procedures designed to maintain the patency of Schlemm’s canal may be safer than fistulising procedures like trabeculectomy in the treatment of patients with glaucoma and cataract, said Clive Peckar MSc, FRCS, FRCSEd, FRCOphth, Spire Cheshire Hospital, UK.

“I am confident after 15 years of experience of Schlemm’s canal surgery that canaloplasty has real benefits, with low rates of complications, and you should consider adding it to your armamentarium for the management of patients with both cataract and glaucoma,” he told the 16th ESCRS Winter Meeting, during a symposium in Prague.

Dr Peckar said that he generally performs phaco-canaloplasty in patients with cataract and open-angle glaucoma. In exceptional cases with marked cataract and minimal open angle glaucoma, as well as in patients with narrow inlet angles, he generally performs phacoemulsification alone initially to see if that will produce an adequate reduction in IOP, he said.

However, he advised strongly against performing a canaloplasty in eyes where a cataract procedure was likely to be necessary within the following six months, because of the high hydrostatic pressure that occurs during the phacoemulsification.

Dr Peckar noted that, unlike techniques such as trabeculectomy and drainage implant procedures, Schlemm’s canal surgery does not depend on a fistulising bleb to reduce IOP. Instead it re-establishes aqueous drainage by maintaining the integrity of Schlemm’s canal and opening its collector channels, he said.

Schlemm’s canal surgery has undergone a continual evolution since Robert Stegmann MD first introduced viscosocanalostomy back in 1996. That procedure involves baring a portion of Descemet’s membrane, creating an intra-scleral reservoir (or “lake”), and injecting viscoelastic material into the adjacent openings (“ostia”) created in Schlemm’s canal.

The problem with viscosocanalostomies was that they tended to fail over the long term in about three to five per cent of Caucasian patients and in 15 per cent of patients of African descent due to ostia or lake closure, Dr Peckar said. That led to the next innovation, which was the use of intra-ostial polyamide stents in 1999. Gonioscopic imaging of some of the first stents implanted shows that they have maintained the patency of Schlemm’s Canal at 10 year’s follow-up, Dr Peckar noted (Figure 1). The stents were followed by the introduction of canaloplasty with a tension suture in 2005 and by intracanalicular stenting in 2010.

The canaloplasty with tension suture technique involves the passage of a catheter, 200 µm in diameter with 250 µm at its tip, through the entire circumference of Schlemm’s canal. The catheter injects two microlitres of high viscosity sodium hyaluronate (Healon GV) every two clock hours. A helium neon laser illuminates the catheter’s tip so that the surgeon may observe its progress during the procedure.

When the leading tip of the catheter emerges, the surgeon ties a suture to the end of the catheter and draws it through Schlemm’s canal and then ties and tightens a knot in the suture’s two ends. The flap is then closed and sutured watertight so that no bleb will form, he noted.

“Further, when you access the Schlemm’s canal, the ostia (blood can be seen exiting temporal ostium) usually remain patent and you have access to the entire canal, whereas if you were to use a ring expander, it would be often less than 180° and you have access to the canal with some ostia in the area of the expander that you couldn’t access as well. You have access to the whole canal which is the advantage of this technique,” Dr Peckar said.

An evolving technique

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“The advantage of this particular procedure is that, not only does it give you access to the whole canal, but it also allows you to dilate and stretch the canal and open up the collector channels, to aid physiological outflow. Once you have tied the sutures, under tension, you can see the aqueous permeating through the Descemet’s window, and when you carry out micro-angiography (also known as channelography) you can see the dyed aqueous going through the collector channels while leaving the ciliary veins untouched,” Dr Peckar said.

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Figure 2: Phaco-Viscosocanalostomy versus Phaco-Canaloplasty: IOPs

Phaco-canaloplasty safe and effective

Dr Peckar noted that in his hands phaco-canaloplasty and phaco-viscosocanalostomy are both effective in terms of IOP reduction. In a series of 108 patients who underwent phaco-viscosocanalostomy, mean IOP with maximal medication fell from a preoperative value of 22.0 mmHg preoperatively, to 16.0 mmHg postoperatively. Similarly in a series of 51 eyes that underwent phaco-canaloplasty, mean IOP with maximal medication fell from 24 mmHg preoperatively to 14 mmHg postoperatively (Figure 2).

The complication rates with both viscosocanalostomy and canaloplasty procedures tend to be fairly low, he said. In a joint paper by Dr Peckar and Norbert Körber MD in Cologne, there were no instances of choroidal detachment or flat anterior chamber (Peckar C. O. and Körber N., Spectrum der Augenheilkunde (Sept 2008); 22/4: 240-246).

A transient hypoxia occurred in two per cent of 121 eyes that underwent viscosocanalostomy and in 10 per cent of eyes undergoing canaloplasty. The biggest problem in the combined series was that in nine per cent of eyes undergoing canaloplasty it was not possible to pass a suture 360° because of an irregularly shaped Schlemm’s canal, he said.

“We sometimes think of Schlemm’s canal as a big circle around the eye but it can be quite irregular and at any point in the circumference you could come up with an angle that is difficult to overcome.”

The recent introduction of intracanalicular stents overcomes that difficulty. The new stents are 9.0mm long, are completely flexible and have a shape similar to the spine of a miniature snake (Stegmann Canal Expander”). Each is designed to occupy a quarter of Schlemm’s circumference maintaining dilatation and allowing access to the collector channels. They are placed following dilatation with the same type of microcatheter as is used in the tension suture technique (“ITrack”) using a 6/0 carrier to position the Expander (Figure 3).

“The advantage of the intra-canulacal stents is that although we may be unable in some cases to use a tension suture, it will still usually be possible to thread a Canal Expander into each side,” Dr Peckar added.