Viscocanalostomy and Canaloplasty

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Origination: 9/2012  Next Review: 9/2019

Policy
Blue Cross and Blue Shield of Kansas City (Blue KC) will provide coverage for canaloplasty when it is determined to be medically necessary because the criteria shown below are met.

When Policy Topic is covered
Canaloplasty may be considered medically necessary as a method to reduce intraocular pressure in patients with chronic primary open-angle glaucoma under the following conditions:
- Medical therapy has failed to adequately control intraocular pressure, AND
- The patient is not a candidate for any other intraocular pressure lowering procedure (e.g. trabeculectomy or glaucoma drainage implant) due to a high risk for complications.

When Policy Topic is not covered
Canaloplasty is considered investigational under all other conditions, including angle-closure glaucoma.

Viscocanalostomy is considered not medically necessary.

Considerations
Tensioning devices are only able to reduce intraocular pressure (IOP) to the mid-teens, and may be inadequate when very low IOP is needed to reduce glaucoma damage.

The CPT codes for these procedures were changed in 2011. The current codes are as follows:
66174 - Transluminal dilation of aqueous outflow canal; without retention of device or stent
66175 - Transluminal dilation of aqueous outflow canal; with retention of device or stent

The insertion of the iTrack device for subchoroidal delivery of pharmacologic is addressed in a separate policy.
Glaucoma surgery is intended to reduce intraocular pressure (IOP) when the target IOP cannot be reached with medications. Due to complications with established surgical approaches (eg, trabeculectomy), alternative surgical treatments (eg, transluminal dilation by viscocanalostomy or canaloplasty) are being evaluated for patients with glaucoma.

For individuals who have open-angle glaucoma who have failed medical therapy who receive viscocanalostomy, the evidence includes small randomized controlled trials (RCTs) comparing viscocanalostomy with trabeculectomy. Relevant outcomes are symptoms, morbid events, quality of life, and medication use. Meta-analysis of these trials has indicated that trabeculectomy has a greater IOP-lowering effect than viscocanalostomy. Reduction in IOP was greater with canaloplasty than viscocanalostomy in a small within-subject comparison. Viscocanalostomy has not been shown to be as good as or better than established alternatives. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.

For individuals who have open-angle glaucoma who have failed medical therapy who receive canaloplasty, the evidence includes 1 RCT, 1 comparative effectiveness review, and several case series. Relevant outcomes are symptoms, morbid events, quality of life, and medication use. The RCT found not only significantly higher complete success rates with trabeculectomy than with canaloplasty, but also higher complication rates. The qualified success rate (with medication) was similar between groups. A systematic review found that canaloplasty provided modest IOP reduction (to ≈16 mm Hg) with minor intraoperative or postoperative complications. Further evidence from RCTs is required to corroborate results of this single trial. The evidence is insufficient to determine the effects of the technology on health outcomes.

Clinical input in 2011 considered canaloplasty to be appropriate for a select group of patients, including those who are at risk for infection or hypotony, who have surface disease precluding the creation of good trabeculectomy bleb, or who would not be able to cover a glaucoma drainage device implant. In this clinical context,
the evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

**Background**

Surgical procedures for glaucoma aim to reduce intraocular pressure (IOP) resulting from impaired aqueous humor drainage in the trabecular meshwork and/or Schlemm’s canal. In the primary (conventional) outflow pathway from the eye, aqueous humor passes through the trabecular meshwork, enters a space lined with endothelial cells (Schlemm’s canal), drains into collector channels, and then into the aqueous veins. Increases in resistance in the trabecular meshwork and/or the inner wall of Schlemm’s canal can disrupt the balance of aqueous humor inflow and outflow, resulting in an increase in IOP and glaucoma risk.

Surgical intervention may be indicated in patients with glaucoma when the target IOP cannot be reached pharmacologically. Trabeculectomy (guarded filtration surgery) is the most established surgical procedure for glaucoma, allowing aqueous humor to directly enter the subconjunctival space. This procedure creates a subconjunctival reservoir with a filtering “bleb” on the eye, which can effectively reduce IOP, but is associated with numerous and sometimes sight-threatening complications (e.g., leaks, hypotony, choroidal effusions and hemorrhages, hyphemas or bleb-related endophthalmitis) and long-term failure. Other surgical procedures (not addressed in this policy) include trabecular laser ablation and deep sclerectomy, which removes the outer wall of Schlemm’s canal and excises deep sclera and peripheral cornea.

More recently the Trabectome™, an electrocautery device with irrigation and aspiration, has been used to selectively ablate the trabecular meshwork and inner wall of Schlemm’s canal without external access or creation of a subconjunctival bleb. IOP with this ab interno procedure is typically higher than the pressure achieved with standard filtering trabeculectomy. Aqueous shunts may also be placed to facilitate drainage of aqueous humor. Complications of anterior chamber shunts include corneal endothelial failure and erosion of the overlying conjunctiva.

Alternative nonpenetrating methods that are being evaluated for glaucoma are viscocanalostomy and canaloplasty. Viscocanalostomy is a variant of deep sclerectomy and unroofs and dilates Schlemm’s canal without penetrating the trabecular meshwork or anterior chamber. A high-viscosity viscoelastic solution, such as sodium hyaluronate, is used to open the canal and create a passage from the canal to a scleral reservoir. It has been proposed that viscocanalostomy may lower IOP while avoiding bleb-related complications.

Canaloplasty was developed from viscocanalostomy and involves dilation and tension of Schlemm’s canal with a suture loop between the inner wall of the canal and the trabecular meshwork. This ab externo procedure uses the iTrack™ illuminated microcatheter (iScience Interventional) to access and dilate the length of Schlemm’s canal and to pass the suture loop through the canal. An important difference between viscocanalostomy and canaloplasty is that canaloplasty
attempts to open the entire length of Schlemm’s canal, rather than one section of it.

Because aqueous humor outflow is pressure-dependent, the pressure in the reservoir and venous system is critical for reaching the target IOP. Therefore, some procedures may not reduce IOP below the pressure of the distal outflow system used (eg, <15 mm Hg), and are not indicated for patients for whom very low IOP is desired (eg, those with advanced glaucoma). Health outcomes of interest are the IOP achieved, reduction in medications, ability to convert to trabeculectomy if the procedure is unsuccessful, complications, and durability of the procedure.

**Regulatory Status**
The iTrack (iScience Interventional) received 510(k) marketing clearance from the U.S. Food and Drug Administration (FDA) in 2004 as a surgical ophthalmic microcannula that is indicated for the general purpose of “fluid infusion and aspiration, as well as illumination, during surgery.” In 2008, the iTrack received FDA-clearance for the indication of “catheterization and viscodilation of Schlemm’s canal to reduce intraocular pressure in adult patients with open angle glaucoma.”

**Rationale**
This evidence review was created in September 2011 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was performed through January 8, 2018.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. RCTs are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader
clinical populations and settings of clinical practice. The following is a summary of the key literature to date.

**Viscocanalostomy**

**Systematic Reviews**
A meta-analysis by Chai and Loon (2010) compared the safety and efficacy of viscocanalostomy with the criterion standard of trabeculectomy.\(^1\) Ten RCTs with a total of 458 eyes (397 patients) with medically uncontrolled glaucoma were analyzed. The number of eyes in each study ranged from 20 to 60, with follow-up ranging from 6 months to 4 years. Most eyes (81%) had primary open-angle glaucoma (POAG), while 16.4% had secondary open-angle glaucoma, and 1.7% had primary angle-closure glaucoma. Meta-analysis found that trabeculectomy had a significantly better pressure-lowering outcome. The difference in intraocular pressure (IOP) between viscocanalostomy and trabeculectomy was 2.25 mm Hg at 6 months, 3.64 mm Hg at 12 months, and 3.42 mm Hg at 24 months. Viscocanalostomy had a significantly higher relative risk (RR) of perforation of the Descemet membrane (RR=7.72). In contrast, viscocanalostomy had significantly fewer postoperative events than trabeculectomy (hypotony RR=0.29, hyphema RR=0.50, shallow anterior chamber RR=0.19, cataract formation RR=0.31). Although viscocanalostomy had a better risk profile, most adverse events associated with trabeculectomy were considered to be mild and reversible. Similar results were obtained in a Cochrane review and meta-analysis by Eldaly et al (2014) that included 2 small randomized trials (total 50 eyes).\(^2\)

**Randomized Controlled Trials**
A study included in the Chai and Loon systematic review is the RCT by Gilmour et al (2009), which reported 4-year follow-up.\(^3\) Patients (N=43) with open-angle glaucoma were randomized to viscocanalostomy (25 eyes) or trabeculectomy (25 eyes) and prospectively followed at regular intervals for up to 60 months. A successful outcome was defined as an IOP less than 18 mm Hg with no medications; a qualified success was defined as an IOP less than 18 mm Hg with or without topical treatment. One patient in each group was lost to follow-up. At baseline, patients had a mean IOP of 25 mm Hg and were using an average of 1.4 medications. At mean follow-up of 40 months (range, 6-60 months), 10 (42%) patients in the trabeculectomy group had achieved success compared with 5 (21%) patients in the viscocanalostomy group. Although 19 (79%) patients in both groups achieved qualified success, fewer trabeculectomy patients required additional topical treatment (50% vs 83%, respectively) to achieve qualified success. There were more early postoperative complications in the trabeculectomy group (eg, hypotony, wound leak, choroidal detachment), but they did not affect outcomes. At 1 month, conjunctival blebs were observed in 19 (79%) of the trabeculectomy group and 16 (64%) of the viscocanalostomy group. At 12 months, blebs were observed in 19 (79%) of the trabeculectomy group and 14 (56%) of the viscocanalostomy group. The proportion of patients with conjunctival blebs at final follow-up and the statistical significance of these differences were not reported. It was reported that more bleb manipulations (7 vs 1) and
antimetabolites (5 vs 1) were needed in the trabeculectomy group. The 3 patients who required cataract surgery were in the viscocanalostomy group.

Case Series
Kobayashi et al (2003) reported on a within-subject safety and efficacy comparison of trabeculectomy (with mitomycin C) and viscocanalostomy in 25 patients with bilateral POAG who had IOP greater than 22 mm Hg under medical therapy. Patients were randomized to trabeculectomy in 1 eye and viscocanalostomy (with removal of the internal wall of the Schlemm canal) in the other. Follow-up was performed on certain days, weeks, and months up to 12 months after surgery. Throughout follow-up, mean IOP decreased significantly more in trabeculectomy-treated eyes (eg, from 24.8 to 12.6 mm Hg at 12 months) than in viscocanalostomy-treated eyes (from 25.0 to 17.1 mm Hg at 12 months). At 12 months, significantly more trabeculectomy-treated eyes achieved an IOP less than 20 mm Hg without medication (88% vs 64%, respectively). Mean IOP reduction was 48.9% in trabeculectomy-treated eyes and 30.5% in viscocanalostomy-treated eyes. Overall success (IOP <20 mm Hg) and IOP reduction greater than 30% with or without glaucoma medication did not differ significantly between the groups (96% for trabeculectomy vs 92% for viscocanalostomy). Although trabeculectomy had a greater IOP-lowering effect, viscocanalostomy had fewer complications (1 microperforation of the Descemet membrane vs 4 cases of shallow anterior chamber, and 5 cases of hypotony with IOP <4 mm Hg).

Grieshaber et al (2015) reported on long-term results of viscocanalostomy for a series of 726 patients. Mean IOP before surgery was 42.6 mm Hg. Mean IOP postsurgery was 15.4 mm Hg at 5 years, 15.5 mm Hg at 10 years, and 16.8 mm Hg at 15 years. Qualified success (with or without medications) at 10 years (<of 18 mm Hg) was 40% in the European population and 59% in the African population. Laser goniopuncture was performed postoperatively on 127 (17.7%) eyes. Fifty-three (7.3%) eyes were considered failures and required reoperation. There were no significant complications.

Stangos et al (2012) reported on the effect of the learning curve on surgical outcomes from viscocanalostomy for a retrospective series of 180 consecutive cases performed by 2 surgeons at a single center in Europe. Overall success (no visual field deterioration with an IOP ≤20 mm Hg) and IOP reduction of 30% or more compared with baseline values improved from 64% for the first 45 and to 91% for the last 45 cases of the series. Complete success (no medications required) improved from 38% to 73%. Surgical complications did not differ significantly between the first (16) and last 45 cases (10).

Section Summary: Viscocanalostomy
Two meta-analyses and a systematic review have evaluated RCTs comparing viscocanalostomy with trabeculectomy and reported that trabeculectomy was significantly better than viscocanalostomy at lowering IOP in patients with open-angle glaucoma. Similarly, a randomized, within-subject comparative trial reported that trabeculectomy was significantly better than viscocanalostomy at lowering
IOP. However, results of other outcome measures did not differ significantly between trabeculectomy and viscocanalostomy. Viscocanalostomy was associated with fewer complications than trabeculectomy. A nonrandomized uncontrolled study suggested that results of viscocanalostomy were sustained over the long-term (up to 15 years) with no significant complications. However, about 7% of treated eyes required reoperation.

Canaloplasty

Systematic Reviews
A comparative effectiveness review of newer (Trabectome and canaloplasty) and older (trabeculectomy and Baerveldt shunt) surgeries for glaucoma was published in 2009. Twelve-month outcomes (IOP adjunctive medications, complications) were compared after glaucoma-only and combined glaucoma-phacoemulsification surgeries. Reviewers found that Trabectome and canaloplasty provided modest IOP reduction (to \(\approx 16\) mm Hg) with minor intraoperative or postoperative complications. Reductions for Baerveldt glaucoma implant IOP were comparable to those for trabeculectomy (\(\approx 12\) mm Hg), but the Baerveldt shunt required more postoperative IOP-lowering medication (average, 1.3 medications vs 0.5 medications, respectively) to produce a success rate comparable to trabeculectomy. Patients treated with Trabectome required more medications (average, 1.5) to control IOP than patients treated with canaloplasty (average, 0.6). Reviewers concluded that Trabectome and canaloplasty were reasonable surgical choices for patients in whom IOPs in the mid-teens seemed adequate; although trabeculectomy was the most effective IOP-lowering procedure, it also had the most serious complication rates.

Randomized Controlled Trials
Matlach et al (2015) reported on an RCT with 62 patients that compared canaloplasty (n=31) with trabeculectomy (n=31) for the treatment of open-angle glaucoma. Patients included had medically uncontrolled or not sufficiently lowered IOP and progression of visual field defects or structural changes to the optic disc over time. The primary end point was an IOP of 18 mm Hg or less or an IOP reduction of at least 20% and less than 21 mm Hg without medication. Complete success at 2 years was achieved in 74.2% of patients after trabeculectomy and 39.1% of patients after canaloplasty (p=0.01). The qualified success rate (with medication) did not differ significantly between the 2 groups, although more patients in the canaloplasty group needed IOP-lowering medication (52.2% vs 25.8%, respectively). Mean absolute IOP reduction was similar for both interventions. There was a trend (p=0.08) for visual acuity to be lower in the canaloplasty group during follow-up. Trabeculectomy was associated with more frequent postoperative complications, including hypotony (37.5%), choroidal detachment (12.5%), and corneal erosion (43.8%). Scarring of the filtering bleb was a late complication in 25% of trabeculectomy patients. One study flaw was the unequal rate of dropouts (23.3% [7/30] for canaloplasty vs 3.1% [1/32] for trabeculectomy) over the 2 years of study. Another study (2015) by this group found higher quality of life (QOL) at 24 months following canaloplasty than trabeculectomy in a questionnaire survey of 327 patients. Canaloplasty patients
had a higher positive postoperative mood, higher satisfaction with surgical results, and lower rates of visual and nonvisual symptoms and stress caused by surgery or postsurgical treatment. Difficulties with activities of daily living (eg, reading) and complaints (eg, eye burning) were significantly lower in the canaloplasty group. Some questions used were not from validated QOL questionnaires.

Case Series
Most of the primary literature on canaloplasty consists of case series that have compared posttreatment with pretreatment IOP. For example, a retrospective comparative study by Ayyala et al (2011) evaluated outcomes from 33 eyes (33 patients) that underwent canaloplasty and 46 eyes (46 patients) that underwent trabeculectomy during a 2-year period and had a minimum follow-up of 12 months.10 This study group was drawn from 243 patients who underwent surgery during the same 2-year period (87 canaloplasty procedures, 156 trabeculectomy procedures). The specific procedure was determined by the ability to obtain insurance coverage for canaloplasty, and the groups were comparable in demographics, previous surgery, and visual acuity at baseline. At 12 months postsurgery, mean reduction in IOP from preoperative values was 32% for canaloplasty and 43% for trabeculectomy (p=0.072). IOP was slightly lower in the trabeculectomy group (11.6 mm Hg vs 13.8 mm Hg; p=0.03), and fewer patients in that group needed postoperative glaucoma medications. There was no significant difference in surgical reoperation rates between the 2 procedures (15% canaloplasty vs 11% trabeculectomy). This study had a potential for patient selection bias. Only a minority of surgical patients had 12-month follow-up data, and treatment group assignment depended on insurance status.

Lewis et al (2007) reported on interim data analysis from a manufacturer-sponsored multicenter (15 centers) safety and efficacy study on canaloplasty using the iTrack microcatheter11 with 2- and 3-year results reported in 2009 and 2011.12,13 The 2011 study included 157 patients with a diagnosis of POAG, pigmentary glaucoma, exfoliative glaucoma, and a baseline IOP of 16 mm Hg or higher before surgery, with a history of IOP of 21 mm Hg or higher. Exclusion criteria were neovascular disease, uveitis, peripheral anterior synchiae, angle recession, and developmental or secondary glaucoma (except for pigmentary and exfoliative glaucoma). At baseline, mean IOP was 23.8 mm Hg, and patients were on an average of 1.8 medications. Canaloplasty was successful in 133 (85%) eyes. Eyes that did not have placement of a tensioning suture were viscodilated to the extent possible by catheterizing the canal from both ostia. Some of the more common early surgical and postoperative complications included microhyphema (12%), hyphema (10%), elevated IOP (6%), and Descemet membrane detachment (3%). More common late postoperative complications included cataracts (12.7%) and transient IOP elevation (6.4%). At 3 years postoperatively, 134 study eyes (85% follow-up) had a mean IOP of 15.2 mm Hg and mean glaucoma medication use of 0.8 medications; 66 (49.3%) eyes were on no medications. Another 7 (4.4%) patients had additional glaucoma surgery. With qualified success defined as achieving an IOP of 18 mm Hg or lower (with 0-2 medications), success was achieved in 69 (77.5%) of the 89 eyes that had
successful suture implantation alone and in 24 (89%) of the 27 eyes with
successful suture placement combined with phacoemulsification.

Additional reports from this group of investigators included interim 1-year results
(2008) for 40 patients who had combined canaloplasty and cataracts surgery
(potential overlap in patients from the study described earlier) and a within-
subjects comparison (2012) in 15 patients who participated in the trial described
earlier who had bilateral POAG and received canaloplasty in 1 eye and
viscocanalostomy in the contralateral eye. For the canaloplasty eye, IOP
decreased from 26.5 mm Hg on 2.1 medications to 14.5 mm Hg on 0.3
medications. For the viscocanalostomy eye, IOP decreased from 24.3 mm Hg on
1.9 medications to 16.1 mm Hg on 0.4 medications. Reduction in IOP from
baseline was significantly greater with canaloplasty (12.0 mm Hg) than with
viscocanalostomy (8.2 mm Hg; p=0.02). No losses in visual acuity or adverse
events were reported for either procedure. The investigators noted that this study
evaluated the effects of two other maneuvers associated with canaloplasty: (1)
360° viscodilation of Schlemm canal, as opposed to partial dilation achieved with
viscocanalostomy, and (2) prolonged opening and tensioning of Schlemm canal
with suture placement.

The same investigators also reported on an industry-sponsored, 3-year
prospective, multicenter study (2011) of 109 open-angle glaucoma patients (109
eyes) who underwent canaloplasty or combined cataract-canaloplasty surgery. All patients had documented visual field loss and met criteria for diagnosis of
glaucoma and failure of prior medical or laser therapy. A tensioning suture was
successfully placed in 98 (89.9%) eyes, and 96 (88.1%) eyes completed the 3-
year follow-up. Of the 13 patients who did not complete follow-up, 4 (3.7%) had
additional glaucoma surgery; they were not included in the analysis. In eyes
treated with canaloplasty with a successful tensioning suture, IOP decreased from
23 mm Hg on 1.9 medications to 15.1 mm Hg on 0.9 medications. In eyes treated
with combined cataract-canaloplasty surgery with a successful tensioning suture,
IOP decreased from 24.3 mm Hg on 1.5 medications to 13.8 mm Hg on 0.5
medications. For the 11 eyes that had canaloplasty without suture placement, IOP
decreased from 24.4 mm Hg on 1.9 medications to 15.6 mm Hg on 1.2
medications. Late postoperative complications included cataracts (19.1%) and
transient IOP elevation (1.8%).

A prospective series with 60 consecutive black South African patients with POAG
who underwent canaloplasty was reported by Grieshaber et al (2010). Mean
preoperative IOP was 45 mm Hg. At 12-month follow-up, IOP was 15 mm Hg
(n=54); at 36 months, IOP was 13 mm Hg (n=49). Eleven (18%) patients were
lost to follow-up at 3 years. With qualified success defined as achieving an IOP of
21 mm Hg or lower (with or without medications), success was achieved in 40
(82%; 95% CI not reported) of 49 patients. When defined as an IOP of 16 mm Hg
or less without medications, 47% (95% CI 36% to 62%) of eyes met criteria for
complete success at 36 months. There were no severe complications in this series.
Three-year follow-up from an independent series of 214 patients treated with canaloplasty in Europe was reported by Brusini (2014). Mean IOP was reduced from 29.4 mm Hg at baseline to 17.0 mm Hg, after excluding 17 (7.9%) patients who later underwent trabeculectomy. At 3 years, IOP was 21 mm Hg or lower in 86.2% of patients, 18 mm Hg or lower in 58.6%, and 16 mm Hg or lower in 37.9%. There was a decrease in mean medication use, from 3.3 at baseline to 1.3 at follow-up. Complications, which included hyphema, Descemet membrane detachment, IOP spikes, and hypotony, were fewer than typically seen with trabeculectomy. Several disadvantages of the procedure were noted, including the inability to complete the procedure in 16.4% of eyes.

Voykov et al (2015) reported on 5-year follow-up on patients (20 eyes) with open-angle glaucoma who underwent canaloplasty at a single center in Germany. Mean IOP decreased from 25.7 mm Hg at baseline (n=33) to 15.5 mm Hg (n=19) at 1 year, 15.1 mm Hg (n=18) at 3 years, and 14.2 mm Hg (n=18) at 5 years. At each time point, reductions in mean IOP were statistically significant vs baseline (p<0.001). Mean number of medications used was 3.4 at baseline, 1.5 at 1 year, 1.6 at 3 years, and 1.7 at 5 years. At each time point, medication use was significantly lower than baseline (p<0.001). Thirteen (65%) of 20 eyes underwent another surgical procedure due to inadequate IOP control. Median length of time before additional surgery was 24 months (95% confidence interval, 1 to 51 months). The complication rate was low, with the most common being hyphema (7/20 [35%] eyes). No sight-threatening complications were reported.

**Section Summary: Canaloplasty**
Findings from a small RCT and a comparative effectiveness review have indicated that trabeculectomy is generally superior to canaloplasty for lowering IOP; however, the procedure has been associated with more serious complication rates. Another study has reported that canaloplasty resulted in improved QOL outcomes at 2 years relative to trabeculectomy, although not all QOL measures derived from validated questionnaires. Additionally, several, small, industry-sponsored case series comparing pre- with posttreatment results of canaloplasty have shown that most patients achieved sufficient IOP-lowering with reduced need for continued medication and relatively few complications.

**Summary of Evidence**
For individuals who have open-angle glaucoma who have failed medical therapy who receive viscocanalostomy, the evidence includes small RCTs comparing viscocanalostomy with trabeculectomy. Relevant outcomes are symptoms, morbid events, quality of life, and medication use. Meta-analysis of these trials has indicated that trabeculectomy has a greater IOP-lowering effect than viscocanalostomy. Reduction in IOP was greater with canaloplasty than viscocanalostomy in a small within-subject comparison. Viscocanalostomy has not been shown to be as good as or better than established alternatives. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.
For individuals who have open-angle glaucoma who have failed medical therapy who receive canaloplasty, the evidence includes an RCT, a comparative effectiveness review, and several case series. Relevant outcomes are symptoms, morbid events, quality of life, and medication use. The RCT found not only significantly higher complete success rates with trabeculectomy than with canaloplasty, but also higher complication rates. The qualified success rate (with medication) was similar between groups. A systematic review found that canaloplasty provided modest IOP reduction (to \( \approx 16 \text{ mm Hg} \)) with minor intraoperative or postoperative complications. The evidence is insufficient to determine the effects of the technology on health outcomes.

**Supplemental Information**

**Clinical Input From Physician Specialty Societies and Academic Medical Centers**

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

In response to requests on viscocanalostomy, input was received from 1 specialty medical society and 3 academic medical centers while this policy was under review in 2011. Although some considered viscocanalostomy to be medically necessary in a select group of patients who would be at risk for suffering a blinding complication with trabeculectomy, input was mixed. For example, 1 reviewer considered outcomes with viscocanalostomy to be inferior to other currently used nonpenetrating techniques.

In response to requests on canaloplasty, input was received from 1 specialty medical society and 2 academic medical centers while this policy was under review in 2011. One ophthalmology association provided a statement indicating that the case series cited are sufficient to show efficacy of canaloplasty to lower intraocular pressure to treat open-angle glaucoma. Other reviewers considered canaloplasty to be investigational but medically necessary for a select group of patients (eg, patients at risk for infection or hypotony, who have surface disease precluding the creation of good trabeculectomy bleb, or for whom a patch would not cover a glaucoma drainage device implant).

**Practice Guidelines and Position Statements**

**American Academy of Ophthalmology**

A technology assessment from the American Academy of Ophthalmology (2011) included canaloplasty in its review of novel glaucoma procedures.\(^{20}\) The Academy concluded that all the techniques and devices reviewed were still in the initial stage (\( \leq 5 \) years) of clinical experience and lacked widespread use, with only level III evidence (cohort studies) supporting the procedures. In addition to describing
potential advantages and disadvantages of the procedure, it was noted that the long-term effects of a foreign body in the Schlemm canal are not known.

**National Institute for Health and Care Excellence**

In 2017, the National Institute for Health and Care Excellence (NICE) updated its 2008 guidance on canaloplasty for primary open-angle glaucoma.\(^\text{21,22}\) The current recommendation is that the “evidence on the safety and efficacy of ab externo canaloplasty for primary open-angle glaucoma is adequate is support the use of this procedure....”

Similarly, in 2017, NICE updated its 2009 guidance on the diagnosis and management of chronic open-angle glaucoma.\(^\text{23,24}\) When comparing penetrating surgery (trabeculectomy) with nonpenetrating surgery (deep sclerectomy and viscocanalostomy), NICE found moderate-quality evidence that trabeculectomy is more effective than nonpenetrating surgery in reducing the number of eyes with an unacceptable intraocular pressure, but was more likely to cause cataract formation and persistent hypotony at 12- to 36-month follow-up. There was very low quality evidence that trabeculectomy is more effective than nonpenetrating surgery in reducing intraocular pressure from baseline to 6- and 12-month follow-up, but the effect size might have been too small to be clinically significant. The guidance recommended offering information on the risks and benefits associated with surgery and offering surgery (type not specified) with pharmacologic augmentation to people with chronic open-angle glaucoma at risk of progressing to sight loss, despite treatment.

**U.S. Preventive Services Task Force Recommendations**

Not applicable.

**Medicare National Coverages**

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

**Ongoing and Unpublished Clinical Trials**

A search of ClinicalTrials.gov in February 2018 did not identify any ongoing or unpublished trials that would likely influence this review.

**References**


14. Koerber NJ. Canaloplasty in one eye compared with viscocanalostomy in the contralateral eye in patients with bilateral open-angle glaucoma. J Glaucoma. Feb 2012;21(2):129-134. PMID 21278587


Billing Coding/Physician Documentation Information

66174  Transluminal dilation of aqueous outflow canal; without retention of device or stent

66175  Transluminal dilation of aqueous outflow canal; with retention of device or stent

ICD-10 Codes

H40.10x0- Glaucoma code range
H42

Category III code, 0177T, was deleted effective 1/1/2011.

Additional Policy Key Words

N/A

Policy Implementation/Update Information

9/1/12  New policy. Topics previously covered under policy 9.03.21 Aqueous Shunts for Glaucoma.

9/1/13  No policy statement changes.

9/1/14  No policy statement changes.

9/1/15  No policy statement changes.

10/1/15 No policy statement changes.

9/1/16  No policy statement changes.

5/1/17  A policy statement was added that viscocanalostomy is considered not medically necessary and removed statement that stated it was investigational.

9/1/17  No policy statement changes.

9/1/18  No policy statement changes.

State and Federal mandates and health plan contract language, including specific provisions/exclusions, take precedence over Medical Policy and must be considered first in determining eligibility for coverage. The medical policies contained herein are for informational purposes. The medical policies do not constitute medical advice or medical care. Treating health care providers are independent contractors and are neither employees nor agents Blue KC and are solely responsible for diagnosis, treatment and medical advice. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, photocopying, or otherwise, without permission from Blue KC.