



Minimally Invasive Glaucoma Surgery

FACT SHEET

(The term 'glaucoma' refers to a characteristic pattern of damage to the optic nerve)

Surgery in glaucoma has generally been reserved for those patients who have not been able to achieve intraocular pressure (IOP) control (and thus stabilised glaucoma) through less invasive techniques such as eyedrops or laser trabeculoplasty. The (gold) standard operation for open angle glaucoma is trabeculectomy, which was developed by Cairns and Watson in the late 1960's (see *Glaucoma News* #54: Editor). Trabeculectomy is not a 'perfect' operation, but it is most often successful in achieving control when drops and laser can't.

In an effort to find alternative surgical means to control IOP with fewer potential side effects, new techniques and implants are being developed. These are collectively called MIGS: minimally invasive (or micro-invasive) glaucoma surgery, and there have been recent news items concerning these. This article examines MIGS and its potential benefits for glaucoma patients.

Most MIGS operations are designed to fashion alternative or augmented pathways for extra fluid to leave the eye: more fluid out means lower IOP.

Although not strictly a MIGS procedure, the ExPress® implant, which is a tiny steel implant that removes the need for 2 steps in a standard trabeculectomy, laid the groundwork for MIGS.

Several MIGS implants drain fluid from the front chamber of the eye (the anterior chamber or AC):

- The iStent® implant is a tiny device like a periscope that is inserted sideways through the trabecular meshwork into Schlemm's canal, usually at the time of cataract surgery. Later variants have different shapes. There are reports of multiple implants being inserted in one eye, to bring larger decreases in IOP (although the cost of this might be prohibitive).
- The CyPass® implant is inserted into the suprachoroidal space in the eye, and allows fluid to drain from the AC into this area.
- The AqueSys® gel implant, on the other hand, drains fluid from the AC into the conventional surgical drainage space, the subconjunctival tissue.

Other MIGS operations try to open up the trabecular meshwork or Schlemm's canal to allow more fluid out:

- The Hydrus® is an implant that holds the canal open
- Canaloplasty 'tents' the canal open by feeding in and then tying off a fine circumferential thread within the canal.
- Trabectome® uses electro-cautery to chew away some of the meshwork and so allow freer fluid access to Schlemm's canal.

A final category of procedures uses laser to decrease the amount of fluid going into the eye rather than increasing the outflow:

- Endocyclophotocoagulation (ECP) – which is a variation of an older external treatment called cyclodiode – is usually classed as a MIGS treatment.

Many of the MIGS procedures can be combined with cataract surgery, and in fact some should probably only be performed where the natural lens is no longer present, due to the potential to damage that lens otherwise.

Not all of these implants and devices are currently available in Australia as there are safety and regulatory hurdles to be overcome before they can be released. There are financial considerations for the manufacturers, given that Australia is a relatively small market, and surgeons in Australia have to train in the new techniques.

At the present time, iStent® is available and Hydrus® has been introduced. To the author's knowledge, AqueSys® and CyPass® have not yet been released here and only one centre is using ECP on a regular basis. The capital costs of setting up canaloplasty and Trabectome® mean that these may be less likely to be seen in Australia. Private health insurance rebates for the new operations may be variable and public hospitals would, in general, only use such new devices in the setting of a formal research protocol, due in part to obvious budgetary constraints.

Research developments and breakthroughs are undoubtedly exciting – and are reported in the lay media and marketed in such terms – but that does not automatically make them clinically useful. Actual benefit to patients requires a more sober assessment and robust clinical trials are needed to demonstrate patient benefits for any new treatment or operation, and then further to show cost-effectiveness.

Current clinical research on MIGS suggests that these operations do not replace trabeculectomy. The standard operation – which achieves greater decreases in IOP than MIGS – remains preferred for those cases requiring significant IOP lowering, or where the glaucoma is severe. MIGS procedures do not provide any treatment effect that cannot be achieved with conventional treatment, but it is hoped that side-effects with MIGS will be fewer compared to trabeculectomy. Long-term results are not available for many MIGS procedures.

MIGS procedures are at present better classed as operations that enhance existing control in milder glaucoma, or which may allow a reduction in eye-drop treatment burden. One might thus have a MIGS procedure in combination with a cataract operation and afterwards perhaps expect to use fewer eye-drops. There is, at this time, insufficient evidence to justify MIGS over conventional therapy as initial glaucoma treatment.

Fascinating as MIGS is, there exists a legitimate debate as to whether the additional cost of these implants and procedures is justified by the incremental outcomes that are often obtained. Ongoing research will likely show current MIGS procedures to be enthralling steps on a path in the evolution of yet further surgical improvements in glaucoma care.

Our Mission: To eliminate glaucoma blindness