, where the treatment was studied for 61 health conditions, including diarrhoea in children and even heroin addiction.