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Phacocanaloplasty: Combining Canaloplasty with Cataract Surgery

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Phacocanaloplasty, a new procedure, can safely reduce intraocular pressure in cataract surgery patients with open-angle glaucoma.

In the past, surgical treatment for glaucoma generally meant either trabeculectomy or tube shunt surgery. Surgeons treating patients with both glaucoma and cataract had relatively few good options. On one hand, performing incisional glaucoma surgery alone to address the patient's glaucoma could make the cataract worse. On the other hand, performing cataract surgery alone may not lower intraocular pressure (IOP) enough to significantly reduce the patient's risk of glaucoma progression. Performing two separate operations could potentially be hard on the patient; while performing a combined procedure to address the cataract and glaucoma simultaneously could induce an inflammatory response that would limit the efficacy of the filtration procedure.

Fortunately, there are now more surgical options for glaucoma, including canaloplasty, endocyclophotocoagulation (ECP), and Trabectome® surgery (NeoMedix), all of which can be safely combined with cataract surgery. Canaloplasty is particularly effective when performed in association with cataract surgery. There is now evidence that canaloplasty provides greater IOP reduction when performed as part of a combined procedure than when performed alone.

Pros and Cons of Canaloplasty

A relatively new procedure, canaloplasty aims to restore normal function to the aqueous drainage system by putting tension on the trabecular meshwork, thereby opening up the spaces that give aqueous humor access to Schlemms canal. This is achieved by inserting a microcatheter with an illuminated tip (available from iScience) into Schlemms canal and using viscoelastic and a tension suture to open up the canal. The cataract surgery itself may further improve aqueous outflow by altering the architecture of the angle, resulting in a more open configuration.

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The primary benefit of this approach is that it provides efficacy comparable to trabeculectomy without the risks associated with a filtration bleb. After 3 years, a group of canaloplasty patients (who did not undergo cataract surgery) achieved a mean IOP of 15.5 mm Hg (from a mean baseline IOP of 23 mm Hg); when canaloplasty was performed in conjunction with cataract surgery, patients achieved a mean IOP of 13.5 mm Hg. The success of these operations is revealed in their effect on the patients' need for medication: the average reduction in medications was 53% with canaloplasty alone and 80% with phacocanaloplasty.[1]

Because canaloplasty does not require a bleb, it largely avoids the more serious complications associated with trabeculectomy, including infection, hypotony, and ocular surface disease. Like any glaucoma procedure, however, canaloplasty sometimes fails to achieve the desired IOP reduction, in which case more aggressive therapies are needed. Also, in approximately 10% of cases it is not possible to thread the catheter into Schlemms canal; in these cases, the procedure can be converted to a trabeculectomy. Finally, canaloplasty carries a small risk of causing Descemets membrane detachment and hyphema.

Adopting Canaloplasty

Phacocanaloplasty provides significant IOP reduction that appears to be sustained over at least 3 years. While canaloplasty is clearly a valuable technique, adding it to a cataract surgeon's armamentarium requires a commitment to acquiring the necessary skills and knowledge, beginning with a clear understanding of angle anatomy.

CANALOPLASTY

- ☑ Increases aqueous outflow
- ☑ Microcatheter and tension suture help to open up Schlemms canal
- ☑ Equipment available from iScience Interventional
- ☑ Benefits
  - — Offers IOP reduction comparable to trabeculectomy
  - — Reduced risk of bleb-related complications
  - — Can reduce number of glaucoma medications needed
  - — Modest investment in new equipment
- ☑ Disadvantages
  - — Procedure requires a learning curve
  - — Procedure is not covered by all insurance carriers
- ☑ Tips for Success
  - — Plan for learning curve of 10 to 15 cases
  - — Participate in wet labs
  - — Observe other surgeons performing the procedure
  - — Select appropriate patients

Realistic expectations for the first few cases are also important, as surgeons may need to perform 10 to 15 cases to become proficient with this procedure. To shorten this learning curve, I recommend participating in the wet labs offered by iScience, observing other surgeons as they perform the procedure, and clustering cases in the first few months in order to get sufficient practice.

In addition to learning the technical aspects of the procedure, careful patient selection is essential. Starting out performing canaloplasty in patients who are poor candidates for

trabeculectomy is generally ill advised, as these patients are likely to have poor outcomes with any procedure. Instead, I recommend that surgeons perform their first canaloplasty procedures on patients with mild to moderate open-angle glaucoma who are taking two or three antihypertensive medications and have grade 4 angles. These patients stand to benefit significantly from the IOP reduction canaloplasty can provide, and are less likely to have complicating factors that might hinder the success of the procedure.

Suitable Candidates

In general, canaloplasty is suitable for patients with primary open-angle glaucoma, pigmentary glaucoma, and pseudoexfoliative glaucoma, but it is not recommended for patients with angle-closure glaucoma. I also avoid performing canaloplasty in patients who have had several previous glaucoma surgeries, since there may have been trauma or damage to Schlemms canal and the aqueous collector channel system.

Of course, the amount of IOP lowering that patients require is always a key consideration when selecting a procedure. On one end of the spectrum, cataract surgery alone may provide limited IOP lowering; on the other end of the severity scale, patients who need more dramatic IOP reduction may need to be treated with either trabeculectomy or tube shunt surgery.

In between these extremes stand canaloplasty and the other more minimally invasive glaucoma surgeries. I prefer canaloplasty for many of the patients in this middle group, since my clinical impression is that canaloplasty provides better IOP lowering than most glaucoma procedures.

Tips for a Successful Combined Procedure

Once surgeons have decided to learn canaloplasty and selected the appropriate patients, this procedure can be easily combined with cataract surgery. Because it is not necessary to integrate the two procedures, I simply perform the cataract surgery first, typically from a temporal approach, and then I perform the canaloplasty procedure.

I perform the cataract surgery exactly as I would a routine case, except that I place a suture on the corneal wound at the end of the procedure. This extra wound sealing is helpful because canaloplasty subjects these eyes to additional manipulation.

Performing Canaloplasty

I start the canaloplasty procedure with a conjunctival incision and superficial scleral flap dissection, much as I would do for a trabeculectomy (Figure 1). I then make a deep flap

dissection to allow access to Schlemms canal (Figure 2). The next step is to make a Descemets window. Before performing this step, I let a little fluid out of the eye to lower the IOP because I do not want the intraocular fluid pressure to build up and burst through the window.

Once Descemets window is ready, I insert the microcatheter into the canal and thread it 360 degrees through Schlemms canal (Figure 3). Next, I tie a 10-0 polypropylene tension suture to the microcatheter (Figure 4). At this point I inject a small amount of viscoelastic into Schlemms canal while retracting the suture from the eye, after which I secure the suture and check its tension. Finally, I remove the deep scleral flap, secure the superficial scleral flap, and check to make sure I have a good, watertight closure of the conjunctival incision (Figure 5).

One of the benefits of this procedure is that it requires only a few pieces of new equipment—just an iLumin™ fiber optic micro illumination system and an iTrack™ microcatheter (both from iScience), as well as some polypropylene sutures. In addition to these basics, there are some other instruments that can help to facilitate different aspects of the procedure but that aren't absolutely necessary. For example, I find that a small Grieshaber® blade works well for creating the inner scleral flap, and a small canaloplasty manipulator can help the surgeon make the Descemets window.

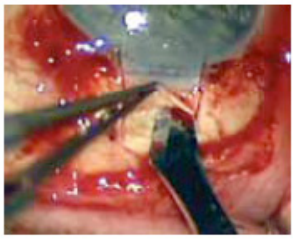

FIGURE 1 Creation of a superficial scleral flap.

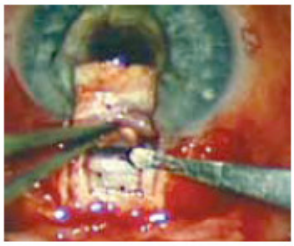

FIGURE 2 Creation of a deep scleral flap.

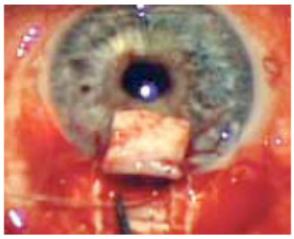

FIGURE 3 The microcatheter is rotated for 360 degrees in Schlemms canal.

FIGURE 4 A 10-0 polypropylene suture is tied to the microcatheter.

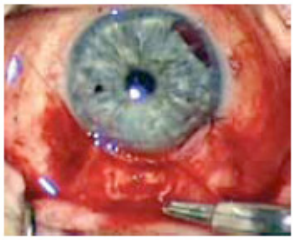

FIGURE 5 The conjunctiva is closed and then checked to ensure a watertight seal.

The Bottom Line

Combining canaloplasty and cataract surgery offers multiple benefits for patients needing treatment for both cataracts and glaucoma. A useful procedure on its own, performing canaloplasty with cataract surgery increases its benefit to patients. Surgeons must commit to performing a sufficient number of cases when learning to perform canaloplasty, but once mastered, this procedure can be highly rewarding.

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