



## Recent Advances in Ophthalmology

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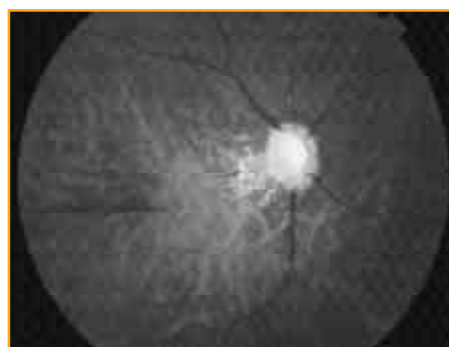
### Introduction

Ophthalmology is one of the most rapidly advancing medical specialties. Due to a combination of ageing population and widespread acceptance of refractive surgery, the demand for ophthalmic care will certainly increase in the twenty-first century. It behoves the practising medical professional to be aware of the recent advances in glaucoma diagnosis and treatment, cataract surgery, myopia and refractive surgery, and macular degeneration.

### Glaucoma

Primary open angle glaucoma is increasingly common in the elderly population. It is a type of optic neuropathy related to raised intraocular pressure. Although intraocular pressure is the most important risk factor for glaucoma, it is now recognised that other factors may be significant such as blood flow, myopia, cardiovascular disease, sleep apnoea and age.<sup>1</sup> More importantly, the conventional wisdom of 21mmHg being the cut-off pressure for glaucoma is not necessarily applicable on an individual basis.<sup>1</sup> It is well-known that there are patients with intraocular pressures below 21mmHg who show evidence of glaucomatous optic neuropathy (normal tension glaucoma). At the same time, there are patients with intraocular pressures of up to 30mmHg who do not have signs of glaucoma. Such individual variation is possibly due to the resilience of the optic nerve to intraocular pressure and this resilience depends on factors such as optic disc anatomy and blood supply. Therefore intraocular pressure screening alone may not be sufficient to diagnose glaucoma. Visual field examination and optic disc evaluation provide vital information in the diagnosis and management of glaucoma.

Recent studies have shown that aggressive intraocular pressure reduction is necessary to halt the progression of glaucoma in some patients, especially those with advanced glaucoma.<sup>2</sup> A major advance in the medical treatment of glaucoma is the advent of prostaglandin analogues in the form of eyedrops.<sup>3</sup> These agents lower intraocular pressures by increasing uveoscleral outflow. They produce more powerful reduction of intraocular pressures than any other classes of drugs before them. They are relatively free of side effects and have the additional convenience of once daily dosage. They are rapidly becoming the agent of choice in the management of primary open angle glaucoma in some developed countries.



Advanced glaucomatous cupping

### Cataract

Cataract is due to opacification of the crystalline lens. It is mostly age-related. Modern cataract surgery (phacoemulsification) involves the delivery of ultrasound energy (not laser which is a common misconception) via a probe the size of a pen to break up the lens. The wound is approximately 3mm in size. A 6mm intraocular lens is folded and inserted through the 3mm wound. Surgery is done under local anaesthesia. Recovery is quick and patients can generally see the following day. The determination of lens power using formulae taking into account the length of the eye and corneal curvature is accurate to the extent that the majority of patients (including those with preexisting refractive errors) do not need distance glasses after surgery. They will still need reading glasses though. Numerous generations of multifocal lens implants have been tried in the last fifteen years with variable results. They are continually being refined and may become more widely applicable in the future.

### Myopia and Refractive Surgery

Myopia (short-sightedness) is exceedingly common in Hong Kong. The aetiology is believed to be partly genetic and partly environmental (close work at a young age). Highly myopic patients are at increased risk of cataract, glaucoma, retinal detachment and myopic macular degeneration. There is lack of good evidence to substantiate any form of treatment that may retard the progression of myopia in children although there are some anecdotal reports that orthokeratology (use of rigid gas-permeable lenses to artificially flatten the cornea) may have a favourable effect.<sup>4</sup> Refractive surgery only addresses the optical aspect of myopia but does not address the pathologic





aspect. In other words, myopic patients who have undergone refractive surgery are still at increased risk of the ocular diseases mentioned above.

Lasik is the most common refractive surgery.<sup>5</sup> It is applicable to myopia, low to moderate hyperopia (long-sightedness) and low to moderate astigmatism provided the cornea is thick enough. It involves the use of a microkeratome to cut a corneal flap, use of excimer laser to flatten the corneal tissue below the flap and replacing the flap. A recent advance is use of femtosecond laser (such as Intralase) to cut the flap instead of using a mechanical microkeratome. The jury is still out as to whether Intralase is a superior device compared to the conventional microkeratome. Whilst Intralase has a better safety profile, it also has complications not seen with the microkeratome. Lasik overall is a very safe procedure provided the patient is suitable. The results are best for low and moderate myopes. High myopes (especially those over 10 dioptres) are in general not good candidates for lasik. The use of phakic intraocular lenses (placing an intraocular lens implant in the eye without removing the natural crystalline lens) is evolving to become the procedure of choice for these high myopes.<sup>6</sup>

There is to date no effective treatment for presbyopia. Procedures such as lasik or conductive keratoplasty rely on monovision effect. They render the non-dominant eye mildly short-sighted so that the patient uses this eye for reading vision and the dominant eye for distance vision. The use of laser to sculpt a multifocal cornea is on the horizon but there is considerable doubt whether the visual effect will be acceptable to patients.

### Macular Degeneration

Age-related macular degeneration is the most common cause of blindness in the elderly population. Risk factors, apart from age, include smoking, hypertension and increased serum lipids.<sup>7</sup> There are two forms of the disease, the dry form which is slowly progressive and a more sinister wet form which is caused by the growth of a choroidal new vessel below the abnormal macula leading to bleeding, scarring and ultimately detrimental vision.

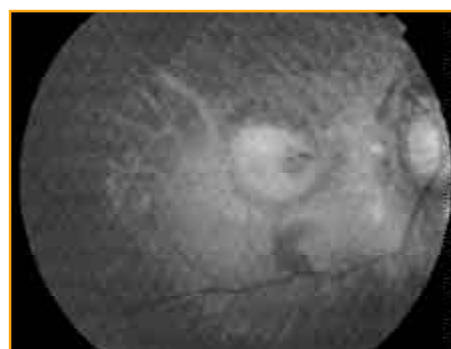
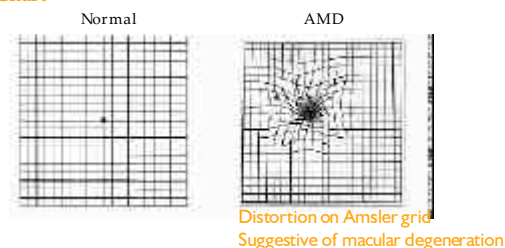
There is no treatment for the dry form of the disease apart from risk factor avoidance. Antioxidants such as lutein, zeaxanthin and zinc may prevent the development of the wet form of the disease and these supplements are recommended for patients with dry macular degeneration.<sup>8</sup> They are available in commercial preparations.

Historically, there was limited treatment option for wet macular degeneration. Thermal laser may be used to destroy the abnormal choroidal vessels but it also destroys the overlying retinal tissue. Hence its use is limited to those cases where the abnormal vessel resides outside the fovea. The advent of photodynamic therapy in recent years broadens the scope of treatment to include those patients with abnormal vessels extending under the fovea.<sup>9</sup> The photosensitising agent is administered intravenously where it accumulates selectively in the abnormal choroidal vessels with an abundance of receptors for the agent. Non-thermal light is used to activate the agent in the eye. The

activated agent causes selective occlusion of the abnormal choroidal vessels but wreaks no havoc on the foveal tissue.

It is imperative that elderly patients undergo macular examination on a regular basis. If they are found to have dry macular degeneration, they will be given an 'Amsler grid' for self-testing on a regular basis as any distortion noted on the grid may represent the emergence of an early choroidal new vessel. The earlier the detection and the smaller the abnormal choroidal vessel, the better the result of treatment.

#### Amsler's Chart



Wet Macular Degeneration with large greyish-white choroidal neovascularisation and haemorrhage

### Conclusions

Gone are the days when ophthalmology was a small specialty and cataract surgery the only type of ophthalmic surgery. Numerous subspecialties have emerged in ophthalmology and it has become a truly 'hitech' and innovative specialty.

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