Nadja Geipert

Milling trabeculoplasty leads to comparable reductions in intraocular pressure in patients with open-angle glaucoma as deep sclerectomy, and is simpler to perform, according to Spanish researchers.

“This technique is easier for those who find deep sclerectomy very difficult,” said Ahmed Galal MD PhD, Alicante Ophthalmology Institute, Alicante, Spain.

Dr Galal conducted a study in which the new procedure was performed on 30 eyes with open-angle glaucoma and a mean intraocular pressure of 23.8 mmHg. The researchers compared the results to 30 eyes with similar pathology and a mean intraocular pressure of 21.6 mmHg that underwent deep sclerectomy. The patients in the two groups were of comparable ages, between 65 and 70 years.

No collagen implants were added for the milling trabeculoplasty procedures, but in the deep sclerectomy group 50% of the patients also had a T-flux implant sutured into the scleral bed. The surgeons did not use any mitomycin C during any of the procedures.

“After six months, the final intraocular pressure was the same in the two groups suggesting that milling is a promising new technique for non-penetrating glaucoma surgery,” said Dr Galal.

Dr Galal and his colleagues JL Rodriguez-Prats MD and Jorge Alio MD first introduced the new procedure for non-penetrating glaucoma surgery to ophthalmologists in 2004 after testing the method's safety and efficacy in 13 patients with open-angle glaucoma (Rodriguez-Prats et al; JCRS; Jul 2004 30(7):1507-16).

The researchers reported a 23% reduction in intraocular pressure in those patients. “The motorised milling drill can be safely used to mill and refine the remaining scleral thickness, eliminating the rupture of trabeculo-Descemet's membrane,” the authors reported in their paper.

While argon laser trabeculoplasty and more recently selective laser trabeculoplasty have been favored as effective and safe alternative treatments for glaucoma, non-penetrating glaucoma surgery’s appeal continues because it would eliminate complications such as hypotony.

The current data indicates that milling trabeculoplasty may represent an additional, less-invasive option for surgeons to treat glaucoma unresponsive to medication, he said.

“After six months, the final intraocular pressure was the same in the two groups suggesting that milling is a promising new technique for non-penetrating glaucoma surgery,” said Dr Galal.

“Comparing the results of the deep sclerectomy and milling trabeculoplasty is difficult because the techniques are so different. After six months, the final intraocular pressure was the same in the two groups suggesting that milling is a promising new technique for non-penetrating glaucoma surgery,” said Dr Galal.

The researchers reported a 23% reduction in intraocular pressure in those patients. “The motorised milling drill can be safely used to mill and refine the remaining scleral thickness, eliminating the rupture of trabeculo-Descemet's membrane,” the authors reported in their paper.
A new technology that combines a gold micro-shunt with a deep-penetrating titanium sapphire laser appears promising for the treatment of glaucoma, according to Robert M. Kershner, MD.

The European Agency for the Evaluation of Medicinal Products (EMEA) gave the new system CE approval in October 2005. A few days later, the DeepLight Gold Micro-Shunt (Solx) implant received investigational device exemption approval from the US Food & Drug Administration.

The CE approval was based largely on a pilot study on 70 eyes with severe primary open-angle glaucoma that showed a 34% reduction in intraocular pressure in the 14 months following the implantation. "One of the exciting things about the gold micro-shunt is that in addition to working as an implantable microscopic shunt that lowers intraocular pressure, the level of IOP control can be titrated by the laser. Additional micro channels can be opened with the laser in the office," said Dr. Kershner, an ophthalmologist and consultant specialist at Eye Laser Consulting in Boston, Massachusetts.

Effective in refractory patients
In a pilot study conducted in Spain and Israel, surgeons implanted the shunt into the eyes of 47 patients with primary open-angle glaucoma who had not responded to maximum medication and surgery. Immediately after the procedure, the patients exhibited a sharp decrease in their intraocular pressures. By 18 months after the surgery, the patients still had intraocular pressures that were on average 35% lower than before implantation. In addition, patients’ average number of medications decreased from 3.3 to 1.2.

A few of the patients experienced complications including corneal oedema or spikes in intraocular pressure, but the problems were transient and easy to resolve, according to Shlomo Melamed, MD, director of the Sam Rothberg Glaucoma Centre at the Goldschleger Eye Institute in Tel-Hashomer, Israel. He was one of the lead investigators of the study.

"This is a minimally invasive procedure with no bleb formation, and it seems safe. There was not a single case of choroidal bleeding," he said.

The shunt is anti-inflammatory, antibacterial and inert because it is made of 99.5% pure gold. It is thinner than a human hair and contains multiple micro channels, some of which can be held in reserve for later laser titration as needed. Capillary attraction allows the aqueous fluid to pass through these micro channels.

The other part of the system is a 790-nanometer wavelength titanium sapphire laser, which is the ideal wavelength for maximum absorption by gold. It penetrates the trabecular meshwork deeply with short infrared light pulses that last only five to 10 microseconds. The laser can also be used alone for treatment.

Repeatable and less thermal damage
Unlike the lasers used for selective or argon laser trabeculoplasty, which release the pressure in the trabecular meshwork by making small burns to get drain holes to stretch, the titanium sapphire laser’s quick pulses shake and dislodge particles that are blocking the fluid flow.

"The laser’s long wavelength and deep penetration does not lead to the same thermal damage and scarring that can occur with the ALT and SLT lasers," said Dr. Kershner.

The gold shunt is inserted with an introducer between the anterior chamber and the suprachoroidal space through a 3.0mm perpendicular corneal incision. The device is not felt by the patient and can only be seen at the slit lamp when the eyelid is raised.

One of the reasons past lasers have led to disappointing long-term results is that they did not allow for re-treatment when intraocular pressure rose. With the new system, if some of the shunt channels get clogged after a few years, a surgeon can open additional channels, which are closed by a thin film of gold with the laser and re-activate the shunt’s effect.

"This is something that is unique in the treatment of glaucoma. We now have the capability of photo-titrating the target intraocular pressure for our patients," said Dr. Kershner.

The system’s maker Solx, from Boston Massachusetts, has tested this part of the system in a few patients 12 months after their first implantation. The company reported that re-treating the shunt with the laser led to drops in intraocular pressure of 5.0mm.

A large multi-centre clinical trial including at least 500 patients is now under way in the U.S.