Canaloplasty After Failed Trabeculectomy: A Possible Option

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Abstract: Canaloplasty is usually indicated for eyes that have not undergone previous filtrating surgery for glaucoma. In some cases, however, “trabeculectomy” can be targeted anterior to the angle components, thus leaving Schlemm’s canal integral and untouched. In the past 4 years of performing canaloplasty in our Glaucoma Clinic in Udine, a total of 6 eyes with previous failed trabeculectomy and elevated intraocular pressure (IOP) despite maximum tolerated medical therapy underwent canaloplasty. The preoperative IOP was 32.2 ± 9.6 mm Hg, ranging from 25 to 48 mm Hg. In this group of patients, canaloplasty could be correctly completed in 5 cases; in 1 case, however, Schlemm’s canal could not be cannulated for the entire 360-degree circumference, thus surgery was converted into viscoanalostomy. Follow-up ranged between 6 and 28 months (mean, 16.7 ± 9.3 mo). The mean IOP at 6, 12, 18, and 24 months was 17.3, 15.4, 14.7, and 16.3 mm Hg, respectively. The number of medications used before and at the 2-year follow-up was 3.2 ± 1.2 and 2.3 ± 0.5, respectively. Our results suggest that canaloplasty can be considered as a possible surgical option in eyes with failed trabeculectomy showing undamaged Schlemm’s canal from previous filtrating surgery.

Key Words: open-angle glaucoma, trabeculectomy, canaloplasty

Trabeculectomy is still considered as the gold standard in the surgical treatment for glaucoma. This technique is effective and simple to perform, however, fibrosis and scarring of the bulbar conjunctiva can sometimes occur postoperatively, which can lead to complete failure. In these cases, various surgical options can be considered, including revision of the nonfunctioning bleb, new trabeculectomy in different site, seton implantation, etc. Canaloplasty is a nonperforating blebless technique, derived from viscoanalostomy, in which a 10-0 prolene suture is positioned and tensioned within Schlemm’s canal, thus facilitating aqueous outflow through natural pathways (collectors channels and aqueous veins). This elegant procedure can only be performed if the Schlemm’s canal is open for the entire 360 degrees; thus, cannot be considered in eyes that have undergone trabeculectomy, in which trabecular meshwork and a portion of the Schlemm’s canal have been excised. In some cases, especially if a surgical punch has been used for trabeculectomy, the excision is positioned anterior to the angle structures (sclero-keratectomy), leaving the canal intact. If intraocular pressure (IOP) rises and surgical failure occurs in these eyes, canaloplasty can be considered as a possible option.

MATERIAL AND METHODS

Five patients affected with primary open-angle glaucoma and 1 with pseudoesfoliation glaucoma having undergone previous trabeculectomy and under maximum tolerated medical therapy (defined as 3 or more different topical medications or insufficient IOP control with tolerated drops in use) underwent canaloplasty under local anesthesia (peribulbar injection of carbocaine and lidocaine). In all cases, the previous trabeculectomy (performed 5 to 12 y prior; mean
8 y) seemed to be positioned anterior to the trabecular meshwork, leaving Schlemm’s canal untouched, as observed by gonioscopy (Fig. 1). All cases had high levels of IOP, typical optic nerve alterations, and glaucomatous visual field defects in progression.

The canaloplasty surgical technique is currently well known and has extensively been reported in literature.2–7 In our cohort, the scleral flap was sculpted laterally to the flap previously used for trabeculectomy. All patients underwent a complete ophthalmic examination every 6 months, including slit-lamp examination to exclude any sign of conjunctival bleb formation, best corrected visual acuity measurement, IOP measurement with Goldmann applanation tonometer, fundus examination with a Volk 78D lens, visual field testing (Humphrey Field Analyzer 30-2 SITA standard test), and gonioscopy with a Goldmann 2-mirror lens. The follow-up ranged from 6 to 28 months (mean, 16.7 ± 9.3 mo).

TABLE 1. Preoperative and Postoperative Intraocular Pressure Values During the Follow-up

<table>
<thead>
<tr>
<th>Preoperative</th>
<th>3 mo</th>
<th>6 mo</th>
<th>12 mo</th>
<th>18 mo</th>
<th>24 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.2 ± 9.6</td>
<td>18.2 ± 5.8</td>
<td>17.3 ± 3.6</td>
<td>15.4 ± 3.8</td>
<td>14.0 ± 2.9</td>
<td>16.3 ± 2.1</td>
</tr>
</tbody>
</table>

Values expressed in mm Hg (mean ± SD).

RESULTS

The preoperative IOP was 32.2 ± 9.6 mm Hg, ranging from 25 to 48 mm Hg. The procedure could be correctly performed in 5 cases (Fig. 2). In 1 primary open-angle glaucoma patient, Schlemm’s canal could not be cannulated, thus the procedure was converted into viscocanalostomy. The mean IOP ± SD at various follow-up times is reported in Table 1. The mean IOP reduction at 2 years was 15.9 mm Hg (49.4%). The number of medications used before and at the 2-year follow-up was 3.2 ± 1.2 and 2.3 ± 0.5, respectively.

DISCUSSION

Canaloplasty is a relatively new surgical procedure that aims at restoring the physiological outflow pathways without subconjunctival filtration. Schlemm’s canal must be integral and pervious for the entire circumference in order to obtain successful results. Canaloplasty is usually not considered after failed trabeculectomy, mainly because a portion of sclera containing the trabecular meshwork and the Schlemm’s canal are usually removed in prior surgery. In some selected cases, however, in which Schlemm’s canal remained intact, canaloplasty can prove to be an interesting alternative after failed trabeculectomy. In these cases, the other possible options include: (1) revision of the failed bleb; (2) new trabeculectomy; (3) nonperforating surgery (either a deep sclerectomy or a viscocanalostomy); and (4) a seton implant.

Revision of the bleb or new trabeculectomy tend not to be successful due to the same reasons that lead to failure of the initial trabeculectomy, mainly conjunctival scarring, which is often difficult to manage despite the use of antimetabolites. Nonperforating surgery can provide better postoperative results in the beginning, however, these types of procedures tend to lose efficacy over time. Some surgeons prefer implanting a tube or a valve in these cases, however, the complications can be severe and sight threatening.

Although our cohort and follow-up are limited, our results suggest that canaloplasty can be a successful alternative after failed trabeculectomy.

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REFERENCES